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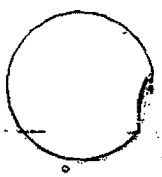
PROCEEDINGS OF THE SEVENTH NATIONAL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CONFERENCE ON HOUSEHOLD HAZARDOUS WASTE MANAGEMENT

DECEMBER 8-12, 1992

MINNEAPOLIS, MINNESOTA



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January 1993

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Waste Watch Center

The Waste Watch Center (WWC), specializes in education, consensus building and policy development to promote improved integrated solid and hazardous waste management, pollution prevention, recycling, waste minimization and household hazardous waste management (HHWM). WWC president, Dana Duxbury, is also president of Dana Duxbury & Associates, which formerly managed this conference.

SWANA

SWANA, an association of solid waste management professionals, provides a vehicle for information exchange among those in the solid waste management field.

Disclaimer

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The report is a compendium of presentations made at the seventh annual Household Hazardous Waste Management Conference. The texts have been submitted by the speakers themselves and, except where noted, have not been summarized or edited by WWC. The speeches do not necessarily reflect the position of U.S. EPA, WWC, or SWANA. Management and regulation of HHW is a rapidly evolving issue; information presented at the conference was accurate and up to date at the time of presentation.

U.S. ENVIRONMENTAL PROTECTION AGENCY
HOUSEHOLD HAZARDOUS WASTE MANAGEMENT CONFERENCE
DECEMBER 8-12, 1992 MINNEAPOLIS, MINNESOTA

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REMARKS BY SYLVIA LOWRANCE
AT EPA'S 7TH ANNNUAL HOUSEHOLD HAZARDOUS WASTE CONFERENCE
MINNEAPOLIS, MINNESOTA
DECEMBER 9, 1992

INTRODUCTION

I'd like to welcome you to EPA's 7th Annual Household Hazardous Waste Conference.

Over the past seven years, as we have explored ways of managing household hazardous waste, we have seen many positive changes in the management of both municipal solid waste and household hazardous waste.

The most significant of those changes has been that of approach. T.S. Elliott once wrote:

"We shall not cease from exploration,
and the end of all our exploring
will be to arrive where we started
and know the place for the first time."

We have gone from a "what do we do with this trash" philosophy to a more holistic approach of "what can we do create less trash" -- from an end of pipe approach to an entire process reassessment.

SOURCE REDUCTION AND RECYCLING

That change in approach has been evident in our handling of municipal solid waste. In the Agenda for Action--our long term strategy for handling municipal solid waste--we have placed source reduction and recycling at the top of our preferred methods of waste management.

Our latest report on municipal solid waste, published every two years, is a graphic example of why we feel that a shift in approach is necessary to meet the ever escalating volume of municipal solid waste. The report shows a jump of close to 16 million tons more being generated annually--for a new total of 196 million tons. The average American now throws away 4.3 pounds of garbage a day.

And as the generation of municipal solid waste continues to increase, the capacity to handle it is decreasing. Many landfills and combustors have closed, and new disposal facilities are often difficult to site.

LANDFILL RULES

Last year we issued new municipal solid waste landfill rules that will result in major changes in the way many landfills are operated, designed and located. These rules were based on a Congressional mandate to write criteria for facilities that receive either household hazardous waste or small quantity generator hazardous waste.

Among other things, the rule establishes operating criteria to ensure that citizens and the surrounding environment are protected from risks caused by unsafe operating practices.
We have also established design criteria that ensure that ground water adjacent to our nation's landfills will be free of contaminants.

To ensure that ground water is protected in the event that the engineered containment system were to fail, the regulations require that ground-water monitoring be conducted. If for some reason, a significant release has occurred and ground water has been contaminated, the rule requires that the contamination be cleaned up.

We think that the rule will result in increased public confidence in landfills and the siting process. But, we also expect that the rule will promote increased local government focus on source reduction and recycling.

RULES CLARIFICATION ON CESQG WASTE

And while we are on the subject of increasing source reduction and recycling, I know that one of the major issues you were looking to EPA for help on was to make sure our Hazardous Waste Regulations didn't prevent you from using Household Hazardous Waste Collection programs to collect Conditionally Exempt Small Quantitiy Generator Waste. We heard your concerns--loud and clear. So we went back, looked carefully at the hazardous waste regulations, and we think we have been able to address your concerns.

In July of this year, we sent a memorandum to our Waste Management Division Directors across the country clarifying hazardous waste regulations to allow state-approved household hazardous waste collection programs to mix such waste with conditionally exempt small quantity generator waste.

That memorandum makes it clear that state-approved Household Hazardous Waste collection programs can accept Conditonally Exempt Small Quantity Generator waste without becoming fully regulated under the hazardous waste program. EPA believes this will bring more Conditionally Exempt Small Quantity Generator waste into Household Hazardous Waste Collection Programs--which in turn--will increase the amount that is recycled or reused.

SOURCE REDUCTION AND RECYCLING GOOD FOR ECONOMY

But getting back to the big picture, source reduction and recycling are good for the economy. They reduce costs of disposal, substitute for new inputs of virgin materials, reduce energy costs, provide revenues from the sale of recyclables, and give firms a market and public image bonus. They also conserve valuable natural resources.

MUNICIPAL SOLID WASTE CHALLENGE PROGRAM

In line with that spirit of conserving natural resources, I'm pleased to take the opportunity afforded by this conference to announce a major new initiative--a voluntary municipal solid waste challenge program for businesses. The program will focus on on high volume wastes such as office, packaging, and cafeteria wastes.

This program will be a first--bringing together for the first time in one national challenge program--source reduction, recycling, and procurement of recycled content and source-reduced products.

Initially, we will target Service 500 companies such as

banks, phone companies, retailers, and airlines. But in two to five years, we would like to expand our audience to manufacturing businesses, hospitals and other institutions, and state and local governments.

We anticipate announcing the program officially and accepting our first participants next Summer.

SOURCE REDUCTION AND RECYLING OF HOUSEHOLD HAZARDOUS WASTE

We believe that this focus on source reduction and recycling is the direction of the future in terms of household hazardous waste as well. Starting with one day household hazardous waste collection programs that focused primarily on safely collecting and disposing of household hazardous waste in hazardous waste landfills or other facilities, we are now moving to programs that try to identify and implement innovative ways of handling household hazardous waste and educate the public on source reduction.

SOURCE REDUCTION

Source reduction is EPA's top priority method of municipal solid waste management. It means reducing the amount or toxicity of materials or products--that is--preventing waste from being created. We must turn to this as our ultimate means of waste reduction because even a growing recycling rate has not prevented the increase in waste generation.

TOXICS REDUCTION PROGRAM

The goal of EPA's Municipal Solid Waste Toxics Reduction Program is to promote the voluntary reduction of hazardous compounds in products by:

- o providing information on the amounts and sources of these compounds in MSW;
- o facilitiating dialogue with industry on possible reductions and alternatives to hazardous compounds, and
- o highlighting successful examples of toxicity reduction by businesses and manufacturers.

EPA recently issued reports on sources of mercury in municipal solid waste, and on technically feasible substitutes for lead and cadmium in products.

We are now looking at what further compounds warrant attention and have initially identified six volatile organic compounds for further research. Our next step is to look at the sources of these compounds and then develop educational tools and have discussions with industry about the potential for voluntary reductions.

PUBLIC EDUCATION

EPA's toxic reduction program focuses on providing information and incentives to people through education, outreach, and technical research, rather than regulation.

EPA believes it is important to educate consumers on the proper managment of wastes generated in the home. Knowledge about household products can lead to improved storage, use, and disposal of these products or the use of safer alternatives.

POWER OF PUBLIC OPINION

The bottom line for waste and toxicity reduction--and that includes safer alternatives for household hazardous waste--is public opinion.

And, the power of consumer choice has just begun to stir. In the long term, it has perhaps the most profound potential for solving the problem of what to do with household hazardous waste.

Among the findings of a recent Roper Poll are that the public's opinion of the seriousness of the solid waste issue in the local community has risen by 16 percentage points in three years.

As to what the public view is of the relationship between the environment and economic development -- 92 percent believe we can find a good balance between economic progress and the environment.

Also, the poll finds that environmentalism is still "in" in 1992 -- ranking third after physical fitness and walking. And that a "good description of American people" that ranks eight descriptive qualities shows that the highest ranked descriptor at 56 percent is "concerned about the environment" while the lowest ranked at 40 percent is "polite."

While they may not be polite about it, Americans are finding that, as consumers, their opinions count.

BUSINESS AND INDUSTRY'S ROLE

In the same poll run by Roper, 70 percent of those polled said that business had a definite responsibility for environmental protection. However, only 35 percent thought that they were fulfilling it fully/fairly well.

Business and industry are discovering that they have an important leadership role in identifying opportunities to reduce or eliminate toxic components or unnessessary waste production in their products. For both environmental and economic reasons, source reduction approaches are being adopted by many manufacturers.

THE FUTURE

The power of public opinion, the power of innovation and acceptance of environmental leadership by industry are beginning to combine as a potent force for change in the future. Someday, perhaps there will no longer be a need for household hazardous waste programs.

NEW PUBLICATIONS

In the meantime, EPA plans to continue to provide public outreach and guidance for the safe handling of household hazardous wastes. A "how to" guide for setting up a household hazardous waste collection program has been developed and will be published early in 1993.

This handbook will cover many aspects of implementing household hazardous waste programs such as selecting wastes and collection methods, managing collected wastes, publicizing the program, estimating costs, and selecting a contractor.

Also, we recently issued a Revised Consumer Handbook that

outlines many practical steps the consumer can take to reduce the amount and toxicity of garbage.

Another handbook being developed by EPA concerns setting up household battery collection programs. This publication is designed to help communities determine whether establishing a program to collect used dry cell batteries is right for them. It is organized around 10 key issues related to setting up and running a collection program.

Also available early next year will be a flyer on the proper management and disposal of household hazardous waste. We hope that making publications such as these available will be helpful to those communities and citizens involved in the safe management of household hazardous waste. If you are interested in getting copies of the publications I've mentioned today, I'm told that there are sign up sheets being made available here at the conference to ensure that you get copies.

GRANT TO STUDY PAINT RECYCLING

EPA has also recently funded a grant to study the recycling of one of the largest volume materials received by collection programs -- paint. Many collection programs try to recycle as much "waste" as possible. More paint is accepted at household hazardous waste collections than any other material, and 50 to 90 percent of that paint is in good enough condition to be useable. It, therefore, is a material with an excellent potential for reuse and recycling.

With that potential in mind, EPA has funded a grant to the Waste Watch Center for the Paint Recycling and Reuse Project. It's goal is to initiate activities throughout the country to identify cost-effective, environmentally sensitive approaches to managing leftover paints; to seek consensus on management options; and to encourage the establishment of and participation in paint recycling and reuse programs.

USED OIL

Another large volume waste received by collection programs is used oil. Few Americans realize the enormity of the motor oil disposal problem in the United States. EPA estimates that do-it-yourself auto mechanics annually dump about sixteen times more oil into drains and sewers than was spilled by the Exxon Valdez.

EPA continues to support local efforts to collect and recycle used oil through public education. We have produced pamphlets for do-it-yourselfers and service stations. Other publications explain how to set up recycling programs for used oil, provide a regularly updated State Used Oil Contact List for do-it-yourselfers to direct them to local sources of information on collection centers, and report on recent national activities in used oil recycling in the form of periodic bulletins.

If you are interested in getting any of these publications call the RCRA/SUPERFUND HOTLINE. (1-800-424-9346)

CONCLUSION

Source reduction and recycling are are leading us to solid waste solutions that are long term rather than short term. They are sound because they are based on the ultimate goal of eliminating the problem rather than putting off it's solution. They are taking us back to square one, and we are seeing it for the first time.

Design for Environment

Walter R.Stahel, The Product-Life Institute, Geneva, Switzerland

The Product-Life Institute in Geneva is primarily concerned with waste prevention, in all areas. I shall try to show in the next 20 minutes that waste prevention, wherever it is feasible, is a better and cheaper solution than waste management, and how you perhaps can foster waste prevention yourself.

What is Hazardous Household Waste? It could be anything in your household, from the wristwatch you wear (with its battery) to the roses (from Columbia, full with herbicides) you buy for your spouse on Christmas.

It is also just the tip of the iceberg: for each pound of product you buy, you created on average 5 pounds of industrial waste, and 20 pound of mining waste. So think twice before you buy it!

These figures are a rule of the thumb, but have been confirmed in several case studies. For example, a 1992 study by a German research institute analyzing the waste stream in the production of the new S-class Mercedes, the "first recyclable car" in the world has found that two tons of recyclable car are faced with 52 tons of industrial waste.

How can you avoid hazardous waste in the household and elsewhere? The main keys are probably management determination and closed loops on the material and product level.

Waste prevention is first of all a problem of management decisions: Look at the example of General Dynamics' Pomona division: From 10,840 tons of hazardous waste in 1984, to 238 tons in 1989. This development was triggered by the CEO stating that he wanted to go to zero waste in five years, and that managers in future would be judged on waste prevention before anything else!

It can be shown that clean production technologies often lead to changes in technologies that result in "cleaner products". You can therefore influence the amount of hazardous household waste to some degree by choosing products from green companies in your purchases.

Secondly, in production processes waste prevention is linked to clean technologies used in closed loops: using the example of waste-free paint processes, you could use powder coatings for e.g. white goods (Miele Germany), or overspray recovery in wet spray painting (water in closed loop, waste paint is recovered with ultrafiltration for re-use as paint; Unicolor AG, Switzerland).

The problem with most of these clean technologies is that they cannot be scaled down to the needs of small businesses and households!

However, there are technologies that can profit small business and DIY, such as water-based glues and varnishes for woodwork (Ebnoether AG, Switzerland). These products are not only better for the environment, but also for you, as worker and resident of the space. Spray cans for hairspray cannot be replaced in professional use by hand-pumps because the hairdresser would not have any fingers left after the first day. Here a small ultrasonic hair lacquer applicator in the form of a handheld battery-powered appliance can do miracles, again for the environment as well as for you health, as it uses no CFC or other gas. It also uses less product than spray cans, so most lacquer ends up on the hair of the client instead of in the nose of the hairdresser(Wella AG, Germany).

Dry cleaning fluids and other waste chemicals in small quantities are a typical problem for many small companies. Mandatory take-back legislation has proved a very efficient approach for small waste quantities in Germany, and I believe some U.S. Companies such as Safety-Kleen, Inc., headquartered near Chicago, is offering the same solution as a service to its clients. This shows that industry in a free market environment can voluntarily implement good solutions without waiting for legislation to be passed first, if management objectives are redirected toward environmental protection.

I shall jump packaging, as it is not a hazardous household waste problem. It is, however, an

The 12 Facts of Ecological Design

The following list suggests source reduction and recycling opportunities for industrial design and redesign.

1. Make it durable.
2. Make it easy to repair.
3. Design it so it can be remanufactured.
4. Design it so it can be reused.
5. Use recycled materials.
6. Use commonly recyclable materials.
7. Make it simple to separate the recyclable components of a product from the non-recyclable components.
8. Eliminate the toxic/problematic components of a product or make them easy to replace or remove before disposal.
9. Make products more energy/resource efficient.
10. Use product design to educate on the environment.
11. Work toward designing source reduction-inducing products (i.e. products that eliminate the need for subsequent waste).
12. Adjust product design to reduce packaging.

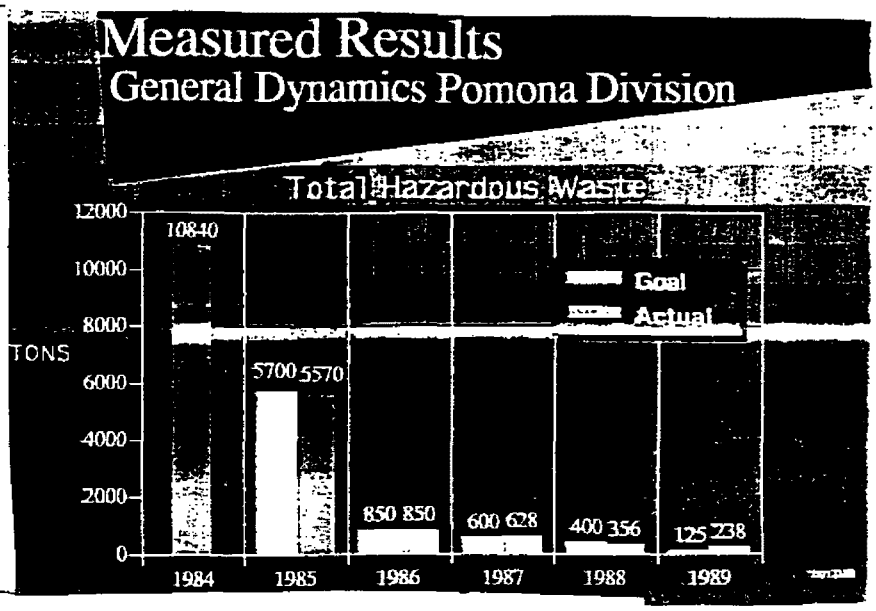
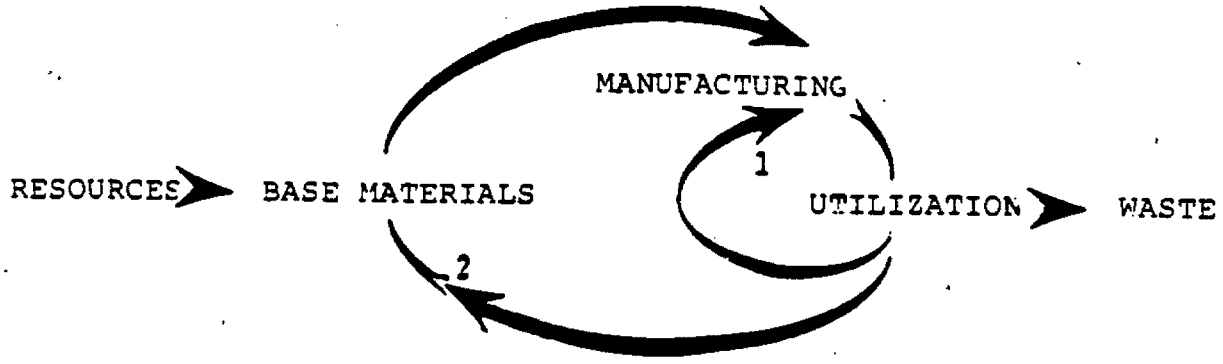


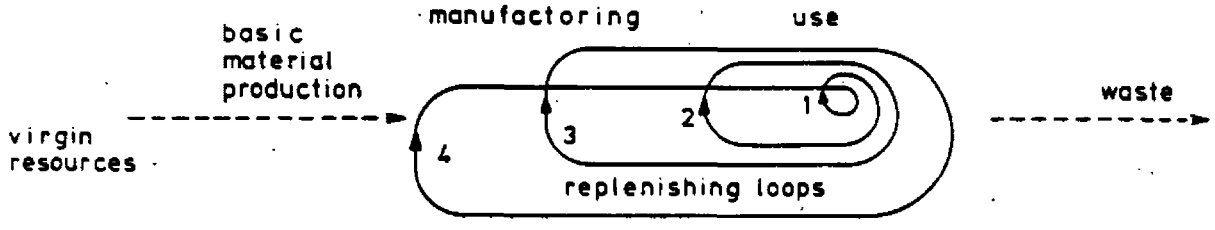
Figure 1: The re-use loop and the re-cycling loop



loop 1 :waste prevention, long-life products and product-life extension

loop 2 :waste reduction, recycling of materials

Figure 2 : The self-replenishing system of product re-use and recycling services.



independence of the life-times of inter-compatible systems, products and components

loop 1: re-use of goods
loop 2: repairs of goods
loop 3: reconditioning/rebuilding of goods
loop 4: recycling of raw materials

Stahel, Walter and Reday, Geneviève (1976/1980) Jobs for Tomorrow, the potential for substituting manpower for energy; report to the Commission of the EC / Vantage Press, New York, N.Y..

excellent example to show the efficiency of prevention approaches based on take-back legislation as is the case in Germany. The European Communities have introduced a similar take-back directive for packaging that will soon become mandatory in most European countries.

Pollution prevention in utilization has many faces: long-life products such as the new Philips induction lamp, an energy saving lamp that will last 60,000 hours (compared to 8,000 hours of a regular energy lamp) illustrate the trade-off between waste volume and toxicity that sometimes has to be made. Refillable cartridges for e.g. laser printers and photocopiers are not only a prevention of toxic waste, but also economically very interesting once somebody has broken the taboo of doing it (to the grief of the manufacturers that make most money selling consumables such as cartridges, not products). Minimum use is another strategy, such as restricted towel changes in hotels (changing them only every second day is now standard practice in Europe), or switching of computers in offices outside office hours, which is the case for 5 out of every 6 hours over the year (EPA's energy star program is helping in this respect a lot).

Electronic appliances are found in increasing numbers in households and small businesses, such as copiers and fax machines. Most of these appliances use disposable cartridges and technical modules that are short lived, because they are the main cash-flows of the producer. Most of these cartridges and modules can, however, easily be checked and refilled. In some cases, a key component of the module also needs to be replaced by a long-life component. In Europe, the refilling business for e.g. toner cartridges has today become so profitable that there are not only voluntary take-back systems in place, but customers are offered cash up to $10 to give the spent module to one shop rather than another.

Buying utilization instead of buying products is a strategy of delegating the hazardous waste problem to an expert, i.e. the company that rents you e.g. the photocopier. Again it can be shown that the renter will adapt by designing the machine in a way that the waste is greatly reduced, as component change is now a cost factor, no longer a profit factor!

Buying utilization also works for e.g. motor oil. Some modern motor oil will safely run for 20,000 or 30,000 miles, so what you need from the oil company is a quality check every 5,000 miles, not an oil change. Mobil Oil Germany is offering this service in Europe; I believe Safety Kleen in Chicago is offering a similar service.

Product-life extension and recycling are primarily problems of demand, not supply. So buy rebuilt products whenever you can, such as retreaded tires: they save 65% of the energy needed to produce a new tire, save tire waste and are cheaper!

The same goes for materials. The recent take-back legislation for packaging in Germany, managed by Dual System, has shown the gigantic quantities of materials that flood the recycling market and have nowhere to go! Try to buy goods made from recycled materials whenever you can in order to help to close the material loop.

Clean repair technologies is the last example I would like to mention here: Lufthansa developed a method "Aquastripping" that allows to strip the paint off an aircraft using a special shower, which relies exclusively on water in a closed circuit. It saves 99% of waste, the only waste being the old paint, no chemicals, no hazard for the people doing the work. And it saves Lufthansa about 8-million DM a year. The same process could be adapted for stripping the paint off cars and most other products. But, again, the technology may be too expensive for small businesses, except if they share the equipment.

Retro-distribution, i.e. returning a hazardous waste through the distribution chain that delivered it (shop, distributor, importer, manufacturer) may be the best approach to dispose safely of hazardous waste. It certainly is the best strategy to make sure that the manufacturer is going to improve the recyclability of the next generation of products, as he has to pay for the recycling or disposal of the

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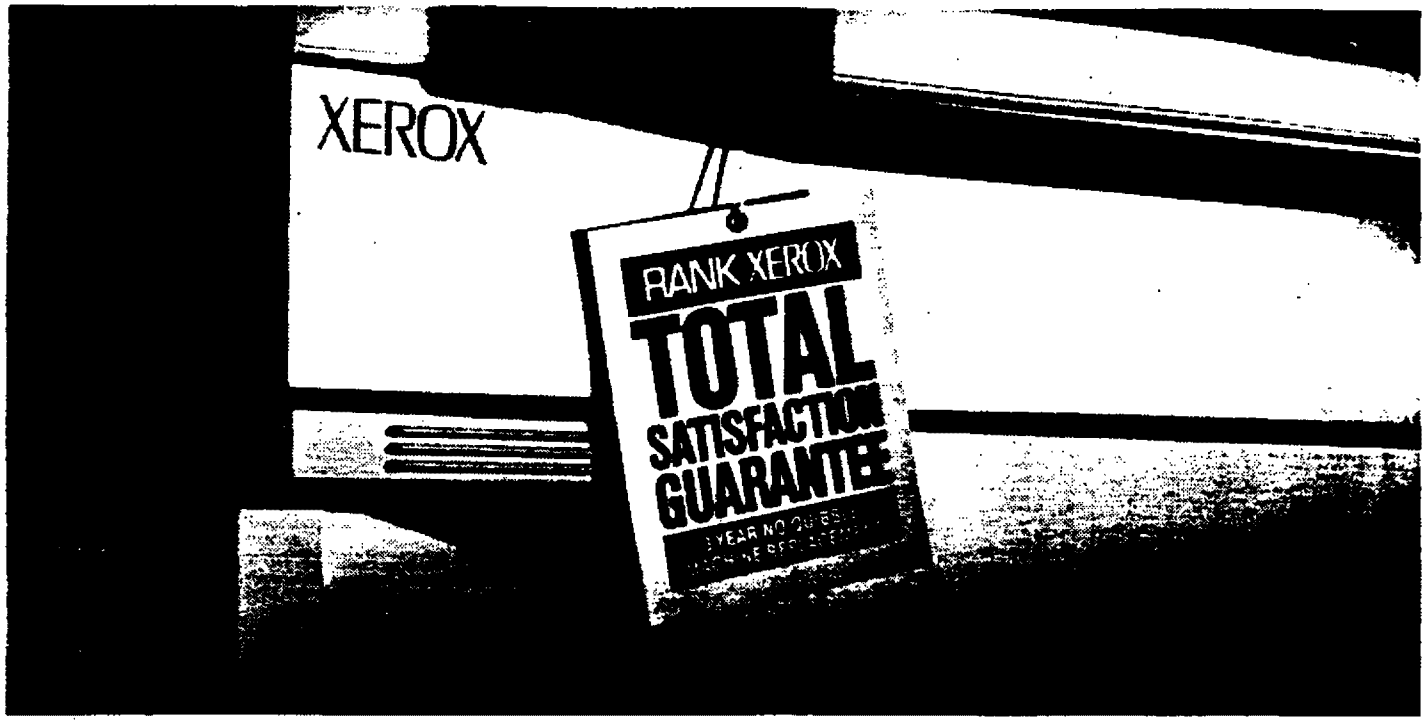

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waste! It also leads to strategies of product-life extension, such as the rebuilding of products and the re-use of components for purely economic reasons, which are also ecologically sane. In Switzerland, we return pharmaceuticals to drugstores that will sort them out in still usable medicine for the Red Cross, and the rest for incineration. In Germany, batteries, motor oil, drycleaning chemicals, CFCs, packaging, tires, all go back to any shop that sells them. In the future, many other products including white goods, electronics and cars will also have to be returned to the shops rather than turned into the municipal waste stream. The legal base for this is the German Waste Law of 1986, giving parliament the power to pass acts for the take-back of individual product groups. It is interesting to note here that the draft (1992) of the new German waste law is called: Law for an economy in cycles!

The underlying principles of all these examples can be summarized as follows:

- start at the beginning: before investing in expensive recycling technology, do everything you can to prevent the waste or to make it less toxic. In Switzerland, we have build, at great expense in research time and investment, a plant to recycle batteries containing heavy metals, only to find that industry in the meantime has found ways to make batteries without heavy metals which can be easily be recycled in a different way. So we have a white elephant that enables the recycling, at high energy and financial cost, of the batteries of the past. The plant can still be used to recycle the batteries in landfills from the past, but it should serve as a lesson to all of you: do first everything you can upstream before investing in end-of-pipe technology. Rechargeable batteries in small household appliances now use a technology based on hydrogen, so the cadmium recycling could also be a short-lived business. (Technically speaking: nickel metal hydride batteries as already used in large appliances such as laptop computers. Their price today is almost the same as nickel-cadmium batteries.) If companies do not follow this rule of always starting to tackle a waste problem at the beginning, waste managers and recyclers may find themselves becoming an obstacle to progress in order to safeguard their investments!

- use products and processes based on renewable resources, such as water, wherever you can.

- use the smallest possible loops (the least effort): long-life goods, re-use of goods and components, repair, rebuild and upgrade goods wherever possible before recycling. Make products last as long as you can and you prevent waste at the source and at the end.

- close the product liability or product responsibility loop from cradle back to cradle! Bring your old goods and your waste back to the shop that sold it to you. The shop will return it to the manufacturers and they will learn how to improve them with regard to re-use or recycling. Buy performance instead of goods, where feasible, by leasing or renting goods.

- promote and buy products that follow ecological design principles: IDSA, the Industrial Designer Society of America, has published 12 facts of ecological design, to promote source reduction and recycling opportunities for industrial design and redesign, in the following order: make it durable, make it easy to repair, design it so it can be remanufactured, design it so it can be reused, use recycled materials, make it simple to separate the recyclable components of a product from the non-recyclable ones, eliminate the toxic/problematic components of a product or make them easy to replace or remove before disposal, make products more energy/resource efficient, use product design to educate on the environment, work toward designing source reduction-inducing products, adjust product design to reduce packaging (see Innovation special 1992, IDSA).

Sustainability: once you have closed the waste loops, and eliminated toxicity from the products, you can still improve the environment by aiming for higher resource efficiency:

- sharing goods is one strategy that has a substantial waste prevention and resource saving potential. Van and car pooling saves space on highways. Commercial washing machines in laundromats use, per wash-cycle, 40 times less resources than household washing machines, in production, maintenance and recycling (also less water, energy and detergents in washing), according

to a study we have done for one of the German State governments. The optimal strategy in this case is therefore designing and attractive "textile care center," or multifunctional service center which includes the function of a laundromat, that has advantages over the washing machine at home. The snag is, of course, that the companies which sell washing machines normally have no knowledge nor will to design and operate attractive service centers! High volume photocopiers in shared use are more energy and resource efficient per copy than small machines.

- multifunctional products have a similar effect. Siemens AG in Germany presented a new equipment this Summer that was heralded as the smallest FAX in the world. It is, however, not only a fax machine, it is also a printer, scanner and copier. And it uses as much energy as a small light bulb and does therefore not need a fan. It is also better for your health, as it does not use laser technology, so there is no ozone, no toner dust. As it can do the job of four machines, it uses per page only 25% of the resource input of a "normal" machine.

- system solutions is the third strategy for higher resource efficiency. Most of these system solutions are of technical nature, but here is a non-technical one: Lufthansa has greatly reduced the waste on its domestic flights by substituting a generous hot and cold pre-flight buffet for its passengers for in-flight food. You eat as much as you like, or nothing if you prefer, or three sweets and no salad, using china plates, glasses and steel cutlery that can all be washed and re-used.

And a last advice: do not hesitate to be lazy! The EPA study on lawnmowers has clearly shown that people who refuse to mow the lawn are not lazy, but environmentally conscious. And the Swiss battery recycling case has shown that you should not invest in end-of-pipe technology before everything has been done to solve the problem upstream, or you may be accused of mismanaging funds, or you may even become an obstacle to progress in order to perpetuate your "resources", i.e. hazardous waste. It is sometimes better to delegate a problem and let the person deal with it who created the problem in the first place: take-back legislation will great encourage manufacturers of products that end up as hazardous waste to reconsider the economics of disposal v. product redesign!

And remember: If waste can be prevented, it will be a better and in the long run cheaper solution than waste management. So make sure you are among the best in order to give your company or state a competitive advantage in the future.

A DIFFERENT VIEWPOINT
CLEANING UP THE WASTE STREAM

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I would like to present a different view point for the need for implementing household hazardous waste (HHW) and small quantity generator (SQG) waste programs. Most HHW programs are implemented with the goal of minimizing future CERCLA* liability. This is a noble cause and HHW programs go a long way to controlling and minimizing future CERCLA liability. However, State and local government programs can not implement this goal alone. To truly minimize future CERCLA liability requires a concerted effort by the federal government and industry to focus on source reduction. This federal/industry action is currently ongoing. It is sometimes stimulated by State legislative actions such as the battery bill to reduce the mercury content in batteries and the toxic package reduction act to reduce cadmium, chromium, mercury and lead in packaging that are currently in place in a number of different States; and Minnesota's Mercury Reduction Act.[1,2,3] However, source reduction efforts require time to implement, time for industry to retool in a cost efficient manner. In the interim and to manage those discarded consumer products that can not be further source reduced requires the implementation of a HHW program.

New Jersey's HHW program goals are the implementation of a statewide program to "clean-up" the solid waste stream in order to maximize its reuse. This reuse includes energy recovery, materials recovery but more importantly producing compost from the solid waste. New Jersey defines its HHW program beyond simply managing discarded consumer products that are defined as HHW or SQG waste. It includes that small volume of solid waste that could negatively impact our ability to reuse the solid waste. New Jersey's program includes HHW, SQG waste and other discarded products that, while not meeting the definition of hazardous waste, impart a negative quality to the solid waste. This negative quality prohibits us, in some cases, from reusing the solid waste as fuel or compost or maximizing our markets

*Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 as amended. This Act provides for liability, compensation, clean-up and emergency response for hazardous substances released into the environment and the clean-up of inactive hazardous waste disposal sites.

for these solid waste derived products. It should be pointed out that it is not any one individual product or manufacturer that causes this problem, but the sum total of their small individual product contributions. Adding up these small individual product contributions prevents the full reuse of the solid waste stream for fuel or compost. It renders the solid waste solely to the status of garbage, fit for nothing but landfilling.

If landfilling were the only available disposal option, given the current design, construction and operational requirements for today's landfill, the need for a HHW program would be less. However, in order to fully implement the mandated requirements of the Resource Conservation and Recovery Act (RCRA), a small quantity of discarded consumer products which contain hazardous substances that could negatively impact on the quality of the solid waste for reuse, have to be eliminated or managed separately. The overall goal of the solid waste program is to work with industries to develop source reduction initiatives, particularly toxic use reduction programs, for the discarded consumer products that they manufacture. However, in the interim and for those consumer products which have a technology limit to further source reduction, we need to develop a source separation system to manage those products apart from the solid waste disposal stream. The HHW program is an integral part of those source separation systems.

This paper will discuss one heavy metal, mercury in the solid waste stream, through the development of and the findings and recommendations of the New Jersey Mercury Emissions Task Force. In addition, some of the cost implementations of the Task Force recommendations and an alternate solution to manage discarded consumer products through the HHW Program are discussed.

It should be noted that the New Jersey Mercury Emissions Task Force Report is a New Jersey Department of Environmental Protection and Energy <u>policy</u> <u>document</u>. It would be inappropriate to view it, at this stage, as the basis for specific regulations or facility permit modifications which may be required to implement the recommendations and goals of the Report.

On September 19, 1991, Camden County Board of Chosen Freeholders, pursuant to the County Environmental Health Act, N.J.S.A. 26:3A2-21 et seq., adopted a resolution proposing a mercury emission standard of .025 pounds per hour for each source of mercury within the county.* This resolution was

*The County Environmental Health Act is a program that delegates certain environmental programs and enforcement activities to New Jersey's counties.

reviewed by the Commissioner of the New Jersey Department of Environmental Protection and on December 10, 1991, the Commissioner issued an Order which disapproved the resolution of the Camden County Freeholders. As set forth in Figure 1, the disapproval of this resolution was based primarily on the following reasons:

1. Insufficient technical and scientific analysis to support the proposed mercury standard;

2. Conflict with the Camden County Solid Waste Management Plan, since the proposed date of December 16, 1991 for implementation of the proposed standard would have necessitated the immediate shutdown of the South Camden Resource Recovery Facility without demonstrated risk to public health; and

3. Inconsistencies with Section 27 of the County Environmental Health Act and the approved interagency agreement between the DEPE and Camden County Department of Health on the issue of delegated authority. The interagency agreement did not delegate authority to the Camden County Department of Health to regulate the control of air pollution through standard setting procedures.

In the December 10th Order, the Commissioner acknowledged the importance of addressing the issue of setting a mercury emission standard and deemed it appropriate for the Department to begin the process of developing a statewide standard. In particular, the Order addressed the need for reducing mercury emissions from MSW incinerators through the implementation of a battery separation program and the installation of air pollution control equipment. The Order mandated the Department to provide an active public participation process to assist in the development of the statewide standard. The Task Force was set up with two groups. The health and environmental issues section and a technical and regulatory issues section. I will first describe the technical and regulatory issues followed by the environmental and health issues. All data summarized and presented in this paper, are described and referenced in detail in the New Jersey Mercury Emission Task Force Report.[4]

Figure 2 represents the anthroprogenic mercury emission sources in New Jersey. The figure presents both the high and low estimate and the medium or weighed average, where sufficient data is available. As can be seen from the figure, the highest source of mercury emissions are from MSW incinerators. This is followed by fuel oil use for commercial, residential, transportation, utility and industrial uses, sludge incinerators and coal utility power plants. This distribution of anthroprogenic sources is particular to New Jersey based on the amount of municipal solid waste that we

incinerate within the State and the use of fuel oil and coal by utility power plants for electrical generation. The distribution of sources will be different for other State's depending on their MSW combustion, fuel use and coal use for electrical generation. On an international level the mercury emissions from coal burning power plants is actually the largest anthroprogenic source of mercury to the atmosphere.

After identifying the various anthroprogenic sources of mercury emissions, the technical subcommittee then concentrated on the individual sources to understand where the mercury was coming from for those individual sources. In the solid waste stream, the mercury in municipal solid waste and the bulky/industrial solid waste streams were evaluated.

To determine the mercury in the municipal solid waste, the data developed by Franklin Associates in their USEPA report Characterization of Products Containing Mercury and Municipal Solid Waste in the United States 1970 to 2000 (USEPA Mercury Report) was used.[5] As can be seen from Equation 1 in Figure 3, the amount of mercury in the New Jersey MSW stream is a direct apportionment of the quantity of mercury determined by the USEPA Mercury Report for the U.S. MSW stream. Knowing the mercury content in the New Jersey MSW stream, we can calculate the amount of mercury in the other waste stream, the bulky/industrial waste stream in New Jersey.

This was done by first determining the average lifetime of an average discarded consumer product. The average lifetime of a product is the time between when it is manufactured, purchased, used and then disposed. The average lifetime was calculated using the data presented in the USEPA Mercury Report. This was accomplished by summing up the average lifetime of the individual discarded consumer products multiplied by the percent mercury that each individual product contributes to the total municipal solid waste stream. As can be seen in Equation 2 of Figure 3, the average lifetime of discarded consumer products is 4 years. This means the mercury content in today's MSW was generated from a consumptive use of mercury 4 years ago or the mercury content in the 1992 MSW stream was generated by a 1988 mercury consumptive use. Using this information, the quality of mercury in the bulky/industrial waste stream can be estimated.

To determine the quality of mercury in the bulky/industrial waste stream, the mercury content in municipal solid waste in year 4 was subtracted from the total consumptive use of mercury in year 0. The total consumptive use of mercury was obtained from the U.S. Bureau of Mines data on mercury use. The remaining quantity of mercury in year 0 was then corrected to account for mercury containing products that are managed as hazardous waste and then apportioned to the New Jersey bulky/industrial waste stream.

As can be seen from Figure 3, the mercury in the municipal solid waste stream in New Jersey is equal to 0.0048 pounds per ton and the mercury in the bulky/industrial waste stream is equal to 0.0089 pounds per ton. It was determined, by evaluating the through-put data of the four operational district MSW incinerators in New Jersey, that the RRFs process on average 95% municipal solid waste and 5% bulky/industrial solid waste. By using the calculated quantities of mercury on a pound per ton basis and the distribution of the different waste types, the mercury in the processible solid waste stream in New Jersey resource recovery facilities was determined to be equal to 0.005 pounds per ton.*

As can be seen from Figures 4 and 5, in the 1992 disposal stream, prior to the effects of the New Jersey Dry Cell Battery Management Act, mercury from batteries represented the single largest source of mercury in the solid waste stream. This is followed by the quantity of mercury from fluorescent lights, fever thermometers and mercury switches. Figure 4 was generated by apportioning the data from the USEPA Mercury Report to the New Jersey municipal waste stream. It should be noted that the USEPA Mercury Report represents an average quantity on a national level. Each individual State, while similar to that distribution, will have individual differences in the municipal waste stream. One particular note, in most coastal States, the number of mercury switches will be higher than the national average.[6] The USEPA Mercury Report does not consider all sources of mercury switches other than mercury light switches (and thermostats). There is a considerable amount of mercury that will be generated by the disposal of the total quantity of mercury switches in the waste stream. In addition, it is this discarded consumer product that may result in the spiking of mercury concentrations in stack test data in mass burn RRFs.

From the quantity of mercury in the processible waste stream, the potential flue gas concentrations of mercury can be calculated. This would represent the uncontrolled emissions of mercury within the flue gas stream in resource recovery facilities. As can be seen from Figure 6 there is good but not exact correlation between the calculated uncontrolled emissions and the actual uncontrolled emissions determined through stack testing of the resource recovery facilities. It should be noted that the stack test data is from 1991-1992 data and must be correct to a 1992 timeframe. The difference between the calculated potential flue gas concentration and the actual measured uncontrolled emissions is a result of the

*This paper uses the terms MSW incinerator and resource recovery facilities interchangeable. A resource recovery can be a materials recovery (including compost) facility or an energy recovery facility. The four New Jersey MSW incinerators also recovery energy from the combustion of the solid waste used as a fuel.

differences between New Jersey's particular mercury content in the waste stream and the mercury content of the average national solid waste stream. As can be seen from the potential flue gas concentration and the actual stack test data, the current New Jersey resource recovery facilities operate with a degree of mercury control within their current air quality control system.

Another aspect of the analysis the waste stream is to evaluate the current source reduction programs that are being implemented in New Jersey. As a result of the New Jersey's Dry Cell Battery Management Act N.J.S.A. 13:1E-99.59 et seq. and the Toxic Packaging Reduction Act N.J.S.A. 13:1E-99.44 et seq., mercury content in the municipal solid waste will be reduced over the next several years.

Figures 7 and 8 represents the estimated reduction in the mercury content in the municipal solid waste stream over the next three years as a result of the Battery Act and the Toxic Packaging Reduction Act. These figures were calculated using the data in the USEPA Mercury Report by transposing the effects of industry source reduction in place in New Jersey. As can be seen by Figures 7 and 8, the mercury in the New Jersey municipal solid waste stream will be reduced by 60 to 75% over the next three years. The most dramatic reduction in the mercury content in the solid waste stream will be from the reduction of mercury in alkaline batteries. The overall reduction in mercury in the municipal solid waste stream, as a result of the New Jersey Dry Cell Battery Management Act will be over 80%.

The New Jersey Dry Cell Battery Management Act, N.J.S.A. 13:1E-99.59 et seq. requires that the mercury content of batteries be less than or equal to 250 parts per million as of January 1, 1992. Given that the average life of the battery is two to three years, we are now starting to see the affects of that reduced level of mercury in alkaline batteries in the municipal waste stream.* In addition, because of the 250 ppm limit on batteries, consumer mercury oxide batteries are prohibited from sale in the State of New Jersey. Institutional mercury oxide batteries are permitted to be sold in the State of New Jersey provided the battery manufacturer submits and receives approval from the New Jersey Department of Environmental Protection and Energy for a Battery Management Plan. The Battery Manufacturers Plan must designate their collection, transportation, processing and management system

*The USEPA Mercury Report estimated a three year life for batteries from production to disposal. One year between production and use and two years between use and disposal. The battery manufacturers estimated a two year life. One year between production and use and one year between use and disposal.

for the mercury oxide batteries. The battery manufacturers would be liable for the cost of the overall system.

Two actions will be taken by the battery manufacturers that will result in additional mercury reduction over that required by the Dry Cell Battery Management Act as follows:

1. The alkaline battery manufacturers had committed to reducing the mercury content in alkaline batteries to 1 ppm by the end of 1993. This will reduce to almost zero (0.01 tons by the end of 1995 for New Jersey), the mercury content in the municipal solid waste stream from alkaline and carbon zinc batteries.

2. The institutional mercury oxide battery manufacturers have decided not to submit a management plan in the State of New Jersey. They have opted rather not to sell their products in the State of New Jersey. However, these batteries will still be available for sale in other States.

As can be seen by Figures 7 and 8, the above two actions will result in the reduction of the mercury content from batteries to essentially zero. These actions will result in fluorescent lamps and switches being the number one source of mercury in the municipal solid waste stream. The mercury content in these consumer products cannot be reduced at the source beyond a technological limit, otherwise they would no longer properly or efficiently operate. We as a society have made a decision that we need these products. Therefore, if we need to reduce the mercury content in solid waste it may be necessary to establish a Battery Act program for fluorescent bulbs, switches and other mercury containing products which source separates them from the solid waste disposal stream.

Figure 9 translates the numbers in terms of reduction resulting from the Dry Cell Battery Management Act and the Toxic Packaging Reduction Act and calculates the potential flue gas concentration in the New Jersey RRFs over the next three years. As can be seen by Figure 9, there is a significant reduction in the mercury content and flue gas concentration from resource recovery facilities.

Another method of calculating the mercury in the solid waste stream is to perform a mercury balance between the mercury in emissions and the total mercury in residual ash in the MSW incinerators. Figure 10 presents a mercury balance for the Camden and Warren County resource recovery facilities. Table 1 of Figure 10 presents the minimum, maximum and average concentrations of the total mercury in parts per million (mg/kg)and pounds per ton. The average mercury content from stack test data from both the Warren County and Camden County

resource recovery facilities in pounds per ton is added to the average residual ash total mercury concentration. As can be seen in this particular mercury balance, the total mercury of the Camden County RRF is 0.0098 pounds per ton and of the Warren County RRF is 0.00308 pounds per ton. These numbers do not agree with the materials flow balance calculation of mercury in the processible waste stream of 0.005 pounds per ton calculated from the data in the USEPA Mercury Report. As with the stack test data, the residual ash data is from 1990 through 1992and needs to be corrected to a 1992 timeframe for an equivalent analysis.

The total mercury content in the residual ash for both the Camden County and Warren County Facilities are from data reported by the facilities as part of their residual ash testing program. The New Jersey Department of Environmental Protection and Energy (NJDEPE) is performing a research project utilizing Warren County's resource recovery residual ash. As a part of our research, we determined the total mercury content of the residual ash two orders a magnitude higher than that reported by the Warren County resource recovery facility. The data for the New Jersey ash research project was generated by the Department's Division of Environmental Quality Laboratories and quality controlled by the State University of New York at Stonybrook's Environmental Laboratory. The Department's data indicates that the total mercury content in the Warren County resource recovery residual ash is 4 ppm. From the results of the research project we have determined that sample preparation and the type of mineral acid used in the "total" leaching test has an impact on the test's results. When you add the 4 ppm total mercury content in the residual ash to the average stack testing data for the Warren County resource recovery facility you get agreement with the Camden County resource recovery total mercury content.

The difference between the mercury content calculated by the mass balance method and the mercury content calculated by the materials flow method may be the differential between New Jersey's particular waste stream content for mercury and the average national content or a longer lag time between production, use and disposal. One of the products that adds to this differential in the New Jersey waste stream is mercury switches. New Jersey, as well as a number of other coastal states have a large population of pleasure boats. Each one of these pleasure boats has a bilge pump and those bilge pumps are operated by mercury switches. The average maintenance time on the mercury switches is on the order of one to two years. This factor increases the number of mercury switches that will be found in the New Jersey and any other coastal states municipal solid waste stream. This possible explanation was developed by the Florida Department of Environmental Regulations in their Mercury Report and by discussions with New Jersey mercury switch manufacturers.[6]

The other component of the Mercury Emissions Task Force was to evaluate the health and environmental issues. The work of this subcommitte was divided in three steps were:

1. To review existing information in the scientific literature to determine the scope of the potential problem and to identify ways to focus the risk assessment;

2. To establish a level of risk above which exposure to mercury should be limited; and

3. To evaluate and develop fate and transport models which could be used to estimate the mercury exposure that may result from the emission of mercury from a stationary source.

The health and environment subcommittee undertook an extensive review of the literature concerning mercury in the environment, particularly focusing on background levels, health effects data and exposure assessment models. This review leads to the conclusion that global mercury emissions, deposition and bioaccumulation are important aspects of the overall mercury problem. Ambient air concentrations of mercury in remote locations appear to be increasing. Nationwide data suggest that existing levels of mercury in tuna, swordfish, shark and other fish may lead to human ingestion of mercury in excess of safe levels for a small segment of the population. Although the existing literature was reviewed extensively and discussed within the subcommittee, there remains a substantial amount of uncertainty regarding the level of global mercury contamination, its effect on the residents of New Jersey and the contribution of New Jersey sources to this contamination. Additional data currently being developed are needed to explore this issue more thoroughly.

The toxicological assessment began with an evaluation of limits and standards established by the U.S. Environmental Protection Agency (EPA). A Reference Concentration (RfC), which is designed to protect against adverse health effects from inhalation of elemental mercury, has been established by the EPA at 0.3 micrograms of mercury per cubic meter of air (ug/m^3). A Reference Dose (RfD), which is designed to protect against adverse health effects from ingestion of methylmercury, was previously established by the EPA at 0.3 micrograms of mercury per kilogram of weight per day (ug/kg/day); this RfD, however, has recently been withdrawn by the EPA for re-evaluation.

The subcommittee reviewed the EPA RfD, as well as toxicological literature, in considering a daily level of intake of methylmercury which would be sufficiently protective of the human health of the most sensitive portion of the New

Jersey population. Based upon an analysis of the toxicological literature of health effects in children associated with in utero exposure to mercury ingested by expectant mothers, and computer modeling of current background exposure, a proposed Acceptable Daily Intake (ADI) of 0.07 ug/kg/day has been developed by NJDEPE health and environment subcommittee. It should be noted that the Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Department of Health and Human Services has proposed a minimal risk level (MRL) of methylmercury of 0.04 ug/kg/day. This was also based on an analysis of in utero neurological development; this proposal postdated the analysis which led to the proposed New Jersey ADI of 0.07 ug/kg/day.

A variety of fate and transport models were reviewed. Mercury exposure through inhalation predicted with all of these models indicates a large margin of safety between predicted exposure and the current EPA Reference Concentration of 0.3 ug/m^3. A generic model was developed by the NJDEPE health and environment subcommittee and presented in Volume II of the preliminary report. This generic model, which addresses deposition to soil and water and bioaccumulation in fish, employs restrictive assumptions and suggests that the potential exists for increase in human ingestion of methylmercury. Site-specific modeling, however, generally predicts lower levels of exposure to mercury than the generic modeling method. This is to be expected, since more realistic assumptions can be used when the site is known. Therefore, where available, site-specific data are preferable for review of the impacts of a specific source. The task force decided to start with MSW incinerators because they are a major new source of mercury emissions in New Jersey.

The recommendations of the health and environmental subcommittee were as follows:

1. The ADI of 0.07 ug/kg/day derived in this report should be considered as the health basis for the establishment of a mercury emissions standard. This ADI is preliminary, pending completion of the peer review reports and an analysis of those reports by the NJDEPE.

2. A review of the derivation of the ADI is underway by a panel of external reviewers, which includes experts in the fields of toxicology and risk assessment from academic and medical institutions and government agencies.

3. By the year 2000, mercury emissions from MSW incinerators should be reduced by greater than 95% of current levels, through a combination of waste management practices and emission controls.

4. The DEPE should review national studies that have been mandated by section 112(n)1 of the Clean Air Act Amendments when they become available, and consider how their conclusions should be incorporated into the New Jersey program. This mandate requires EPA to perform studies on mercury emissions from various sources, such as electric utilities and MSW combustors. A report on these studies is due to Congress in November 1994.

5. The NJDEPE should work with environmental agencies at the federal and regional levels to explore global contamination issues and encourage mercury reductions on a global, national and regional level. In addition, the contribution of New Jersey mercury emissions to mercury levels in saltwater fish should be investigated.

6. Additional source categories, such as fuel combustion plants, auto emissions, land application of sludge, sewage sludge digesters and leaching and gas venting of mercury from landfills, should be considered for modeling and possible emission reduction.

In addition to the above recommendations and goals, the following research activities should be developed or expanded to provide a better understanding of the nature of actual and potential mercury exposure in New Jersey:

* A workshop on mercury modeling techniques and model inputs should be held to identify improvements that can be made in the mercury model algorithms and assumptions contained in the DEPE generic model.

* Stack test data should be collected to identify the form of mercury that is emitted from MSW facilities including landfills and its behavior in the atmosphere.

* Mercury concentration data for fish in New Jersey need to be developed. A pilot project for freshwater fish has just started. Following the pilot study, the DEPE should implement a routine fish monitoring program. Data on mercury concentration in water and sediments should also be collected.

* An analysis of fish consumption patterns in New Jersey, particularly consumption of fish caught locally, should be performed.

* Research should be undertaken to define more precisely a mercury RfD for the <u>in utero</u> developmental neurological endpoint.

* The potential additive toxicity of inorganic and organic mercury exposures should be further investigated.

* Other exposure pathways (e.g. vegetable ingestion, drinking water) should be evaluated.

* The DEPE should explore the relative contribution of in-state vs. out-of-state sources with respect to New Jersey exposures to mercury.

* Ecological impacts have not been adequately investigated, largely due to lack of predictive data. Additional information on ecological effects is needed.

The task force recommends a two-phase standard for the reduction of mercury emissions from municipal solid waste incinerators:

1. By December 31, 1995, a mercury emissions standard of 65 ug/dscm should be achieved for all MSW incinerators operating in New Jersey.

2. By January 1, 2000, a mercury emissions standard of 28 ug/dscm should be achieved for all MSW incinerators operating in New Jersey.

<u>Implementing the Standard</u>

These standards can be achieved by implementing the following actions:

* Operators of MSW incinerators should install air pollution control devices that reduce mercury emissions.

* The NJDEPE should require counties to modify their solid waste management plans to include separation of mercury-containing objects from the waste stream -- at a minimum, by January 1994, this should include batteries and by January 1995, fluorescent light bulbs -- for each county that sends its solid waste to incinerators.

* Operators of MSW incinerators should improve waste management practices at their facilities to screen incoming waste for bulk quantities of wastes that are known to or which the operator suspects to contain mercury and thereby prevent large amounts of these waste materials from being incinerated.

* The NJDEPE should ensure that the manufacturers of batteries comply with the requirements of the "Dry Cell Battery Management Act." The requirements of this act, and the proposed mercury reduction plans by battery manufacturers, can result in a 70% to 80% reduction of mercury in New Jersey's solid waste stream by 1995.

* The NJDEPE should ensure that the manufacturers of packaging comply with the requirements of the "Toxic Packaging Reduction Act."

* The state should take actions that will result in further reduction, recycling and separation of waste materials containing mercury. These management options should be implemented by working with the product manufacturers and, where necessary, developing regulations or promoting legislation to ensure that proper management practices occur. At a minimum, by January 1995, the state should develop and implement a program for the separation of fluorescent light bulbs from all waste streams sent to incinerators.

If the Task Force recommendations for mercury limits for MSW incinerators are to be implemented a 95 percent or greater reduction in 1991/1992 mercury flue gas concentration is needed. This reduction cannot be implemented with any one individual strategy. Some air quality control technologies have been measured in the 90+ percent range. However, that reduction depends on a number of factors mainly the initial flue gas concentration and will guarantee an 80 percent reduction to a specific limit. Other control technologies while highly efficient are either costly to install and/or operate. Source reduction will achieve greater than 80 percent reduction. However, that reduction will take time to fully realize in the solid waste stream. Air quality control technology and source reduction strategies cannot achieve the necessary reduction in a timely and cost effective manner. Only a concerted effort that includes source separation programs for mercury containing discarded products can achieve the recommended limits. The most effective source separation efforts are through the permanent HHW programs.

While the focus of the Task Force was to establish mercury emission standards, as can be seen by Figure 13 cadmium and lead are under going the same level of review to establish clean-up levels in soils and end-use compost standards. New Jersey has currently proposed soil standards for all metals and organics through its site remediation program. These soil standards for residential use will be lower then the current action levels implemented by the NJDEPE for guidance in clean-ups. In addition, the Department is evaluating compost standards for sewage sludge compost. Figure 13 delineates the Class A and Class B standards for cadmium and lead. While the standards are still in draft form, they are considerably lower than the current standards for cadmium and lead.

Figures 14 and 15 present a very general economic evaluation of the cost of source reduction and source separation of heavy metals containing products versus the addition of air quality control technology on the backend of

the resource recovery facility. Figure 14 calculates the number of pounds of batteries in each of the counties. It also presents the cost for managing those batteries in a commingled fashion. This cost includes the cost of collection, processing the commingled batteries and than processing the separate battery chemistries. This cost does not include the cost of shipment to the processing facility. The NJDEPE was quoted a price by a battery processor including all those costs of $1.25 per pound. In addition to this cost, there would be an FOB charge to the processing facilities which are located in different areas of the U.S.

Figure 14 represents the cost to the four resource recovery counties at $3.9 million. It also estimates the statewide cost to process the total quantity of batteries in the State at $10.9 million. Given that there are approximately 108 million batteries used and disposed of in New Jersey, the cost for collection and processing batteries would result in approximately a $0.10 per cell additional cost plus a shipment cost.

Figure 15 represents the approximate cost for air quality control technologies for mercury, cadmium, lead and additional residual ash testing as an added cost per ton of waste processed. The majority of the cost is the cost of mercury control which would result from the add on of new air quality control technology and its additional O & M cost. The cost of cadmium and lead control are estimated from existing air quality control technology.

As can be seen by Figure 15 the total cost for air quality control technology for mercury, cadmium and lead and residual ash testing is approximately $5.6 million. It should be noted that the addition of mercury, cadmium and lead in the solid waste stream is not solely the result of batteries. The cost of air quality control technology should be evenly distributed over all heavy metal-containing products. To be a more appropriate analysis the cost of air quality control technology should be apportioned to the various sources of mercury in the solid waste stream. In addition the cost of disposal of the ash containing heavy metals, the treatment and disposal of the leachate from ash landfills and the sludge it produces should be included in the economic analysis. Further, the add on mercury control technology will control more than just mercury in the flue gas stream.

To put this on a consumer level, New Jersey generates approximately 15 million tons of solid waste per year. This is equivalent to approximately 1.8 tons per person per year. New Jersey residents recycle approximately 50% of their waste, which leaves approximately 0.9 tons per person for disposal. It costs $4.25 per ton to manage mercury, cadmium and lead through the air quality control system in resource recovery

facilities. That results in a cost of approximately $3.83 per person per year to manage those metals on the back-end of a facility. New Jersey residents use, on average, approximately 13 batteries per person per year or approximately 1 pound of batteries per person per year. At a cost of $0.10 per battery to manage them in the front-end through source separation would result in a cost of $1.30 per person per year or a cost differential of approximately $2.53 per person per year.

While the above evaluation is a very rough back of the envelope estimate of the costs, it is clear that their will be a cost to managing discarded consumer products that contain heavy metals. The decision that must be made is at what point do we want to incur that cost and what is the most efficient system to manage those costs. It is clear that managing materials in the front end are less costly then to try to control them through the facility in the back-end.

While the above impacts were evaluated for mercury within massburn RRFs or MSW incinerators there will be similar health and environmental issue when other heavy metal containing products are evaluated in terms of their impact on solid waste reuse. A good starting point is the USEPA report Characterization of Products Containing Lead and Cadmium in Municipal Solid waste in the United States, 1970 to 2000, prepared by Franklin Associates Ltd., dated 1989. The issues of heavy metal containing products that are eventually discarded into the solid waste stream are even more critical when the solid waste, including sludge, is to be composted. Unlike MSW incinerators which could be modified to retrofit for additional air quality control equipment, once the heavy metals are in the end use compost there is virtually no cost-effective technology to remove them. Given the above impacts, the potential costs and the mandated goals to reuse solid waste, HHW programs can serve to efficiently and in a cost-effective manner manage those discarded consumer products in the solid waste stream that impart a negative quality to the solid waste and impede our ability to fully reuse the waste.

To implement this program requires everybody's help. It is a new way of doing business in environmental management. It is evident that to leave these products in the waste stream results in a problem. It restricts our ability to fully reuse the solid waste. This problem is not the result of any one individual product or any one individual product manufacturer but, the collective and cumulative impact of heavy metals in discarded consumer products. The quantities of which can be an order of magnitude above residual background concentrations. This problem is magnified because of the volume reduction function of the end use technologies for the reuse of solid waste. This volume reduction serves to increase that concentration of heavy metals through the process.

We, industry and the regulatory community need to work together to resolve this problem. We as regulators of the management of solid waste have to better communicate the problem and not develop overly perscriptive regulatory programs. It is also evident that to maintain a clean environment and to resolve this problem we need to maintain a strong US manufacturing base. We do not need to simply develop regulatory programs that result in putting business out of business. From the product manufacturers side we need to understand the technology, the product, how a product is developed and finally how a product is distributed. With that full understanding, we can assist each other in putting together a system that is not overly perscriptive and is implemented in the most cost-effective manner. HHW facilities can serve as that system. Those heavy metal-containing products which cannot be further source reduced can most effectively utilize the HHW program.

Source reduction and HHW source separation programs are a new way of doing business in environmental management. As with any new program or new discovery, there is an initial inertia against implementation of that program. Inertia is a very big force in this universe, a body at rest tends to stay at rest. There is a cry to maintain the status quo of how we do business or a cry against a new discovery. However, it is time to move into the full implementation of source reduction and permanent HHW facility to manage source separated discarded products. Moving the management of solid waste up front to a materials management issue is the most cost effective way of managing the materials before they become solid waste. In addition, it allows us to implement the goals of the Resource Conservation and Recovery Act to fully reuse that solid waste as a fuel or a compost material.

In my assessment source reduction coupled with a permanent HHW program are equivalent to Christopher Columbus' discovery of the new world. However, as opposed to Christopher Columbus' discovery which expanded the world, source reduction and HHW source separation programs will actually result in a decrease in the regulatory world. Prior to Christopher Columbus' discovery Spain's motto was "Ne Plus Ultra" or there is no more beyond. Spain was proud of the fact that they were on the edge of the world. It gave them a specific place in the world. When Christopher Columbus came back to Spain, it changed that position. Spain could have maintained the status quo, ignored Columbus' discovery given in to the inertia against this discovery and kept its place in the world with its motto. However, Spain accepted this new discovery and its new position in the world. It seized the opportunities that the discovery presented by a minor change in their philosophy and motto by simply dropping the "Ne" in their motto. Their motto to this

day reads "Plus Ultra", there is much more beyond. All industry and private enterprise need to do is adopt a very simply philosophy change to include materials management of the products they manufacture from production through disposal.

Private enterprise is always asking for government to get out of the way. This is one program that we can deliver that we are asking private enterprise to come in, step in and take the lead. For those flat worlders who do not believe in source reduction and HHW source separation programs all we ask is that you overcome your inertia and seize the opportunities that will make themselves available from source reduction and HHW source separation programs.

ACKNOWLEDGEMENT

The findings and recommendations of the NJDEPE Task Force on Mercury Emission Standard Setting are the collective work of all the Task Force member including both the public members and NJDEPE staff.

REFERENCE

1. N.J.S.A. 13:1E-99.59 New Jersey Dry Cell Battery Management Act.

2. N.J.S.A. 13:1E-99.44 New Jersey Toxic Packaging Reduction Act.

3. Minnesota Statutes section 115.01, subdivision 8 Fluorescent and High Intensity Discharge Lamps; Report and section 116.92 Mercury Emissions Reduction.

4. NJDEPE The Findings and Recommendations of the Task Force on Mercury Emissions Standard Setting - Preliminary Report September 1992, Interim Report December 1992.

5. USEPA Characterization of Products Containing Mercury in Municipal Solid Waste in the United States 1970 to 2000 OSW # EPA 530-R-92-013 April 1992.

6. Florida DER Mercury Emissions to the Atmosphere in Florida - final report 91166c1 August 1992.

figure 1

MERCURY EMISSIONS TASK FORCE

1. NJDEPE PETITIONED BY CAMDEN COUNTY THROUGH CEHA TO ESTABLISH A POINT SOURCE STANDARD FOR MERCURY CONTROL TO 50 μg/dscm

2. NJDEPE REJECTED STANDARD:
   INSUFFICIENT TECHNICAL AND SCIENTIFIC ANALYSIS TO SUPPORT STANDARD

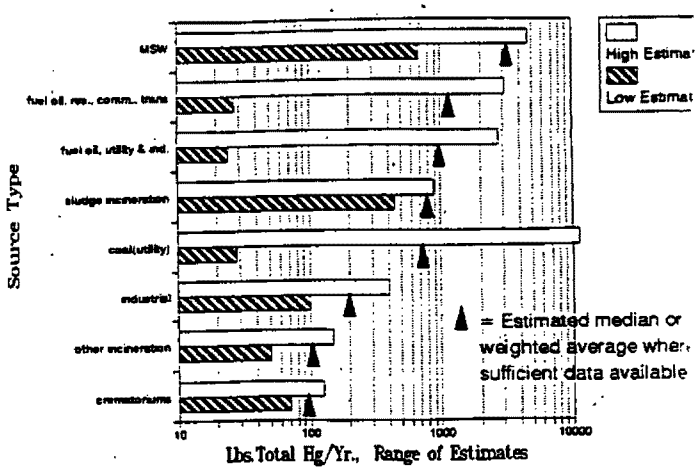
3. INCONSISTENT WITH CEHA:
   NO DELEGATION OF AUTHORITY TO CAMDEN TO REGULATE AIR POLLUTION THROUGH STANDARD SETTING

4. ESTABLISHMENT OF A MERCURY EMISSIONS TF

   A. HEALTH & ENVIRONMENTAL ISSUES
   B. TECHNICAL & REGULATORY ISSUES

Figure 2

Anthropogenic Mercury Emissions in NJ to the atmosphere; estimated, by source



NOTE: Ranges of mercury emissions to the atmosphere from other potential sources are not given because available data was considered insufficient. Based on the limited data available, the possibility exists that emissions from combustion of natural gas and gasoline could be significant.

MERCURY IN PROCESSIBLE SOLID WASTE STREAM IN NEW JERSEY'S RRF'S

★ MERCURY IN MSW IN NEW JERSEY

$$NJ_{Hg.M} = US_{Hg.M} * 1.153 * 0.031 \qquad \text{Eq. 1}$$

★ MERCURY IN B/ISW IN NEW JERSEY

$$\sum_{i=1}^{n} = L_i * Hg_i = 4 \text{ YEARS} \qquad \text{Eq. 2}$$

$$NJ_{Hg.B/I} = (US_{C\ year\ 0} - US_{Hg.M\ year\ 4}) * 0.70 * 1.153 * 0.031 \qquad \text{Eq. 3}$$

$NJ_{Hg.M}$ = 0.0048 lbs/ton

$NJ_{Hg.B/I}$ = 0.0089 lbs/ton

★ MERCURY IN PSW IN NEW JERSEY RRFs

MSW = 95% B/ISW = 5%

$NJ_{Hg.RRF\ PW}$ = 0.005 lbs/ton

figure 3

Figure 4

Mercury In Consumer Products In The New Jersey MSW Stream

Product 1992	Tons	Percent
Batteries		
Alkaline*	8.23	48.3
Mercury Oxide**	5.86	34.4
Others	0.16	0.9
Battery subtotal	14.25	83.6
Electric Lighting		
Fluorescent Lamps	1.05	6.1
High Intensity Lamps	0.03	0.2
Lighting Subtotal	1.08	6.3
Paint Residues	0.37	2.2
Fever Thermometers	0.59	3.5
Thermostats	0.35	2.0
Pigment	0.23	1.4
Dental Uses	0.13	0.7
Special Paper Coating	0.02	0.1
Mercury Light Switches	0.04	0.3
TOTAL	17.05	100.0

* Main contribution from residential MSW
** Main contribution from institutional MSW

Figure 5

Mercury In Consumer Products In The New Jersey MSW Stream

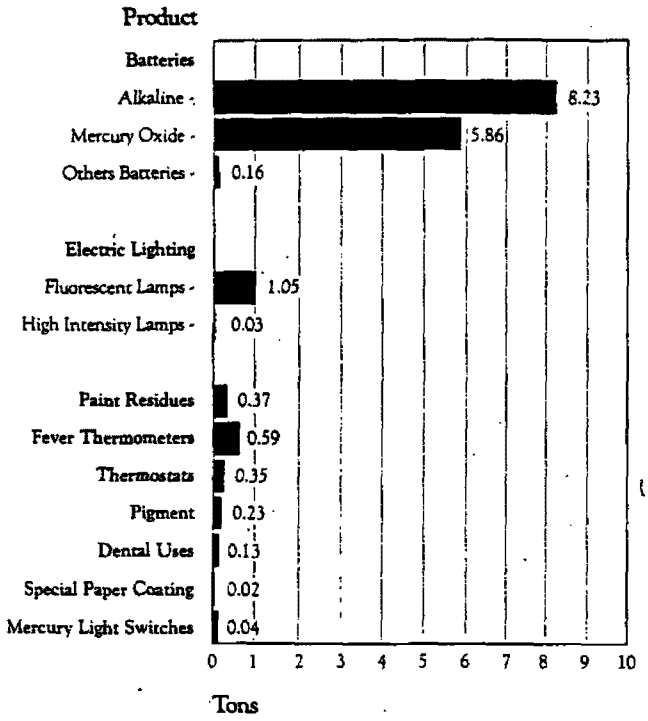


Figure 6

Mercury Content In New Jersey RRF's

Facility	Permit Limits	Stack Test	Potential Flue Gas Concentrations
		(pounds/hour/unit)	
Camden RRF	0.08	0.033	0.074
Essex RRF	0.053	0.021	0.155
Gloucester RRF	0.12	0.042	0.063
Warren RRF	0.05	0.016	0.043

* Data from Chapter 6
** Nominal through-put operating at 100% on-line availability with 100% mercury volitalization without controls.

Figure 7

Reduction Of Mercury In Discarded Consumer Products In The New Jersey MSW Stream Resulting From Current Source Reduction Programs

Product	1993	1994	1995
		Tons	
Batteries			
Alkaline	1.49	1.58	1.69
Mercury-Oxide	2.17	1.06	0.14
Others	0.15	0.14	0.13
Battery Subtotal	3.81	2.78	1.96
Electric Lighting			
Fluorescent Lamps	1.09	1.13	1.17
High Intensity Lamps	0.03	0.03	0.04
Lighting Subtotal	1.12	1.16	1.21
Paint Residue	0.27	0.18	0.08
Fever Thermometers	0.59	0.59	0.60
Thermostats	0.33	0.31	0.29
Pigments	0.17	0.11	0.05
Dental Uses	0.12	0.11	0.10
Special Paper Coating	0.01	0.01	0.00
Mercury Light Switches	0.05	0.06	0.06
Total	6.47	5.31	4.35

Figure 8

Reduction Of Mercury In Discarded Consumer Products In The New Jersey MSW Stream Resulting From Current Source Reduction Programs

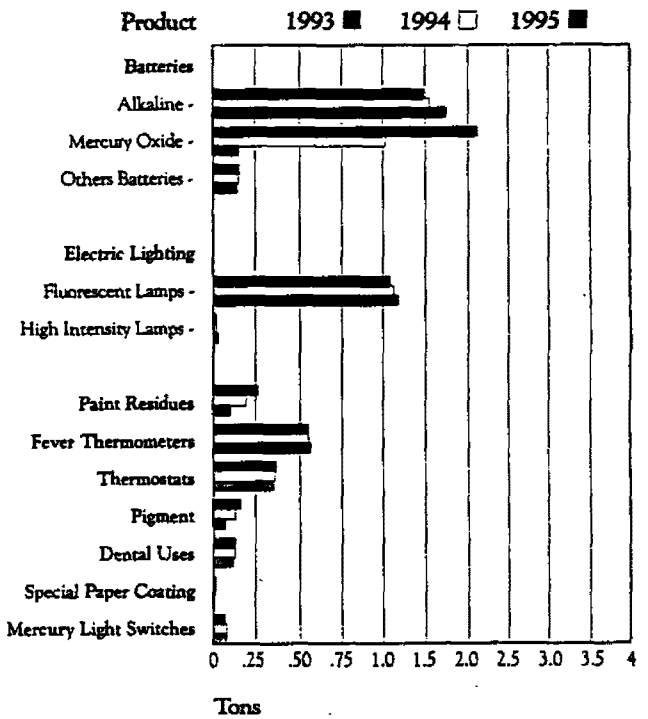


Figure 9

Potential Flue Gas Concentrations In New Jersey RRF's With Source Reduction Program

Year	Facility Permit Limit pounds/hr/unit	Potential Flue Gas* Concentrations pounds/hr/unit 1992	1993	1994	1995
Camden RRF	0.08	0.074	0.031	0.025	0.022
Essex RRF	0.053	0.155	0.063	0.053	0.044
Gloucester RRF	0.012	0.063	0.028	0.023	0.019
Warren RRF	0.05	0.043	0.017	0.013	0.009

figure 10

RRF MERCURY MASS BALANCE

TOTAL MERCURY IN RRF RESIDUAL ASH

FACILITY	MIN.	MAX.	AVG.	N
		mg/kg (#/ton)		
CAMDEN CO. RRF	0.035 0.00007	7.7 0.0154	3.05 0.0061	114
WARREN CO. RRF	0.01 0.00002	0.81 0.0016	0.041 0.00008	130

MERCURY EMISSIONS IN RRF

FACILITY	PERMIT LIMITS	STACK TESTS
	lbs/ton	
CAMDEN CO. RRF	0.0055	0.0037
WARREN CO. RRF	0.006	0.003

MERCURY BALANCE IN RRF

FACILITY	RESIDUAL ASH	EMISSIONS	TOTAL
CAMDEN CO. RRF	0.0061	0.0037	0.0098
WARREN CO. RRF	0.00008	0.003	0.00308

figure 11

RISK ASSESSMENT

USEPA

Mercury

RfC 0.3 $\mu g/m^3$

Methhylmercury

RfD 0.3 $\mu g/kg/day$

NJDEPE-DSR

RECOMMENDED

Methhylmercury

ADI 0.07 $\mu g/kg/day$

DHHS-ATSDR

PROPOSED

Methhylmercury

MRL 0.04 $\mu g/kg/day$

figure 12

FATE & TRANSPORT MODELLING FOR MSW INCINERATION

* The ADI should be considered as the health basis for the mercury emissions standard

* Limit source contributions to insignificant levels in terms of methylmercury ingestion less than 1% of ADI

* Reduce mercury emissions from MSW incinerators to less than 95 % of current levels

figure 13

OTHER HEALTH RISK BASED STANDARDS

SOIL STANDARDS

	ACTION LEVELS	SOIL STANDARDS
	mg/kg	
CADMIUM	3	1
LEAD	250	100

SLUDGE COMPOST

	CLASS A	CLASS B	USEPA	NJDEPE
CADMIUM	20	40	[redacted]	
LEAD	2400	4800		

figure 14

COST

SOURCE REDUCTION

	BATTERIES(lbs)	COST(1.25/lb)
CAMDEN	564,728	$ 705,910
ESSEX	873,477	1,091,846
BERGEN	926,247	1,157,809
GLOUC	258,226	322,782
WARREN	103,292	129,115
SOMERSET	269,454	336,817
HUNTERDON	119,005	148,757
TOTAL	3,114,429	3,893,036
STATEWIDE	8,676,379	10,845,000

figure 15

AIR QUALITY CONTROL TECHNOLOGIES

FACILITY	CAPACITY (NC*0.85)	MERCURY ($3.00/ton)	CADMIUM ($0.50/ton)	LEAD ($0.50/ton)	RA TEST ($0.25/ton)	TOTAL ($)
CAMDEN	325,763	977,289	162,882	162,882	81,441	1,384,494
ESSEX	698,062	2,094,186	349,031	349,031	174,516	2,966,764
GLOUC	178,393	535,179	89,197	89,197	44,598	758,171
WARREN	124100	372,300	62,050	62,050	31,025	527,425
TOTAL ($)		3,978,954	663,160	663,160	331,580	5,636,854

Developing An Effective Education Program In Schools

Dr. Herbert D. Thier, Director
SEPUP, Lawrence Hall of Science
University of California at Berkeley

It's really a privilege to be here and to have this opportunity to talk to this Convention which represents such a diverse combination of groups, Institutions, and individuals. My goals this morning are three fold. First I want to discuss some general principles related to bringing educational programs of the kind you are interested in, into the schools. Then I want to briefly introduce you to the goals and objectives of the Science Education for Public Understanding Program (SEPUP). Finally I want to share with you some of the draft national standards for science education in the United States.

I would like to start off by talking about what I consider the three C's of developing an effective school education program, Consult, Create, and Cooperate. By consult I don't mean go out and hire a group of consultants, I rather mean consult with the group you want to work with the schools. The schools are a complex social institution. Schools in each state operate differently and schools in each community operate differently. One way to approach the schools of course is to go to the local board of education or the board at the state level. Five or six years later you may be able to start thinking about implementing your program. The other approach is to find yourself a strong champion who is in the schools, who knows the schools, and becomes a real part of your group. That is what I mean by a consultant. Talk with the group you want to affect, discuss with them their realities and their needs and interests. Work with them so that what you create meets their needs and objectives while accomplishing the goals you have set for the program.

By create I mean change in public education is a creative act. It takes intensive work, it takes collaboration between experts in the subject matter and how to deliver it. It also requires an understanding of the community in which you want to implement the new educational materials. Many of you are experts and work very effectively with organized and disorganized community groups. I want to suggest to you that the school is an equally complex social system. Therefore, to bring about real changes in the schools requires the kind of careful thinking you give to beginning a program in your own communities.

Lastly cooperate. There is little or no need to reinvent the wheel. You are experts in what you do so don't try to become experts in everything. Cooperate, and collaborate so that people in education can work together with you to develop very strong productive programs that will help accomplish your objectives for the schools.

I would now like to talk about what I call the difference between public education and public information. Providing a brochure, or a one day speaker, or an assembly in a school is an excellent form of public information. There's absolutely nothing wrong with it and its a very productive thing to do to introduce your program to a community. However it is not public education. Episodic intervention whether in the form of a single visit or a brochure, will never become integrated into the actual curriculum of the school. If you really want to change the way young people think, you need to provide them with meaningful interactive experiences related to their interests. Remember our fourth graders this year will vote in the first presidential election of the 21st century.

When you think this way, you begin to look at our only renewable resource, the young in a very different way. You realize that, we need to integrate these issues we are so concerned about into the ongoing curriculum of the school. However, neither I nor you can do that. The best that either of us can do, is to design effective instructional materials. That is we can design something that gets learners actively involved so they know what's happening and the consider the issues involved.

The curriculum is something that requires a teacher, because curriculum is truly the interaction between the knowledgeable teacher or other instructional leader and the student. No matter how good the material may be, unless you have a competent instructional leader concerned with the group they are working with, little will happen. This is why we need the teacher's input to accomplish productive education especially in the area of issue oriented science because we not only want to change, what students know, but how they act.

You can not do it with teaching machines, television, etc. alone, not even computers. Technological advances can help but they cannot replace human interaction if you want to change thinking and action. The unique role that the concerned adult can play in facilitating learning and understanding, is what makes the difference.

At this point, I want to briefly introduce you to the program I have the privilege of directing. It started in California as a small state program some nine years ago. Today the Science Education for Public Understanding Program, (SEPUP) is active in every state in the United States. It is also active in Australia, Spain. We have just changed the name from chemical education (CEPUP) to science education (SEPUP) for public understanding to reflect our expansion to a wide variety of new topics.

The National Science Foundation has funded a new grant for the next phase of our project. The name change reflects the expansion of topics we will address, including physical, earth, and life sciences. SEPUP will develop two year long courses for the early secondary school grades (7-10) that will emphasize an integrated approach to teaching issue-oriented science. The new SEPUP courses will continue the activity-based approach of CEPUP. Interdisciplinary aspects will be enhanced as the program continues to make the concepts and techniques of science relevant to the real-world experiences of the learner. In a science curriculum either course will be able to stand alone, be used in sequence, or serve as a resource for those who wish to prepare a customized course to respond to local needs. The first course will be available for extended field test usage in September 1994.

Course One:

A capstone course for the middle/junior high school

Our first yearlong course will focus on concrete and experience-based issues that impact either the student's personal lives or their local community. We expect to adapt more than half of the material for this course from existing modules, such as Chemical Survey, Solutions and Pollution, Risk Comparison, Determining Threshold Limits, Chemicals in Foods: Additives, Investigating Groundwater: The Fruitvale Story, Toxic Waste, and Plastics in Our Lives. The course will be carefully constructed to develop thematic connections to enhance student learning. It will entail modification and resequencing, as well as preparation of background and connecting activities, to provide an integrated experience for the learner. Additional materials will include activities that encourage students to interrelate their learning from several modules, and to become more independent in their design, analysis and written and oral reporting of laboratory experiences.

Among the additional topics under consideration for the first course are radiation and health, including concerns about the electromagnetic fields associated with high voltage transmission lines, individual and local responses to energy issues, and water quality. Issues involving over-the-counter and prescription drugs will be dealt with in a new unit on pharmacology and dosage, which will be closely interwoven with material from the existing Determining Threshold Limits module.

Course Two:

Science for citizenship in the 21st century

The second course will stress more abstract issues; those that have global implications and involve difficult trade-offs. A major theme will be "sustainable development," the international U.N.-sponsored goal for environmentally responsible development.

Most of the material for this course will be developed in the next two years. Topics under consideration include comparing environmental health risks, biotechnology, global implications of energy sources, and global atmospheric changes. Approximately a third of the second course will be adapted from current or soon-to-be-available modules such as The Waste Hierarchy, Island Factory, Investigating Hazardous Wastes, Refrigeration, and Air Pollution.

The basis for the whole SEPUP program is the fact that rather than anxiously demanding answers it is essential that people learn to ask pertinent questions, also obtain evidence and use it as the basis of decision making. They also need to understand the limitations associated with scientific evidence.

The goals of our program are 1: To promote the use of scientific principles, processes and evidence in public decision making. 2: To contribute to improving the quality of science education in America. 3: To provide school and community groups education experiences focusing on

chemicals, the rest of science and their interaction with people and the environment. And especially 4, To enhance the role of science teachers as school and community leaders. If there's one thing you take home from this talk, think about the science teachers in your own community as allied partners who can work with you, in delivering highly effective community education in schools and other places.

Our newest module which will be published in 1993 is on a topic that I'm sure is of high interest to this group. It focuses on the students exploration of the safe and effective use of household chemicals, as they investigate questions such as: how much of a household chemical is enough? Would two household chemicals mixed together work better than one? How do they work in the first place? What we try, to get the students to understand in this module is the concept of rate, and the concept of product interaction. The fact that if a little bit works, a lot doesn't necessarily work a lot better. We are also interested in getting the students to consider some of the very unique and interesting issues we face in relation to an expanded definition of household disposal issues. For example in California, I can go out and buy many products like acetone in my local hardware store. I can buy as much as I like, but it is illegal for me to dispose of these same products in the state of California.

As we see the issue the whole concept of household hazardous chemicals has to be expanded greatly beyond household hazardous chemicals to community hazardous chemicals. Community hazardous chemicals include all substances identified as hazardous and currently unregulated like the acetone in my example. The regulations for large business's are increasing, but there's a large area of unregulated usage going on, where we need not only rules and regulations, but public understanding to bring about public policy. This unregulated area includes the home, hobby and home or small business use of substances that have been identified as hazardous.

As one example of the kind of activities that we develop for students and adults, in SEPUP imagine that you come up to the check out counter at the supermarket and they ask you whether you want a bag made out of paper of plastic. We begin our Plastic in Your Lives module by holding up a paper bag and a plastic bag in the classroom. We ask students which one they prefer and they have a chance to vote, by placing a piece of paper with one reason for their choice into the appropriate bag. Think about this activity for yourself.

How many people here would vote for plastic? How many would vote for paper? How many would vote for neither? Most of the students vote for paper at the beginning of the module. We then take them through an understanding what polymers are and the very important part they play in our society. We also discuss the various environmental issues related to the use of polymers in our society. We come back at the end of the module to consider energy and total life cycle issues to show that both paper and plastic bags have their advantages and disadvantages. When you look at the energy needed to make them and what really happens to both in land fills, it becomes clear there are very few advantages to either one. And lo and behold many of the students on their own come up with the European concept of a reusable bag.

Finally I would like to present to you excerpts from the work of the National Committee on Science Education Standards and Assessment, which is working under the leadership of the National Research Council in cooperation with the major scientific and educational organizations in this country to develop a set of standards, for science education in the United States. The excerpts presented are from the November 1992 preliminary report of the group.

Considering our common interests I have focused on the part of the document related to the reasons for having standards and the standards for the application of science to decision making. First the committee identifies some of the purposes and uses of standards as follows:

"Standards for science curriculum, teaching, and assessment will be integrated in a single document. The standards will specify criteria to judge the quality of school science and to guide the future development of the science education enterprise."

"Standards for science content will specify what all students should attain for:

1 a limited number of fundamental subject matter understandings;

2 the ability to inquire;

3 the ability and inclination to use scientific knowledge and reasoning when making decisions;

4 an awareness of how science is practiced and of the interactions of science, technology, and society."

"A knowledge of science is an essential part of an individual's abilities to:

1 function well and make informed decisions in the home, community, and workplace;

2 continue to learn for personal, professional, and civic reasons;

3 understand the relatedness of the spheres of human activity and the influences of culture and context on human understanding."

"Therefore, school science programs must provide experiences that:

1 are personally and socially relevant;

2 call for a wide range of knowledge, methods, and approaches to analyze personal and societal issues critically;

3 encourage students to act in ways that reflect their understanding of the impact of scientific knowledge on their lives, society, and the world;

4 encourage students' appreciation of the scientific endeavor and their excitement and pleasure in its pursuit;

5 develop in students an appreciation of the beauty and order of the natural world."

Then under the area of application of science the committee identifies the following goals for a student at the end of twelfth grade:

By the end of grade 12, all students should have developed the following decision-making skills. They should be able to:

1 identify and state clearly an issue of personal, civic, national, or global significance that is of high interest to them. The statement must be in a form that requires a decision; for example: "How will the county dispose of its garbage after the present landfill has reached capacity?"

2 identify important dimensions of the issue such as the scientific, political, ethical, cultural, technological, and economic impacts.

3 gather information about the scientific and technological aspects of the issue, including relevant principles, concepts, and data.

4 generate a set of alternative solutions that address all dimensions of the issue.

5 evaluate each proposed solution in light of its scientific and technological aspects and recognize when as incomplete knowledge base may result in uncertainty and ambiguity.

Finally the document summarizes the relationship between science and public decision making with the following statement: "Scientific understanding is an essential, but not a sufficient, ingredient for decision-making; however, science alone cannot provide the decision. It can help to clarify some of the issues and to determine scientific or technological feasibility. Nevertheless, in the end, social, political, economic, and ethical values will influence the decision significantly."

This new set of standards will make it easier for those of us who are concerned about emphasizing societal issues in the science program to work together. As we "Consult", "Cooperate", and "Create" together we can develop very strong and meaningful science materials that deal with the societal issues of interest to the community while at the same time deal with the fundamental science concepts involved. Students as a result will have in addition to the understanding of the science, the knowledge of how to use the findings of science as a basis for decision making. This is what I call the "Civics for the 21st century, because it will empower the individual to use evidence and reason instead of propaganda and emotionalism as the basis for their decision making about these science related issues that are so important to the future of our society.

Further information about the national standard for science education can be obtained by contacting them at:

NCSESA Critique & Consensus
National Research Council
2101 Constitution Avenue, NW
HA 486
Washington, DC 20418

TO BE OR NOT TO BE ... A CESQG:
An overview of issues regarding conditionally-exempt small quantity generators

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1. INTRODUCTION/DEFINITIONS:

Hazardous chemicals are used by all segments of modern society: industries, small businesses, governmental services, households. Hazardous wastes are likewise produced by everyone, but regulatorily they are pigeon-holed differently and, in some cases up until now, ignored.

A shelf of various products in a home basement and a shelf in a small business might look virtually the same and contain many of the same materials. Yet the very small business has the potential to use, store and throw away hazardous substances in greater concentrations and amounts than the typical household. Home hobbies blend into working-out-of-the-home businesses to further gray the distinctions in household versus business as well as in chemical and waste types. And to even further complicate the arena and make life more interesting for management programs, a surprising amount of working-out-of-the-home business is done "under the table," with no business licenses for identification or tracking nor any taxes paid. This latter issue makes for great challenges for local programs wishing to address the very small business wastes.

There is a long continuum of waste generators, from the large industries that are fully regulated, known in some circles as "LQGS" or large quantity generators, through various epithets and their accompanying acronyms for medium quantity generators ("MQGs"), small (but still regulated) quantity generators ("SQGs"), to the "very small quantity generators" ("VSQGs") or the term gaining most usage now: the **"conditionally-exempt small quantity generators" ("CESQGs")**.

The federal Resource Conservation and Recovery Act (RCRA) defines (in 40 CFR 261.5) these entities as those businesses that produce less than 100 kg (220 lbs.) of wastes that meet one of the various definitions of hazardous per month or batch, and which store no more than 1000 kg (2200 lbs.) of these wastes total. It is O.K. by RCRA for CESQG hazardous wastes to go into municipal solid waste provided that the state so designates MSW facilities as acceptable for these small quantities of hazardous wastes.

As more and more communities across the country develop some type of program to address household hazardous wastes, CESQG hazardous wastes tend to be the ones that have slipped and continue to slip through the cracks.

2. KEY POINTS:

I would like to cover some issues relating to CESQG hazardous wastes, in order to convince you that:

1. **CESQG wastes are a big deal (much bigger than HHW);** and
2. **Every program that addresses HHW should also be addressing CESQGs.**

3. SOME FACTS, FIGURES, ESTIMATES AND CHARACTERISTICS OF CESQGs:

First, some "factoids" (including quantitative estimates) that will be useful to the discussion. Conditionally-exempt small quantity generators can be large or small businesses; they tend to be "small" and so we usually talk about small businesses and small quantity generators interchangeably. They also can include local government agencies, schools and other entities that are not usually thought of as small businesses. In Washington state, 90 percent of all businesses are "small" by state standards (50 or fewer employees). Another amazing statistic is that four out of five small businesses fail within five years: there is incredible turnover in these entities that we might be trying to reach.

Typical small businesses that are potential CESQGs include:

Vehicle maintenance
- auto service & repair
- auto body repair

Construction and contracting
Printing and graphic arts
Laundries and dry cleaners
Photofinishing
Pesticide application
Furniture/wood manufacturing and refinishing
Cleaning agents and cosmetics
Dental offices
Laboratories
You-name-it ...

Part of the challenge of addressing CESQG businesses lies in the numbers present in any area. They are everywhere and in numbers that make contact or enforcement a daunting task. In the Seattle-King County metropolitan area, for example,

there are 50,000+ licensed businesses. Ninety percent are "small", which equals 45,000 small businesses. By Standard Industrial Classification (SIC code) and waste analyses, we estimate that 20,000 of these 45,000 are potentially significant CESQGs. So, in a metropolitan area of 1.6 million people, there is 1 CESQG business for every 75 people.

Some other estimates I have seen include Massachusetts, with a population of 6 million and an estimate of only 13,500 CESQGs statewide (1 CESQG for every 450 people); and Vermont, with a population of 500,000 and an estimate of "more than 4,000" (2,500 - 12,000) (1 "ESQG" for every 125 people). One might be able to use some of these estimates or methods to predict at least the upper and lower extremes of numbers of small businesses for any given population.

Typical CESQG wastes include a wide variety of substances:

Spent solvents
- halogenated
- non-halogenated

Heavy metals
Ignitable wastes
Acids/bases
Paints and paint sludges.

Like household hazardous wastes, CESQG wastes are small by individual generator but become an issue because of the number of generators throwing these wastes into the municipal waste streams or the environment: the cumulative effect. Our program in the Seattle-King County area estimates that CESQG wastes are twice the tonnage of household hazardous wastes and are therefore a more significant waste stream to deal with. Our municipal solid waste and wastewater data led us to estimate that CESQGs produce 13,000 tons of hazardous waste in our area; with an estimate of 20,000 CESQGs, this means that each one on average produces 1400 lbs./year (2/3rds of a ton) or 119 lbs./month. These estimates pass the "uh-huh" test and, again, could be used by other programs to help estimate the magnitude of the problem before them.

Other, less tangible characteristics of CESQG businesses include some of the following: the top priority of any small business is staying open, serving customers -- the environment or hazardous waste in particular may be way down the list of worries or concerns on any given day or year; small businesses by nature have few staff, none of whom have regulatory or waste management expertise; resources (both money and staff time) are lacking. These are all significant factors to consider when attempting to address small business' hazardous wastes.

4. ISSUES:

I would like to highlight seven major issues that programs need to address when considering the plight of conditionally-exempt small quantity generators:

1. **Gray areas of regulations.** Definitions vary state to state as to what is a conditionally-exempt SQG or even if any exemption exists. Such individual businesses are hard to identify. Even in states that "regulate to zero", there is very little enforcement or compliance activity.

2. **Threshold not absolute.** Businesses swing above and below the magic 220 pound line, on an ongoing basis or month to month. In addition, in an economic downturn, businesses may dip below the line only to cross back over when the economy picks up. Within any given business type, some may be fully regulated while others may fall below the regulatory threshold.

3. **The shadow of CERCLA lurks.** No matter who you are, if you cause a problem, you are liable. CERCLA does not recognize the conditional exemption that RCRA allows.

4. **Small businesses need help, not more regulation.** The ten most frightening words in the English language to a small business are, "I'm from the government and I'm here to help you." Our task, however, is just that: awareness raising, technical assistance, generic and site-specific advice. These are the things small generators need, not regulation.

5. [Corollary] **You could never hire an army big enough to regulate even if you wanted to!** There are simply too many of these small businesses out there and they change so frequently that the traditional approach used with larger industries simply will not work.

6. **Services for CESQGs are few and far between.** Advice, technical assistance: Most such services are aimed at LQGs and SQGs (even all the existing pollution prevention programs around the country). Few if any services are currently available that focus attention on the true CE- or very small generators. Collection and waste handling: Getting tiny amounts of waste picked up is often very expensive and/or next to impossible to arrange. And in some states (Rhode Island and Maine, as examples) CESQGs cannot legally transport their wastes. (California, Massachusetts and Minnesota have revised their laws to allow for self-transport.) Even when pick-up or drop-off services are available, they are usually only in urban or metropolitan areas, not rural. Lastly, most HHW collection services do not allow CESQG participation. These are substantial

obstacles to overcome, whether from the perspective of the small business or from that of the local program trying to address their wastes.

7. **The Objective is behavior change.** We have got to motivate,. make it easy, and reinforce good behavior. How do we best motivate small businesses to do what they don't legally have to?

5. SUMMARY:

In summary, I would like to make the following key points:

1. CESQGs are the last major source of hazardous waste into MSW, sewers and environment that is not being addressed.

2. Programs that are currently focusing on HHW should also address CESQGs.

3. CESQGs need help (education, technical assistance), not more regulation.

4. Our ultimate objective is behavior change.

I encourage all programs to **THINK BIG WHILE DEALING SMALL!** And to deal in the conditionally-exempt small quantity generator businesses to programs that help solve their hazardous waste management problems.

Priorities for Source Reduction

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Introduction

In this paper, I would like to set the tone for the source reduction portion of this conference. According to Dana Duxbury's statistics, in 1991 there were 802 collection "events," including 96 permanent collection programs.[1] The number of programs has risen dramatically as local governments seek to remove hazardous materials from municipal waste streams and homeowners' basements. However, we are still looking at the tip of the iceberg. In Seattle, where collections have taken place for many years and a second permanent collection site is about to open, 30,000 customers were served in the most recent year. That may seem like alot, but it represents only 5% of the households in the county. At a program cost of $2 million, the cost per vehicle works out to between $60 and $70.[2] When faced with the cost of serving 100% of the population, source reduction looks attractive.

Over the years, source reduction has increasingly been recognized as the most desirable method for preventing both solid and hazardous waste. Despite its obvious importance, source reduction is often given lip service but seldom receives the priority it deserves. If we are to move ahead, we must define our goals, set priorities, and evaluate the results.

What do we mean by source reduction? To define source reduction of hazardous products, we need to examine all three terms: *source*, *reduction*, and *hazardous products*. Depending upon one's point of view, the *source* of household toxics could be the homeowner, the retailer, or the manufacturer. All three of these groups have a vital role to play in source reduction, and all three therefore can and should be considered part of the source. *Reduction* refers to a decrease in the hazardous properties and/or the volume of the products used or disposed of. The hazardous properties can include toxicity, flammability, corrosivity, reactivity, or environmental effects. All are important. *Hazardous products* include any products which pose health or environmental risks during use or storage or which would be considered as a hazardous waste by a household hazardous waste collection program. Combining these elements we come up with a working definition: "source reduction of hazardous household products is a decrease in the quantity or hazardousness of products which can cause health or environmental effects during manufacture, use, or disposal."

Setting Goals

Figure 1 shows what I might call Ptolemy's view of the household hazardous waste (HHW) universe. The diagram shows the relationships between HHW and a number of closely related fields. HHW is pictured at the center because it is the theme of this conference and thus is the common element linking our interests. Many of us may have different views of HHW and different reasons for being at this conference. Regardless of your individual perspectives, however, there are two reasons for examining this diagram. The first is to help see the broad picture of the multitude of reasons why source reduction is important. The second is to remind us that reductions in one area can lead to increases in another. It does not help to remove hazardous waste from the solid waste stream if that waste ends up causing problems in the liquid waste stream or in the air. These so-called cross-media shifts are not really waste reduction at all.

By looking at Figure 1, we can see what some of the broad goals of source reduction should be. Source reduction should seek to decrease the purchase, use, and disposal of hazardous products which:

- cause accidents or illness;
- contribute to indoor air quality problems;
- pose risks to wastewater treatment (i.e. to workers, equipment, or effluent, sludge, and air quality);
- pose risks in solid waste management (incineration, landfill, goundwater);
- contaminate surface and groundwater through runoff or improper disposal;
- cause depletion of the ozone layer;
- kill birds, bees, fish, and other beneficial organisms; and
- require special and expensive means of collection.

Figure 1.

These are broad, general goals. Within any particular source reduction program, whether it be a program of education, reformulation, or reduction in product use, it is important to define limited, attainable objectives for each area affected by the program. Thus, if the program addresses indoor air pollution, specific targets might include ambient air or product concentrations of particular pollutants, or a 30% reduction in the use of a certain type of product in a given number of homes.

At the same time, however, when evaluating the effectiveness of a source reduction strategy, one must look broadly at all possible health and environmental effects. A gain in one area may be offset by a loss in another. When manufacturers reformulated typewriter correction fluids to replace the carcinogen trichloroethylene, they replaced it with methyl chloroform, an ozone depleting chemical that now must be phased out by the year 2002.[3] Indoor air quality was improved at the expense of the outdoor environment, and, in effect, one type of cancer was traded for another.

Availability of Alternatives

Table 1 lists the major types of hazardous products, the typical problem constituents, and some available alternatives. This list is not exhaustive, but it is intended to give a qualitative picture of the extent to which hazardous products are currently replaceable if a consumer wished to do so. The situation is far from static, as new products are being developed every day.

Table 1. Hazardous Products, Ingredients, Principal Hazards, and Alternatives

Cleaning Products	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Chlorine bleach	sodium hypochlorite	•			•		hydrogen peroxide, borax
Dishwasher det	chlorine bleach, phosphates	•			•	•	chlorine/phosphate free formulations
Drain	lye	•	•				snake, plunger, air gun
Oven	lye	•	•				Easy Off Non Caustic Formula
Toilet bowl	lye, acids, chlorine bleach	•	•				ordinary cleaners
Spot remover	petrol. distillates, trichloroethane	•		•		•	enzyme presoaks, citrus oils, detergents
Metal cleaner	petrol. distillates, ammonia	•		•	•	•	products without petroleum distillates
Household ammonia	ammonia	•			•		vinegar (windows), washing soda (wax removal)

Polishes/Waxes	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Furniture polish	petroleum distillates	•		•		•	vegetable/mineral oil based
Floor polish	petroleum distillates	•		•		•	acrylics
Metal polish	petroleum distillates	•		•		•	
Shoe polish	petroleum distillates	•		•		•	

Paints/Solvents	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Oil-based paint	petroleum distillates, lead	•		•		•	latex paint
Latex paint	glycol ethers, mercury	•				•	low VOC latex paint
Paint thinner	petrol. distillates, turpentine	•		•		•	use water-based paint
Paint remover	methylene chloride, toluene, acetone, methanol	•	•	•		•	water soluble strippers

Pesticides	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Garden insecticides	diazinon, acephate, malathion	•				•	IPM:plant selection, barriers, traps, biologicals, soaps
Indoor Insect sprays	pyrethrins, trichloroethane	•		•		•	IPM: barriers, traps, soap sprays, boric acid, pyrethrum
Flea bombs	pyrethrins, trichloroethane	•		•		•	IPM: vacuuming, flea comb, shampoo, citrus oils, pyrethrum
Mothballs	naphthalene, p-dichlorobenzene	•				•	IPM: vacuuming, airing and cleaning, freezing, packing
Rat poison	warfarin	•					IPM: traps
Slug poison	metaldehyde	•					IPM: copper barrier, beer traps, late night search & destroy, bait
Weed Killers	2,4-D, dicamba, glyphosate	•		•		•	IPM: careful landscape planning, ground covers, hand pulling
Fungicides	funginex, sulfur	•	•			•	IPM: moisture control, sulfur
Disinfectants	chlorine, quats, pine oil, phenol	•					IPM: examine need for, pine oil, weak chlorine bleach solution
Wood preservatives	copper, zinc, folpet, TBTO, penta	•		•		•	IPM: water repellant, paint, borates, zinc/copper

Automotive	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Motor fuel	gasoline, benzene, lead, aromatics	•		•		•	none
Motor oil	petroleum distillates	•		•		•	none
Antifreeze	ethylene glycol	•				•	propylene glycol
Brake fluid	glycols and glycol ethers	•				•	none
Carburetor. cleaner	petr. distillates, chlorinated hydro	•		•		•	have car serviced at shop
Batteries	sulfuric acid, lead	•	•		•	•	none
Car Wash	surfactants	•				•	avoid runoff, have car washed at regulated business

Adhesives	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Rubber cement	hexane, heptane, petr. distillates	•		•		•	glue stick, white glue, paste, tape, waxer
Epoxy	epoxy resins, amines	•	•	•	•	•	none
Contact cement	trichloroethane, petr. distillates	•		•		•	Elmers Saf T Contact Cement
Model cement	acetone, toluene, styrene	•		•		•	none
Instant glue	cyanoacrylates	•					none
Spray adhesive	trichloroethane, methylene chlor	•		•		•	photos: dry mount tissues

Art/Hobby Supplies	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Spray paints	trichloroethane, methylene chlor.	•		•		•	use brush
Artist paints	metallic dyes	•				•	organic dyes
Photo chemicals	acids, bases,						none
Lead solder	lead	•				•	lead-free solder
Markers	xylene, alcohols, ketones	•		•		•	crayons, pencils, grease pencils, water-based markers, alcohol/based markers
Correction fluid	trichloroethane	•				•	correction tape
Lubricating oil	petroleum distillates	•		•			none

Miscellaneous	Typical Problem Ingredients	Tox	Cor	Flm	Rct	Env	Alternatives
Household batteries	mercury, cadmium, nickel	•				•	Hg free alkaline, Cd free rechargeable batteries, solar powered devices
Medicines	varies	•					none
Charcoal lighter fluid	petroleum distillates	•		•		•	chimney, electric starter
Pool chemicals	chlorine	•	•		•		
Lawn fertilizers	nitrates, various salts	•				•	compost, seed/bone meals, slow release fertilizers

It is clear from looking at this table that the availability of suitable alternatives varies widely across the product categories. For the most hazardous types of cleaners, effective alternatives are widely available. Corrosive drain, oven, and toilet bowl cleaners are easily replaced. Toxic spot removers can also largely be avoided, although potentially many different products may be needed, depending upon the types of spots and stains. For metals, some non-hazardous cleaners are available in the marketplace, and some of the do-it-yourself recipies also work remarkably well. Chlorine bleach can be replaced in some laundry applications, particularly for colored loads,but none of the alternatives has the disinfecting ability or extreme whitening power of chlorine bleach. Dishwasher detergents without chlorine bleach and phosphates have been on the market for several years, but some of these products have not performed well under varying water source conditions. It seems that some research and testing is still needed in this area. Generally, however, a knowledgeable consumer could quite easily avoid most of the extremely hazardous cleaning products by making careful choices. Of all of the product categories considered here, cleaning products are the most likely to be disposable through the wastewater treatment system and least likely to require special collection.

Polishes and waxes are usually hazardous if they contain petroleum distillates, which make them both flammable and toxic, particularly through aspiration into the lungs, and unsuitable for disposal in wastewater. Polishes used over large surface areas, such as floors, can be sources of indoor air pollution.[4] Furniture polishes based upon vegetable or mineral oils are significantly less dangerous. Acrylic floor polishes also eliminate the flammability hazard and reduce the vapor hazard. Solid shoe polishes are less hazardous than aerosols because of their physical form, but they are still a disposal problem. Some alternatives exist, but most of the major brands would be considered hazardous for disposal purposes.

Paints make up one of the major volume items in hazardous waste collections. As the variety and quality of latex paints continue to improve, most oil-based paints can be replaced with these less hazardous alternatives. For some special purposes, oil based paints are still necessary, but their use is decreasing. Latex paints are becoming even more environmentally friendly, the removal of mercury having been closely followed by the development of solvent-free paints. (One of these paints will be discussed in the panel on case studies of reformulated products.) These paints are quite new, and customers are not yet aware of their existence or advantages. As oil-based paints are replaced, the need for thinners and brush cleaners is eliminated at the same time. Paint strippers are among the most hazardous products in the home. Recent development of water soluble strippers based upon dibasic acid esters provides a viable alternative to strippers based on methylene chloride, acetone, toluene, and methanol. The fact that at least six brands are now available indicates considerable interest in these products. The development of this type of paint stripper will also be a subject of the product reformulation case studies.

In my view, all pest control products, whether hazardous or not, should be used in the context of an Integrated Pest Control (IPM) approach, which not only minimizes the hazards by requiring that least-toxic controls be given priority, but also maximizes the chance for success. The question of alternatives should not be "what [single] product can I substitute for malathion," but rather "what less-toxic tools are available." Generally, the variety of physical controls is impressive, including traps, barriers, and other inventive systems, and new products continue to come on the market. While not all problems ultimately can be solved without toxic chemicals, an extremely high reduction in either quantity or toxicity is quite possible in many cases. The main problems in pest control are educating the consumer about the IPM approach, overcoming the extreme convenience of chemical pesticides, and making alternative products more available and competitively

priced. Chemical pesticides currently benefit from an unfair advantage: their disposal and environmental costs are not factored into the sales price. Research needs to continue on less toxic, more selective pest controls, but these will also have to be evaluated in the context of an IPM approach. A less-toxic or more selective chemical is still a chemical, and chemicals receive lowest priority in IPM. An additional problem in evaluating the suitability of a pesticide as a safer alternative is the presence of undisclosed "inert" ingredients. Many pyrethrin formulations, for example, contain the solvent methyl chloroform, whose damaging environmental effects counterbalance any environmental advantages of the active ingredient. Given the complexity of this field, it is clear that a considerable burden will rest with the consumer, and good pesticide education is very important.

With automotive products we come to the first major category in which relatively few alternatives are available. Motor fuel and motor oil, like brake fluid, transmission fluid, and many other petroleum-based fluids are currently not directly replacable. The culprit appears to be the modern automobile itself, and management of the fluids appears to be the only choice. Recycling is absolutely essential, but it is not source reduction. Reduction in miles driven, and hence fluids used, is a form of source reduction, but its large scale implementation often depends upon many external factors, such as availability of public transit. The only automotive fluid for which there is a direct replacement is antifreeze. Propylene glycol antifreezes are clearly less toxic, at least before the corrosion inhibitors are added. The major factor blocking widespread acceptance of PG antifreeze as a suitable alternative is the fact that it is not currently being recycled.

Few alternatives are available for adhesives, particularly those with special properties, such as adhesion to unusual surfaces, flexibility, super high strength, or instant bonding. The most replaceable hazardous glue is probably rubber cement, which may be replaced by glue sticks, white glues, pastes, and electric waxers, depending upon the application. There are some safer alternatives to traditional contact cement as well. But for epoxies, model cements, and instant glues, options are limited.

Art and hobby supplies constitute a difficult area as well, because of the variety of materials, some fairly exotic. Clearly, some materials are much safer than others, and many choices exist. For the child or casual hobbiest or craftsperson it is imperative to base the choice of materials heavily on the basis of safety, and choices like using primarily water-based art materials need not be overly restrictive. Unfortunately the recent loss (due to budget cuts) of the California Art Materials List is a major blow to those of us trying to identify the least toxic art products. The Art and Craft Materials Institute (ACMI) ratings are useful, but they do not coincide exactly with the old California listing. For professional artists working at home, it is more difficult to envision artistic decisions based solely upon safety considerations, when specific media offer unique properties and results. Yet health concerns are very important in the arts and crafts business, and mere protective equipment is not enough. Research is necessary into safer dyes, pigments, solvents, and other media to achieve safer materials with essentially the same artistic properties as the traditional ones.

A number of other miscellaneous products are easily replaced with less hazardous alternatives. Charcoal lighter fluid is completely unneccessary nowadays, with the proliferation of chimney devices that start fires more quickly, reliably, and safely from a single sheet of newspaper. Apparently most consumers are not yet aware of these devices.

Directions and Priorities for the Future

On the last day of the 1991 conference in Seattle, a group of attendees came together in a discussion group to talk about toxicity reduction. Some of the ideas that came out of that group are worth reviewing here at the start of the 1992 conference because they seem to

point in a constructive direction. The group outlined a four part strategy, which I have paraphrased below.

Phase 1
- Identify hazardous constituents that are present in indoor air, municipal solid waste, leachate, incinerator ash, incinerator emissions, MSW compost, wastewater and POTW sludge
- Identify constituents of concern during use and storage

Phase 2
- Prioritize the hazardous constituents based on toxicity, impact on public health, and the environment
- Identify the products which contain these constituents

Phase 3
- Work with manufacturers to encourage product reformulation
- Develop educational strategies and legislative remedies based on the targeted products

Phase 4
- Use Life Cycle Analysis to develop lists of safer substitute products
- Identify and implement effective education methods

Obviously this program is very ambitious, but some of the specific actions suggested here have already begun. A good deal of evidence required for Phase 1 already exists at the federal, state, and local government level, although it needs to be collected to identify gaps and to see the whole picture. The approach that is being used at EPA[5] to address indoor air pollutants seems a good model for identifying constituents of concern, as well as for setting priorities for source reduction.

Phase 2 is the difficult part. One of the most important roles for the government can be setting priorities for hazardous waste reduction based upon human and environmental health risks. This methodology should include environmental factors such as ozone depletion potential, smog production, toxicity to environmental organisms, groundwater pollution, etc. Estimates should also be made of synergistic interactions that may occur with likely co-pollutants. When pesticides are involved, inert ingredients should be fully taken into account. These risk assessments should not be used to predict actual quantitative risks or safety factors, because the state of the art is not adequate to do that, but they can be used to compare risks for the purpose of setting priorities for action. EPA has also analyzed a great number of consumer products for hydrocarbons of special concern in indoor air pollution.[6] Surveys such as this need to be extended to identify products which contain all targeted constituents of concern.

Possible actions which may arise from this analysis include working with manufacturers to encourage specific reductions, banning certain ingredients, setting incentives or taxes to facilitate finding alternatives for certain types of products or ingredients, and additional restrictions on sales or labeling of products. For manufacturers the goal continues to be to find safer alternatives, particularly in areas where few exist or most products remain extremely hazardous, such as adhesives, paints, automotive products, art materials, and pesticides. Lately there seems to have been an epidemic of so-called "green cleaners," but this is not really the area in which we need the most research. In fact, with the exception of paint strippers and enzyme-based drain cleaners, it almost seems as though the number of new "green" products seems to be inversely proportional to

the need for the products. We probably don't need any more "green" window cleaners or dishwashing liquids, but we could certainly use some less toxic adhesives, phosphate-free dishwasher detergents on the mass-market, and special purpose paints.

At the same time, as alternative products are introduced, the hazardous products they replace need to be removed from the marketplace. Why do we still have lye-based drain cleaners on the market when so many alternatives are available?

Retailers need to become more educated about the products they sell, and how their disposal can be a tremendous environmental and economic burden. Selection of which products to sell should take into account the hazards of the products, and safer alternatives should at least be offered side by side, giving the consumer a choice and helping to provide markets for these products while achieving some education at the same time. Perhaps we should make more effort to bring retailers into this conference so that they can begin to better understand the issues and the challenges we all face.

In a market economy, however, the consumer has the real power and the real responsibility. Given the right products, the right prices, sufficient availability, honest informative labels, and some basic knowledge, the consumer must do the rest. A product isn't going to remain on the market for long if it doesn't sell. Education about safer alternatives needs to get more specific and it needs to reach beyond the 10% or so of the population which is already quite informed. Phase 4 can involve many players, including non-profit organizations, cooperative extension, local governments, and retailers. Third party certifiers have a vital role in helping consumers sort out product claims. Finally, consumer behavior needs to be measured for signs of progress.

Even without detailed risk assessments, some priorities are obvious. I submit that the following types of products are high priority candidates for source reduction:

- Products considered extremely toxic, extremely flammable, corrosive, or highly reactive
- Products containing known or suspected human carcinogens
- Products containing ingredients toxic to reproductive system, nervous system, etc.
- Products containing ingredients which are persistent in the environment
- Products which contain ingredients which bioaccumulate or bioconcentrate
- Products containing chemicals likely to leach into groundwater
- Products containing chemicals with major impacts on surface water (e.g. phosphates)
- Products containing pesticides which are particularly toxic to harmless or beneficial organisms
- Products containing ozone-depleting chemicals

Measurement

Once we have defined source reduction and set specific goals and priorities, we need to have a way of measuring it to see if we are making progress. Up until now, most people

have used primarily indirect ways to measure HHW reduction or they have not measured it at all. We need to get more sophisticated and more precise in our measuring tools.

There are really only three ways to measure source reduction. One is to measure what people buy. The second is to measure what they throw away. The third is to ask consumers what they buy or throw away. By themselves, surveys are notoriously unreliable because what people say is often not in accord with what they do. Surveys are best used in conjunction with direct measurements.

Sorting of garbage to determine the content of hazardous products is underway, and results from Minneapolis will be reported at this converence. Surveys are being utilized to measure what consumers say they do or will do. We have not really tackled product purchasing statistics, however. Direct measurement of source reduction can be done by monitoring the hazardous chemicals which go into and out of industries, stores, and homes. More effort needs to be put into obtaining and interpreting these numbers.

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National Household Hazardous Waste Conference (12/92)
Speech by Minnesota State Representative Jean Wagenius

I appreciate the opportunity to talk about reducing the toxicity of the household hazardous waste stream.

In the recent past government managed the household waste stream as a convenience to its constituents and to keep our commons neat and tidy. It wasn't much of a trick as long as our waste stream was chicken bones and coffee grounds -- just collect the stuff and use it for fill for wetlands or gullies.

In the 70's we had landfill operators cover garbage to keep the flies and accompanying possibilities for disease down; we called these new landfills sanitary. In the 1980's we found that sanitary was a cruel misnomer. The state of the art landfills of the 1970's as well as all those that had gone before were leaking an extraordinarily toxic mix into the groundwater.

Like most, Minnesota's response was to build incinerators and to require clay liners and leachate collection systems for both ash and regular landfills.

The potential neighbors of these new incinerators and landfills have responded by saying "No, we don't want them". Government, the managers of waste and the industry which produces the products that end up in the garbage have dismissed the neighbors

calling them NIMBY'S and, in my judgement, are both blaming the victims and blinding themselves to solutions.

Truthfully you would have to be somewhat irrational to just accept a landfill next door. Of 150ish landfills in Minnesota, 63 are on the state's superfund list -- some of these are open and operating -- and of those not on the superfund list, everyone in the field believes that when they are tested, they too will end up on superfund. The average cost of containment, not cleanup, just containment, is $4.2 million dollars, so the total estimate for containing the ground water pollution is between $250 and $450 million dollars. Just to put that in context, understand that we consume about 2% of the GNP. We are scheduled to run out of superfund money at the end of the fiscal year. As a neighbor of a potential new landfill, would you really trust a system that has a projected budget shortfall of $700 million, little money in superfund and over a hundred leaking landfills?

Our state, like most others is planning new state of the art facilities to manage our growing waste pile. In 1988 the Minneapolis/St. Paul Metropolitan area paid $16.7 million just in financing for the capital costs for facilities. The projected cost for capital financing in the year 2011 is 81 million - 5 times as much. As you know capital costs are only a small part

of the bill. And folks here are already complaining about escalating garbage bills.

With both the clean up of old facilities and the building of new facilities it is the toxins, not the volume, that is skyrocketing our costs. While not everything in the waste stream is toxic, everything that is burned, buried or composted has to be treated as if it were toxic. In other words, some toxins are contaminating the whole disposal stream and are driving our costs.

I want to give you an idea about the amount of toxicity coming into our municipal waste stream and I'll do it in two ways. One way is to look at waste composition.

The Minnesota Pollution Control Agency is in the process of studying our waste composition. Based on preliminary results they have determined that .1% of the municipal solid waste stream is household hazardous waste. The .1% does not include batteries, container weight or the toxins in things that are not regarded as household hazardous wastes -- like the cadmium or lead in inks on waste paper and plastic.

Even so, based on the .1% figure, there were 5 million pounds of household hazardous waste in our municipal waste stream in 1991.

Remember we only consume about 2% of GNP. About half of the 5 million pounds went into our landfills.

Thus, an average sized landfill will receive about 48,000 pounds of household hazardous waste each year and 1,200,000 pounds over a 25 year lifetime. Clearly that is sufficient reason to manage all waste as if it were hazardous.

Another way of looking at toxicity in our waste stream is to look at what is ending up in the ground water around a landfill. We have identified about 30 toxins that show up in the leachate of at least 1/2 of the landfills which have been tested. We call them priority toxics. These toxics would be familiar to you: arsenic, cadmium, mercury, toluene, benzene, methyl chloride, etc. Our Office of Waste Management has culled through the products containing these priority toxins and determined that 89 million lbs of them are used in the products Minnesotan's buy each year. Remember again, we consume roughly 2% of the GNP, so that gives you a rough idea of how much is out there -- how much is not being managed in the industrial waste stream.

It is instructive at this point to give you a rough comparison of the amounts of these priority toxins that are <u>released</u> by industry and those that we <u>use</u>. Using the Minnesota Toxic Release Inventory data for 1990, the staff of the Legislative Commission on Waste Management compared the aggregate Minnesota

use of each of the priority toxics to totals of industry releases for each toxin. In almost every case we used substantially more than industry released.

For example, industry released approximately 7,900 lbs of arsenic, we used more than 225,000 lbs. Industry released almost 500,000 lbs of lead, we used more than 4 times as much. Industry didn't release any methyl chloride, we used 160,000 lbs. Industry released 13,000,000 lbs of toluene, but we used more than twice that. And my final example, industry released 220,000 lbs of benzene, we used 6,400,000 lbs.

One of the conclusions I draw from these figures is that as a society, we are not facing a major source of our pollution problems -- that is use for our household products -- and until we do so, our waste management problem will be acute.

I think government has 3 options: 1. to ban toxins on a case by case basis, 2. to collect them in the household hazardous waste stream or to have the producer of the toxic product collect them, and 3. to label or tax them to try and discourage them.

I'll briefly tell you about the experience Minnesota has had with each option: Several years ago Minnesota adopted the CONEG proposal to ban four toxics (lead, mercury, cadmium and hexavalent chromium) from packaging. The ban not only limits

toxicity but makes recycling of packaging easier. We then took the CONEG proposal the next step and banned the four toxics from other things like paints, dyes and fungicides.

In each of the last three years I was the chief House author of legislation dealing with mercury and in each bill there were some bans.

I will tell you about them in some detail to show you that while bans are worthwhile for some things that are so harmful to Minnesota in particular, it is just too time consuming to rely on them as a general strategy.

Hennepin County began burning waste in late 1989 in a state of the art waste to energy burner with a state imposed mercury emissions standard of .002 lbs. of mercury per ton. Given the size of the burner, it can permissibly emit 2 lbs. of mercury per day. Keep this standard in mind. When the burner began it was operating under the strictest standard in the nation. It is also woefully inadequate.

Studies in both Wisconsin and Minnesota have documented mercury's harm. A Minnesota study found pervasive evidence that high levels of mercury contamination of fish are not natural and are increasing; these studies were done on some of our most remote and pristine lakes.

The mercury is coming primarily from the atmosphere and is entering the atmosphere from three main sources: combustion of coal for electric power, mercury additives to paint and waste incineration. The average annual increase of mercury since 1930 has been about 3% per year, 5% since 1970.

The study found that even the smallest amount of mercury in a lake is capable of causing harm. Concentration of only 2 parts per trillion can trigger a fish consumption advisory. In some Minnesota lakes mercury concentration is high enough in fish to harm or even kill mink, otters and loons. A May 1991 report from the Minnesota Department of Health, advises eating fish from 310 lakes only once per week because of mercury. The advisory was posted on 95% of lakes that were tested.

Dr. Carl Watrus, from the University of Wisconsin, reported to us that he found that 1/2 gram, or the amount of mercury that would fit in an "0" on a printed page is enough to contaminate a 30 to 40 acre lake. Compare that to the 2 lbs a day that the Hennepin County burner can emit or to the 1000 lbs per year that NSP emits from its stacks in producing 70% of Minnesota's electricity.

In 1990 Senator Greg Dahl and I proposed legislation limiting the amount of mercury in household batteries. At that time batteries were the number one contributors of mercury in the waste stream. I found about that through sheer luck. Manufacturers were

anything but straight forward. Obfuscation would be a kind word. However a persistent college intern found someone at the Dept. of Interior Bureau of Mines who kept track of where mined mercury was sent and from there we were able to piece together industry's use of mercury.

Manufacturers never told us that several European countries had already limited the amount of mercury in alkaline batteries, because European countries had "dead" lakes and had determined that much of the mercury came from waste incinerators which in turn came from alkaline batteries.

In our first battery law we adopted the 1993 European/Canadian standard of no more than .025% mercury by weight for alkaline batteries. This went into effect in February 1992. For Minnesota, that meant 500 lbs. of mercury rather than 11,000 lbs. We also required that when manufacturers sell four types of batteries to government or industry they either arrange for the processing of the used batteries or take them back themselves. The four are mercury, lead, silver and nickel cadmium. In our second battery law we required the elimination of all mercury in alkaline batteries by 1996. We also adopted the European limit for mercury in button cells.

However, mercury in button cells remains a problem. While the amount in each cell is very small, the cells are ubiquitous.

Both the number and the small size made them hard to collect. The better solution for us is for manufacturers to eliminate the mercury. To their credit, Everready has already developed and is marketing a zinc air button cell with no added mercury. We will have a bill this year proposing that as the standard for all button cells sold in Minnesota beginning in 1997.

Rayovac, at this point, is opposing the statutory deadline. If, however, we don't impose a statutory standard, companies like Everready that would be willing to do the necessary research and development and conversion of equipment would be put at a competitive disadvantage. Put another way, the most polluting company would be allowed to set the industry standard. And Minnesota taxpayers would have to pick up the expense of collection and disposing of button batteries.

In the process of working with mercury in batteries, we found out about rechargeable household batteries. That brings me to the second of the options for government: collect household hazardous waste or have the producer do it. Rechargeable batteries come in two forms: nickel cadmium and sealed lead acid. They are a disposal problem no matter how you do it. Moreover cadmium shows up in the groundwater under our unlined landfills, in the leachate of our lined landfills and is one of the reasons the Hennepin County burner is sending its ash to a hazardous waste site. Cadmium is far more leachable once burned.

Moreover, our counties who want to compost say that one ni-cad can ruin a whole batch. Our Office of Waste Management estimates that the battery industry used 1,470 tons of cadmium in 1990. That means that 28 tons is coming into my state (remember we consume 2%) each year.

EPA has told us that the projected increase of Ni-cads is straight up and to get them out of our waste stream. What EPA didn't tell us was how to pay for the disposal. While Europe and Japan have facilities for recycling cadmium, there is no facility in the U.S. Thus, if we told our counties they had to get ni-cads out, they would have to send them to a hazardous waste site at state expense which would essentially amount to a huge state subsidy to users. This is the major problem with the collection strategy: who pays for counties collecting household hazardous waste?

There are those who would argue that garbage is a state function, and we should just raise our garbage rates. I see two problems: one is that besides the initial cost of a separate collection and disposal system, the state assumes liability when we send hazardous material to a hazardous waste site. Both costs are just too much to assume. Secondly, it is fundamentally unfair to our citizens who end up paying for the handling of someone else's very expensive pollution.

Another way of looking at the economic issue here is this: government socializes the costs of things we want to encourage. Education is a prime example. If we socialize the cost of collecting toxins we only encourage them. Our policies need to be set to discourage, not encourage them.

So given all that, we passed legislation in 1991 banning rechargeable batteries from the waste stream and requiring the manufacturers of rechargeables to design and pay for a collection program which can be reasonably expected to collect 90% of the batteries. The date is 1994 but beginning this last spring, the industry was required to begin pilot programs, each of which can be reasonably expected to collect 90% of the batteries. Companies that don't participate can't sell batteries in the state.

The real advantage from a recycling point of view is that industry will now have an incentive to recycle its cadmium - because it is aggregating it. If our own counties were to collect, they could only dispose.

Unfortunately, it is the taxpayer and not the user who is paying now. If you have ever watched a tax committee struggle with an issue, you would know that those who scream the loudest are those who are enjoying a government subsidy and are in danger of losing

it. In this case it is the product manufacturer not the end user who is screaming.

I have talked to my constituents many times about this issue. They firmly believe in the polluter pays principal even when they are users themselves. As a user they can control the amount of money they spend; they know it is more difficult to contain the costs they are paying as a taxpayer.

Thus I believe it is just a matter of time before we tax polluters in consumer products and those who defend the present system of subsidizing those who pollute are doing so at their political risk.

-END-

Why Household Hazardous Waste Management Is Needed

by

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Why worry about the disposal of hazardous household products? Anyone who has worked at an HHW collection probably has some answer to that question, based on the sheer quantities, variety and age of items that get turned in when people are given the opportunity.

People use a lot of hazardous consumer products and often misuse them, as the three examples in Figure 1 show. When old or unwanted amounts are thrown away, they retain their hazardous characteristics and can pose problems in the waste stream and in the environment.

I would like to briefly review potential problems or areas of concern resulting from the improper handling of household hazardous wastes, following the outline in Table 1.

I. Municipal Solid Waste:

Americans produce about 160 million tons of solid waste per year, of which ten percent is recycled, ten percent is incinerated and 80 percent (130 million tons) is landfilled (EPA, 1989). Those quantities figure out to be 1300 pounds per person per year or 3.5 pounds per person per day; 3500 pounds or 1.7 tons per household per year. That's a lot of garbage.

Amidst the paper, orange rinds, glass and cans, how much is hazardous? Various solid waste sorts have all tended to find that 0.3 to 0.5 percent by weight of municipal solid waste is identifiable items that can be labeled household hazardous wastes (see Cal Recovery Systems, 1985; Rathje et al., 1987). The Seattle-King County area has settled on a figure of 0.33 percent for planning purposes (Local Hazardous Waste Management Plan for Seattle-King County, 1989). Dana Duxbury, in a recent Waste Age article (Duxbury, 1989), uses a figure of 0.5 percent as a national average. What is the significance of a level of 1/3 to 1/2 of 1 percent in municipal solid waste? This is subject to plenty of dispute or difference of interpretation. The EPA-funded study in Marin County, CA, and New Orleans, LA, (Rathje et al., 1987) concluded, "There are significant amounts of hazardous wastes in household garbage, and even

Woman dies in home accident

The Pierce County Sheriff's office is investigating a bizarre accident that took the life of a 39-year-old Tacoma-area woman.

The victim, identified as Phyllis Ward, 39, was found dead about 11:30 p.m. yesterday entangled in the oven in the kitchen of her apartment just south of the Tacoma city limits.

Sgt. Pat Lemagie reported that the woman had sprayed a cleaner on her oven eight hours earlier and left the element on — according to

Toilet blows its tank due to clean thinking

SATELLITE BEACH, Fla. (AP) — A man says he turned his toilet into a test tube when he mixed two common cleansers and got an explosive reaction.

Hilton Martin told fire officials in this Florida town south of Cape Canaveral that he cleaned the toilet with Comet cleanser and then sprayed a container of Sani-Flush cleanser inside the tank.

The water started boiling and the kitchen phone started ringing.

"About the time that he walked out of the bathroom, the tank on the toilet exploded," said paramedic Mike Whitaker, adding that Martin was lucky to escape injury in last week's incident.

Fire officials say the explosion resulted from some type of chemical reaction.

Sydney McHugh, a spokesman for Procter & Gamble Co. in Cincinnati, said ... Comet, ... manufactures ... with local ...

Bug spray backfires, blows out the windows

NORTH LAS VEGAS, Nev. (AP) — A woman trying to rid her home of pests narrowly escaped serious injury yesterday along with two others when fumes from 15 cans of bug fogger ignited and exploded, fire officials said.

"It literally blew the roof off the house," said Fire Marshal Bob Mills. "The windows of the home were blown out, and the roof was knocked an inch out of alignment."

Marilyn Lucas, her teen-age daughter and a friend of her daughter had just gotten out the door when the bug spray was ignited by the pilot light on a kitchen stove, Mills said.

"They weren't injured, but they were scared to death," said Mills. "They could have received very serious burns if they had been in the house."

Bug foggers are designed to be set off and empty themselves of spray while the user leaves the house for a couple of hours.

The bug spray did not kill all the insects, Mills said.

Figure 1. Examples of Problems Caused by the Misuse of Hazardous Household Products.

MUNICIPAL SOLID WASTE

- worker injuries
- equipment damage
- landfill leachate contamination
- landfill air emissions
- incinerator ash and emission contamination

DOMESTIC WASTEWATER

- worker injuries
- pipe damage
- discharge to water or air
- sludge contamination
- septic tank/drainfield groundwater contamination
- septage contamination

OTHER AVENUES TO THE ENVIRONMENT

- storm drain contamination
- hole-in-the-ground groundwater contamination

LONG-TERM STORAGE

- poisonings
- indoor air pollution
- fires and firefighter safety

Table 1. Potential Problem Areas from the Mismanagement of Household Hazardous Wastes.

the most conservative estimates of the amount discarded for a large community are substantial.... It represents a significant quantity...."

So why worry?

a. Worker injuries. Municipal or private workers who pick up household rubbish are exposed to a variety of things when they dump the containers into their trucks or deal with the refuse at transfer stations or landfills. There have been a number of incidents of injuries to workers, but no national statistics are kept, to my knowledge. A California study in 1982 found that three percent of all refuse collection workers in the state were injured due to contact with HHW mixed in with trash and garbage.

b. Equipment damage. Garbage trucks, shredders and other solid waste handling equipment have been damaged from explosions and fires resulting from the chemistry in household trash. Again, national statistics are scarce, but numerous incidents have been reported, including at virtually every operation that involves a shredder (Popp et al., 1985).

c. Landfills. Eighty percent of America's municipal solid waste is landfilled. EPA's Subtitle D report (EPA, 1986a) concluded that:

- more than half of all active landfills in the U.S. are municipal;
- less than half of these municipal landfills have runon/runoff controls;
- only 1/4 of municipal landfills have groundwater monitoring systems;
- only 15 percent of municipal landfills have liners, either clay soil or synthetic; and
- only 5 percent of municipal landfills have leachate collection systems.

Twenty percent of all National Priority List ("Superfund") sites are old municipal landfills.

Leachate from landfills can be contaminated with HHW chemicals. A number of studies have well documented hazardous metals and organic chemicals in municipal leachate, even those far from industrial sources (see Dunlap et al., 1977; Sabel and Clark, 1984). These and related studies implicate consumer products as sources of these contaminants.

Municipal landfills have also been found to produce hazardous air emissions, including vinyl chloride, a known human carcinogen, at levels violating health standards (Wood and Porter, 1986; Battelle Pacific Northwest Labs, 1987). The source of vinyl chloride appears to be bacterial action on chlorinated solvents such as TCE within the landfill.

d. Incineration/resource recovery. Up to ten percent of municipal solid waste is now burned. Concerns have been expressed about the dioxins and furans that are produced in incineration. Major concerns related to HHW involve heavy metals, especially mercury up the stack and lead and cadmium in the ash. The dominant source of these metals in municipal solid waste is household and automobile batteries (Franklin Associates, 1989). At the Danish hazardous waste incinerator in Kommunekemi, every drum of HHW is opened and inspected to remove all batteries and other potential mercury sources. If this is done at a hazardous waste incinerator with state of the art controls, what should we expect at municipal incinerators?

II. Domestic Wastewaters:

The advent of keeping human wastes from being tossed out the window and instead carrying them away with water was a great public health benefit -- at least at first. However, today domestic wastewaters carry more than just human wastes; many modern consumer products are either designed to go down the drain or, because they are liquid, get disposed down the drain. Domestic wastewater consists of 99.9 percent water by weight and only 0.02 - 0.03 percent suspended solids, plus even less of other things. However, that doesn't mean sewage is squeeky clean. Relatively small concentrations of chemicals can be quite significant in the liquid waste stream.

A number of studies have documented heavy metals and organic chemicals in domestic wastewaters (see Levins et al., 1979; Gurnham et al., 1979; EPA, 1982; Cooley et al., 1984; EPA, 1986b). These chemicals include cadmium, lead, mercury, nickel and other metals, plus solvents, paint thinners and degreasers such as tri- and tetrachloroethylene, methylene chloride, benzene, and toluene, pesticides such as DDT and lindane, and plastic components known as phthalate esters.

So why worry?

a. On-site systems -- septic tanks and drain fields. About one-third of all U.S. housing units use septic tanks, cesspool or other forms of on-site wastewater disposal. Human, organic wastes can be decomposed in these systems, with soil used as a final filter , but they are not designed to handle hazardous chemicals. On-site systems are concentrated in the U.S. Northeast, with lesser concentrations in Florida, southern California and the Northwest.

Studies have found organic chemicals passing right through septic tanks and drainfields into groundwater (Tomson et al., 1983; DeWalle et al., 1985; Kolega et al., 1985;

Kolega, 1989). An EPA study (EPA, 1984) concluded, "Only 40 percent of existing septic tank systems function properly....[O]f all groundwater pollution sources, septic tank systems and cesspools rank highest in total volume of wastewater discharged directly to soils overlying groundwater and they are the most frequently reported sources of contamination."

b. Municipal sewerage systems. Publicly-owned sewage treatment systems often have industries and commercial businesses plumbed into them, but usually their predominant customers are households. Sewerage systems employ at a minimum primary treatment, which relies on gravity settling of solids, and usually secondary treatment, which uses bacteria to further break down organic materials; some systems also have tertiary or advanced treatment to remove specific problems such as nutrients. None of these treatment processes were designed specifically for hazardous chemicals. Some do in fact "treat" certain hazardous chemicals, but do so for the most part by shifting them into another medium such as air or solids.

All studies that have looked at contributions of chemicals into municipal sewerage systems have documented residential sources of heavy metals and organics (see previous references). Relative contributions will vary a lot depending on the mix of industries and businesses in the sewerage area, but all systems receive major input from households and can't afford to ignore these sources to keep effluent quality and sludge quality high. While most effects are cumulative from many small sources, it doesn't take much of some things to cause real havoc to a sewage treatment plant. For example, a pint jar of mercury was turned in at one of the Seattle area HHW Round-Ups. If this single household's accumulation had instead been dumped down the drain, it would have contaminated our whole system, causing violations of effluent limits and contaminating sludge, even in Seattle's largest, 125-million-gallons-per-day plant.

III. Other Avenues to the Environment:

a. Storm drains. Urban runoff carries lots of junk off road surfaces into local rivers, lakes or bays. But people also tend to dump all kinds of things down catch basins, gutters or street drains -- out of sight is out of mind. This is an especially common avenue for used motor oil and antifreeze, but also for such things as pesticides, car wash water, gasoline, brake fluid, paint rinse water, masonry acid rinses and just about every other liquid waste from an outdoor activity. Explosions have occurred in drain pipes, usually from gasoline dumping. Fish kills and water pollution are the more common result, since most storm

drains discharge directly into the nearest body of water without any treatment.

b. Holes in the ground. Similar to storm drain dumping, many HHWs are simply disposed on or in the ground. Used motor oil, old, liquid pesticides and paints are commonly handled this way, with resulting opportunities for the wastes to be washed through the soil directly into groundwater. This practice coupled with the vulnerability of its groundwater was one of the driving concerns which resulted in establishment of Florida's HHW Amnesty Days program.

IV. Long-term Storage:

As we all know, many products sit on the shelves for years or even decades. Any HHW collection well illustrates this point. Why worry?

a. Poisonings. Safety in the home, especially for young children, is a reason for concern about stockpiles of hazardous products, especially old, often more dangerous items. Twenty-five percent of Seattle Poison Center's calls and 30 percent of Minnesota's poison calls relate to hazardous products.

b. Indoor air pollution. Recent studies have concluded that indoor household air is often much more contaminated than ambient outdoor air. While there are many reasons for this and many sources of the various indoor air pollutants, hazardous consumer products are an identified source for organic chemical vapors and other contaminants.

c. Fires. Fire safety is an additional reason for concern. Spontaneous fires have been traced back to old products such as volatile solvents, old gasoline and exotic chemicals such as picric acid being stored in homes. Firefighters are becoming increasingly aware of and concerned about their exposure to fumes in the event of a fire. Previously this concern was limited to industrial fires, but increasingly it reflects awareness of the myriad of chemicals stored in the average house.

Summary:

Why are household hazardous waste management programs needed? There is a lot of HHW out there and it can cause human safety concerns as well as environmental concerns. It is becomming increasingly accepted that it would be a whole lot better to manage HHW separately from the regular municipal waste streams. Programs are needed that will manage HHW safely and properly in order to minimize actual and potential problems from the current mismanagement of HHW.

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Environmental Protection Agency
Household Hazardous Waste Conference
Minneapolis, Minnesota - December 8-12, 1992

Speech Presented by:
Suzanna Rumon - Household Hazardous Waste Specialist
Laidlaw Environmental Services, N.E.
North Andover, Massachusetts

Getting organized:

In getting organized, there are as many different types of organizational outlines as there are projects. We're going to outline the general methods of organizing Household Hazardous Waste Management Programs (HHWMP's) that will best suit your needs and help you avoid many of the pit-falls which we have been identified by the other speakers this morning.

This discussion will assume that siting, liability and insurance issues have been resolved. This assumption is not meant to imply that these are not serious issues, but rather to indicate that the commitment to deal successfully with these ***must*** be guaranteed by the top level decision makers ***before*** the public commitment of any valuable time or money. Once it has been decided that siting and liability issues can be resolved, then you can raise the expectations of the public.

Two things to keep in mind as you run into your own roadblocks doing this first phase:

1) PERSEVERE!!! YOU ARE DOING THE RIGHT THING!

2) DO YOUR FOOTWORK

Starting out:

The most important first step is to set goals! We can assume that the overall goal is to implement a comprehensive HHWMP program. For those who have never done collections, participation in "One-Days" or pilot "permanent" programs will demonstrate that there is a siting demand for these programs. The demand will show that permanent collection programs are an essential component of integrated waste management.

For those who have years of experience with one-days, our goal will be to open a permanent collection center. This means data collection and a lot of work with local, regional and State regulators. This is the work that I want to talk to you about today.

After the goals have been determined, you must garner support for these goals. All successful public service programs start with the pubic; usually there is a great deal of grassroots pressure that goes into getting a municipal or regional government motivated to become involved with hazardous waste. Often, this means that groups like the League of Women Voters, Conservation Commission, or Recycling Committee have been communicating with the relevant elected official or Solid Waste Manager/Public Works Chief or Health Dept. for several years.

In areas where permanent management programs are being pursued, one-day collections will often been institutionalized for many years. In either case, the primary issue is to set up clear lines of COMMUNICATION.

Communication works best if there is ONE contact person. Once this "Point Person" (HazWaste Coordinator) has been identified, it is important to let everyone know who that person is and what his/her responsibilities are. The HazWaste Coordinator has the responsibility for bringing people to the table and to making sure that all the details have been addressed.

Who do you need at this decision making table?

1. Regulators- Fire Marshall, Health Department, Building inspector
2) Opinion Leaders (Environmental/Non-Profit) - Button Pushers, activists
3) Political Leaders - not necessarily only Chief Elected Officials
4) Facility Neighbors - anyone affected by the siting of a HHW site
5) Employees - Both contractor and organizer
6) Customers - Those who will use the facility
7) Local Media - Environment or local beat reporters
8) Local Businesses - Hardware stores, grocery stores, etc.*

Once lines of communication have been established, start using them! This often means setting up regularly scheduled meetings with representatives from the various organizations whose support is needed to reach your goals. Monthly meetings of this HHWP committee will be more productive if clearly defined group goals as well as specific tasks for individuals are identified on a monthly basis.

It is important that some guidelines be established which delegate decision making power and guidance responsibilities. For example, the Chief Elected Officials (CEOs) will almost always have final approval if the programs are funded through public monies. The CEOs representatives, who attend the regularly scheduled meetings, may take responsibility for assisting the operators and program organizers in making decisions identifying how designated funds can be used for non-operational aspects of the program, i.e. education and volunteer coordination.

Most often, CEO's can't spend a lot of time on the project. This may not be the case for small communities, but is virtually always true. Since many committee members will be volunteers from the ranks of municipal employees and have other jobs, it is important to carefully decide tasks.

You will want to make releases, generic articles for local papers and trade publications as well as environmental or non-profit news letters. As long as the HazWaste Coordinator is the contact who gets all the information and draft releases.

* Generally speaking, large chain stores are not willing to commit the time or energy needed to reach customers to tell them that products that they may be buying need special disposal methods and that they should consider not buying the products or purchasing less/non toxic alternatives. Smaller, locally owned businesses tend to support these programs in a much more substantial way because they are long-term members of the community.

There should be a message that the program is being set up to reduce the hazardous constituent of the solid waste stream and help residents (and if your program has advanced to this stage, small businesses) handle their hazardous waste in a way that will protect the environment. It is hard for those of use here to understand, but it is true that the general public, as well as many solid waste professionals in the Waste to Energy Incineration business, still fight the concept of integrated waste management including the separation of hazardous wastes from the municipal solid waste stream. Knowing this - you must do the footwork here - by getting all your ducks in order before going to the general public with the plan to implement a household hazardous collection program. Nothing can do more damage to this important pro-environment program than to have a Sierra Club representative or the leader of a local environmental coalition being quoted as saying that there should be "no hazardous waste dump allowed".

Some of the principle concepts that should be used to marked the HazWaste Collection program concept need to be clearly verbalized by every member of the Household Hazardous Waste Planning Committee.

1) Working to protect the environment and remove hazardous products and remove hazardous products from the waste stream and residential homes. Make solid waste collection and disposal safer and cleaner.

2) Working to educate the public to reduce their dependence of Household Products.

3) Program will meet or surpass the regulatory demands placed on industrial or commercial waste collection programs: Safely Operated

4) The program will become a part of the way people handle their household hazardous waste each day.

In closing: Keep a record of what you do and who helps you - thank them and celebrate your success. Reinforce your program each operating season by thanking all of those who helped you reach your goals and asking them how to improve their program for the next operating season.

"HOME STORAGE SURVEY"

Michael T. Bender — Central Vermont Regional Planning Commission

While developing an unregulated hazardous waste management plan, Central Vermont Regional Planning Commission (CVRPC) initiated a "Home Storage Survey" in December of 1991 to determine the types and amounts of household hazardous products found in Vermont homes and quantities of household hazardous waste (HHW) likely to need disposal. The study's overall purpose was to develop household generation coefficients that could be used by CVRPC and others, including the State of Vermont and perhaps other states, to project HHW management program costs.

CVRPC contracted with Catamount Consulting Group, Inc. to perform the study. The study was co-sponsored by the National Paint and Coatings Association, the Portable Rechargeable Battery Association, the Massachusetts Paint Council and Sherwin-Williams Paints and funded, in part, by the State of Vermont. Technical assistance was provided by the study cosponsors, and the American Petroleum Institute. In some cases, the cosponsors also provided specific product definitions or examples of specific products in order to assist surveyors in more accurately identifying specific categories of household hazardous products and wastes.

A total of 501 households were surveyed out of the Vermont population of 210,000 permanent households with 80% homeowners and 20% renters. Selection of households was based on the 1990 U.S. Census. Representative surveys were taken to reflect the following size towns: less than 2,500 (32%); between 2,500 and 5,000 (26%); between 5,000 and 10,000 (18%) and greater than 10,000 (24%).

About two-thirds of the households contacted by the surveyors agreed to participate in the survey and were sent a survey questionnaire in advance of the home visit by the surveyor. The duration of the household surveys ranged from one-half hour to four hours depending upon the level of interest of the participant and the amount and variety of household hazardous products and wastes that were present.

The survey questionnaire was divided into two sections; data collection of household hazardous products and wastes, and consumer attitudes. HHW was described in the questionnaire as:

> "Many types of products used in the home, workshop, garage, or for hobbies may be toxic, ignitable, corrosive, or may react with other materials to create a hazard. When these products are thrown away, they may become household hazardous waste."

Data survey questions were divided into five categories of HHW; vehicle maintenance, paint and paint products, dry cell batteries, and general household products which comprised the rest. Consumer questions attempted to gauge the following:

1) support for a disposal fee at point of purchase; and
2) the amount participants would be willing to pay.

Almost everyone surveyed was cooperative in providing the requested information. This may be attributed, in part, to participants interest in winning one of ten $100 cash prizes (furnished by the national manufacturers and associations) awarded after the survey was completed. Many households also expressed interest in becoming more aware of what household products are hazardous, and how and where to properly manage and dispose of HHW.

RESULTS

What follows are the highlights of the study findings. Overall, the results indicate that Vermonters generate less HHW than previous estimates. In most of the larger quantity HHW categories (i.e. paint, oil, batteries), households in Vermont generate substantially less than indicated in other national or state estimates.

Data Collection

Although the average Vermont household buys as much paint as the national average, households

in Vermont appear to have less paint left over. Survey results indicate that Vermonters annually generate around 3 pounds of waste paint compared to the Vermont Waste Paint Report estimate of 10 pounds and other State study estimates ranging from 7 to 15 pounds or more of waste paint per household per year. Results also indicate that, on average, Vermont households have an average of 3.6 gallons of paint in storage for 4.6 years with over 70% of the paint in storage being latex.

Under the vehicle maintenance category, the survey indicates that the average Vermont household annually generates 2 gallons of used oil and 2.4 oil filters, which is consistent with national estimates. While the national estimates for those who change their own oil is around 50%, the survey results found that only about 30% of Vermont households changed their own oil. Of those surveyed, 31% have lead acid batteries currently in storage. In addition, the study found that around 120,000 vehicle maintenance products found in household storage are likely to be disposed before they are emptied.

Vermont households purchase 16 dry cell batteries each year or 30% less than national estimates. About 80% of the batteries found in Vermont households are alkalines, 13% are button batteries, 3% are rechargeables and less than 1% are lithium batteries. Survey results also found that the average household contains more than 2 but less than 3 appliances with rechargeable batteries. Power tools accounted for one-quarter of rechargeable battery uses, while flashlights were one-fifth and telephones and electric razors comprised one-eighth of the rechargeable battery powered uses.

Almost all of the households (89%) surveyed had pesticides in storage. Of the those surveyed, 63% indicated that they had household pesticides, 34% had yard pesticides, 35% had garden pesticides, and 11% had pesticides for other uses. Results of the survey estimate that over 1 million containers of pesticides are present in Vermont homes or an average of 4.3 containers of pesticides per household.

Rounding out the list of HHW categories, general household products was made up of a wide variety of home maintenance and use items ranging from cleansers and polishes to disinfectants and spent fluorescent lights, and are too numerous to mention here. One noteworthy result was that 97% of the households surveyed had fluorescent lights in their homes. On average, there are over 3 million general product containers in Vermont homes.

Consumer Attitudes

The majority of those surveyed expressed an interest in participating in HHW collection programs and a willingness to pay at point of purchase for the costs of proper management and disposal. Nearly half of those surveyed would be willing to pay a fee on the purchase of batteries to provide for proper management while over 60% supported a deposit refund system or a curbside program for the collection of dry cell batteries.

Of the survey respondents, 70% indicated that they would support a fee of $.50 per gallon to pay for the proper management of paint. Over 70% would also be willing to participate in a deposit/return system to cover the costs of a paint management program. Almost 50% of those survey also supported a deposit/refund system to support the cost of a used oil management program.

CONCLUSION

Survey results indicate that although Vermont households have large quantities of household hazardous products and waste in storage, Vermonters generally appear to purchase and have less in storage than national or state estimates. Many of those surveyed expressed an interest in properly managing their HHW. Almost one-quarter have already participated in at least one paint drop and swap program.

A large percentage also appeared willing to pay a fee or deposit to fund a HHW management program. Although difficult to enact, advanced disposal fees or deposit/refund systems may be necessary to cover costs of more aggressive and comprehensive HHW management programs in the future.

To receive a copy of the study, "Household Hazardous Waste: A Vermont Perspective," mail your request and $5.00 to CVRPC, 26 State St., Montpelier, VT. 05602.

SCREENING CONSUMER PRODUCTS FOR INDOOR AIR RISKS

James F. Darr, Christina A. Cinalli, Pauline K. Johnston, Ph.D.
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BACKGROUND AND PURPOSE

The U.S. Environmental Protection Agency has identified indoor air as a major pathway of human exposure to numerous chemicals. The Office of Pollution Prevention and Toxics (OPPT) at EPA is engaged in two major projects to screen indoor air risks:

1) The Indoor Air Cluster makes use of existing data on product composition and emission rates in order to do screening-level risk assessments on various product categories. The products being evaluated in the project are primarily household consumer products.

2) The Indoor Air Source Characterization Project (IASCP) is a long-term data development effort by OPPT, the Office of Air and Radiation, and the Office of Research and Development that will attempt to better define the exposures and risks encountered in indoor air. The IASCP will evaluate building materials, furnishings, and equipment as well as consumer products.

The overall goal of both projects is to set priorities for subsequent actions in the areas of testing, pollution prevention and risk management.

INDOOR AIR SOURCE CHARACTERIZATION PROJECT

A major component of the IASCP is the development of a "Source Ranking Database." The purpose of the Source Ranking Database is to provide a mechanism for systematically reviewing a large number of potential indoor air sources and assigning priorities for further evaluation. The basic elements of the database will include:

- A product categorization scheme
- Exposure-related data such as:

— Quantities used — Populations exposed — Duration and frequency of exposure

- Hazard information such as:

— Qualitative judgments on effects of concern

— Benchmark values like reference doses, unit risks, irritant levels

- An approach for combining hazard and exposure elements to arrive at an overall ranking for the product categories.

Database rankings focus on *product categories* as the unit of primary interest. Product categories that rank high will undergo further assessment to characterize risks and to define important data gaps. The theme of this approach is that the identification of risks involving common use and exposure patterns will allow EPA to make decisions on entire groups of chemicals and products that share common concerns.

The first product category selected for evaluation in the IASCP is "interior architectural coatings." This category was selected by professional judgment rather than through the Source Ranking Database, which is still under development. There was strong consensus among EPA staff and management that interior architectural coatings are an important category for evaluation because of their frequency and volume of use in indoor environments and their inherent exposure potential as a "wet source."

Because of the IASCP's orientation toward data development, assessment of current analytical methods is a key component of the project. EPA has conducted an initial evaluation of test methods that could be used to assess emissions from interior architectural coatings. Methods for both total volatiles and specific volatiles were reviewed. The initial study assessed seven analytical methods by evaluating each method's performance in the analysis of one latex paint and one alkyd paint. The seven methods are listed below:

- ASTM methods for volatiles and water
- Gravimetric method developed by Research Triangle Institute
- Direct analysis by gas chromatography/mass spectrometry
- Purge and trap method
- Static headspace method
- Small jar dynamic headspace method
- Small chamber dynamic emissions method

Considerations of accuracy, versatility, cost, and the utility of the resultant data point toward three methods for further evaluation: the ASTM method for volatiles, direct analysis, and the small chamber method.

AEROSOL SPRAY PAINT CLUSTER

Aerosol spray paints were selected for review from the Indoor Air Cluster because of the inherent exposure potential associated with such products and because sufficient data were available to support a screening-level risk assessment. The scope of OPPT's assessment was limited to single-use pressurized cans. Other spray painting operations, such as the use of an air compressor to aerosolize paint, were not included in the assessment.

A market study conducted by OPPT estimated that 136 million pounds of spray paint were produced by over 30 U.S. manufacturers in 1990. Aerosol spray paints consist of four major components:

1) binders (usually alkyd resins)
2) colorants (inorganic and organic pigments)
3) solvents (usually aliphatic and aromatic hydrocarbons, chlorinated hydrocarbons)
4) propellants (usually butane or isobutane)

The market study identified over 80 chemicals and chemical classes that are commonly used in spray paints.

HAZARD SCREENING

Readily available toxicity data were compiled whenever possible and all well-defined chemicals were reviewed by toxicologists on OPPT's Structure-Activity Team (SAT). The SAT assigned a "high, medium, low" level of concern to each chemical based on available data, known structure-activity relationships, and professional judgment. The toxicologic endpoints considered by the SAT included acute and chronic toxicity (target organ effects), oncogenicity, mutagenicity, neurotoxicity, and irritancy. Absorption by all routes of exposure was also considered. The SAT rated 16 chemicals as being of moderate to high concern. Quantitative indicators of toxicity in the form of cancer potency values (oral slope factors[1] or inhalation unit risk[2]) were available for five chemicals; Reference Doses or Reference Concentrations were available for 14 chemicals, nine of which are moderate or high concern chemicals. EPA defines a Reference Dose as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime." It is expressed as a mg/kg/day dose. A Reference Concentration is a comparable value for inhalation exposures, expressed in mg/m^3.

EXPOSURE AND RISK SCREENING

Exposures were estimated for both occupational and consumer settings. The exposure assessment included the following routes: 1) inhalation of vapor components such as solvents and propellants, 2) inhalation of paint solids and resins such as colorants and binders, 3) dermal exposure to paint solids and

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[1]in terms of lifetime risk per mg/kg/day lifetime average daily dose

[2]lifetime risk per $\mu g/m^3$ lifetime inhalation exposure

other non-volatile components through incidental contact.

The study estimated that about one million U.S. workers in eight industry sectors are routinely exposed to aerosol spray paints. Ranges of exposure were developed by categorizing workers into five groups according to estimated usage. The highest estimated usage was two cans per day and the lowest was one can per four months. Both short- and long-term exposures were estimated: 24-hour dose, average daily dose (ADD) during a 40-yr working lifetime, and lifetime (70-yr) average daily dose (LADD).

Similarly, central tendency (mean or median) and high end (>90th percentile) levels were estimated for consumer exposures. These estimates were developed by constructing scenarios in which major input parameters vary. The variables included: inhalation rate, exposure frequency and duration, quantity of product used per event, percent of time event takes place indoors, time spent in room after event. Four scenarios were used in estimating central tendency exposures, another four in estimating high end exposures.

Carcinogenic risks were evaluated by estimating upper-bound individual lifetime risks. Because data were not available to enumerate persons exposed in each exposure group, population risks could not be estimated. Non-carcinogens were evaluated by calculating a "hazard index," which is the ratio of the ADD or LADD to a RfD or RfC. A hazard index value greater than one is assumed to present a potential concern. Hazard index values below one are assumed to represent minimal concern. Consideration of risks from both cancer and other chronic effects led to the identification of the following chemicals as presenting a relatively high concern: methylene chloride, diethylene glycol dimethyl ether, toluene, propylene oxide, hexane, ethylene glycol dimethyl ether, cadmium orange/red lithopone, lead molybdate, lead sulfate, lead chromate, molybdate orange, and chromium lead molybdate oxide. Risk estimates for some of these chemicals are shown in the table below.

Preliminary Risk Estimates

Chemical	Hazard quotient		Upper bound cancer risk	
	Occ. range	Consumer high end	Occ. range	Consumer high end
methylene chloride	0.25 - 40	0.21 - 0.56	1E-05 - 2E-03	2E-05 - 6E-05
Cd orange/red lithopone	0.28 - 44	0.46 - 1.3	6E-04 - 8E-02	1E-03 - 4E-03
CrPbMo oxide			4E-03 - 5E-01	1E-02 - 3E-02
Toluene	84 - 13500	70 - 191		
Hexane	70 - 11000	58 - 160		

LIMITATIONS

The exposure and risk estimates described above should be regarded as only rough, screening-level estimates because of many uncertainties and limitations in both the data itself and the models employed. Most of the product composition data are several years old and it is not known if these data are representative of today's market. Furthermore, there are significant differences in accuracy in chemical concentration data for different chemicals and among the different data sources used in this assessment. The exposure modeling relied heavily on extrapolations from generic data and assumptions based on professional judgment.

CONCLUSIONS

Exposure and risk estimates should be refined for the highest concern chemicals and products within the aerosol spray paint cluster. Source reduction options should then be identified and evaluated for high concern product categories.

Recycled Paint Collection Methods

Carolyn Dann — Waste Watch Center

Paint collection can be accomplished through a variety of methods. I will be reviewing methods currently in use by programs around the country, such as:

- Re-Use Areas/Drop & Swaps
- HHW Program Collections
- Specialty Collections, such as "Recyclables Only" or Paint Only Collections
- Retail Store Collection and
- Curbside Collection.

Each of these approaches makes sense under certain circumstances and to determine which makes the best sense for any program we must also look at the recycling method to be used and the end markets to be targeted for the recycled paint. The variety of approaches to paint recycling is as great or greater than the variety of collection methods. Paint "recycling" can mean the paint is:

- given away as is, in its original container;
- consolidated and sometimes filtered and stirred and even sorted by shades by the HHW program for giving away in bulk;
- reworked by a paint manufacturer who takes drums of consolidated paint, filters, tests, and repackages;
- blended with wash water from manufacturing virgin paint, as part of a waste minimization effort, to make a low-quality graffiti abatement paint;
- consolidated by the HHW programs and blended with virgin materials by a paint manufacturer to produce higher quality, greater variety of colors and textures (flat, semi-gloss, and primer);
- taken in individual containers to the manufacturer where they consolidate as required for their batches and rework, if necessary;
- removing solvents and liquids from solvent-based paint (SBP) and/or latex paint (LP) and burning the solids in a rotary kiln to purify the solids into an ash that can be used in the manufacture of paint;
- sent for use as a supplemental fuel, a fuel in a cement kiln, or other energy recovery process.

Each of these methods is likely to produce different types or qualities of recycled paint. The "drop & swap" paint may be high quality, assuming the original paint was high quality, but it is often available in limited quantities. Paint bulked by collection programs is a mix of high and lower quality paints and can produce larger quantities of paint but of lower quality. The paint mixed with wash water is probably the lowest quality paint discussed here but is appropriate for graffiti abatement, especially in an area that needs frequent repainting. The paint taken and reworked by a paint manufacturer will be higher quality than if it were just consolidated by the collection program. The degree of effort and amount of virgin materials put into the recycled paint will determine its final quality, price, and potential markets. The judgement of the manufacturer is important in determining the right level of reworking. Manufacturers that are willing to take individual cans and do their own consolidation can control the quality the most accurately and create products tailored to specific uses. Scott Herbert will speak more about that in his presentation. Most of the recycling done to date has involved LP, not SBP. The SBP has been recycled via rotary kiln to recover the solids and/or via energy recovery. Philip Morley's study in Seattle concluded that recycling SBP was technically feasible but that the product of their procedure was a low-quality SBP. He concluded that for a SBP to sell it had to be of high-quality and therefore did not recommend recycling SBP through a system such as used in Seattle.

Many of these programs are being considered at HHW programs throughout the country. We have held discussions with representatives of the paint industry, which Tracey will discuss further, and we found that two things are vital in discussing paint recycling with paint manufacturers: payment and testing.

We found that many manufacturers were much more interested in talking with us once we mentioned that HHW programs are currently paying for the service of recycling. Various approaches to sharing the costs are being used.

- In California (Marin Co.), programs frequently pay $2.50-3.00 per gallon to have a manufacturer reprocess LP and the community commits to take it back. Sometimes they (Sacramento Co.) find a manufacturer with a retail outlet who will offer it for sale and only that which does not sell within 90 days is taken back by the community.
- In Canada, the plan was to have the communities buy the paint back after the manufacturers had reprocessed it. I have heard that this has not worked out well for reasons that are not clear to me but have something to do with the price.
- Some communities pay the manufacturers an additional amount to market the paints for them, rather than taking it back themselves. (Marin Co.)
- In San Mateo Co., CA, the county pays $2.85/g to have the paint reprocessed but there is sufficient local demand that there is no extra cost to market it.
- In Portland, OR, as part of developing a relationship and a workable system with a paint manufacturer, the County pays for the testing of the paint, provides it free to a local manufacturer who then reworks it and sells it to contractors for use in multi-family housing.

There are several testing and sorting protocols that exist. These are important to manufacturers because they can provide some assurance that contaminated paint will not be brought into their facility and also that the recycled paint will be safe for sale. By collecting paint through an HHW program which uses a strict sorting protocol and tests the paint, manufacturers can be assured that questionable paint is segregated out and sent for disposal rather than recycling. Testing should include more than enough tests at the start and can then be cut back as the program and manufacturer and others gain confidence in the system. Some testing may be done before processing and some may be done after processing to ensure that the product meets the safety and quality standards. The product testing done on batches of recycled paint typically includes:

- testing for metals (Pb, Hg, Cr,...)
- Volative Organics Analysis to determine the quantities of benzene, toluene and other solvents that require specific listing on labels and hazard warnings,
- Ethylene glycol test.

Portland OR has recently been able to drop their ethylene glycol test because they were getting such low results that they were comfortable that it would not be a problem.

NPCA recommends that testing include:

- metals,
- PCBs, and formaldehyde, and
- bacterial tests.

The need to test incoming paint materials depends upon the collection system and sorting protocol used.

<u>"Use Up" Programs</u>

"Use Up" programs can come in a variety of forms. The most commonly known form is a Drop & Swap program. This is a temporary program that can either be a part of an HHW collection event or a separate

event. In either case, the residents usually bring containers of leftover paint and leave it for others to pick up who want paint. Most programs leave the paint in the original containers (as in Vermont). Other programs do some consolidation of the paint and then make it available to others (as done in Thurston Co., WA) Vermont supports these programs by making guidelines available for communities interested in setting up events and the State of Vermont has purchased some equipment used at drop & swaps to be available for use by the communities. Thurston Co., WA advertised their event in the paper and solicited users of paint. Through this they developed more demand than they could satisfy.

"Use Up" programs can also become a consistent feature of collection events, as in Marin Co., CA, where they have a monthly HHW collection event.

A third variation of "Use Up" programs is a permanent site for reusable materials. Both Seattle, WA and San Francisco, CA have set up programs of this sort. In Seattle, WA, there is a community-based center that rents home repair equipment and tools at a low or minimal cost to residents. To this program they have added leftover materials, such as roofing materials, paints, lumber, etc. In San Francisco, CA, the HHW collection facility has a space set aside that is open to the public three days per week where residents can get usable materials that have been received at the HHW collection program.

Low-Tech Recycling

There are even more variations on this theme than on the Use Up programs. In one case, in Montpelier, VT, collection of paint takes place at a retail store. The store manager accepts back containers of paint if it is still liquid, in its original container, and appears uncontaminated. The people bringing back paint pay a small fee ($1 per gallon) to drop off paint which then can be credited towards the purchase of recycled paint. The manager stores the paint by color range until there is enough to make a five gallon batch. He then sells the recycled paint.

A more typical low-tech recycling program involves collection through HHW collection programs or through specialty collections (such as "Recyclables Only Collections; Battery, Oil, and Paint Collections or BOP Drops; or Paint Only Collections). In these programs the program can either take the individual containers to the manufacturer (as is done in San Mateo Co., CA and Fresno, CA and in Manchaug, MA by the Green Paint Co.) or consolidate the paint into 55-gallon drums and deliver it to a manufacturer. If the program does the consolidation, a sorting protocol is very important. Testing and sorting will be discussed further by George Kinney but the basic sorting involves sorting solvent-based paint (SBP) from latex paint (LP). They are further sorted into light and dark colors and, for LP, into interior and exterior.

The manufacturer's role can involve a number of additional steps depending on how the paint will be used or marketed. The manufacturers blend and filter the paint and in one case, Major Paint Co. of CA, they add their wash water from the production of new paint. Sometimes other additives are added to make the paint meet some minimum standards, then it is tested by batch for metals and VOCs, repackaged into 55-gallon, 5-gallon, or sometimes 1-gallon containers. The marketing involves either the manufacturer giving the paint away at the direction of the county, the county taking back the paint, or selling it at a low cost to non-profits and local governments.

High-Tech Recycling

Collection of paint to be used in "high-tech" recycling can be done through HHW programs, through specialty collections or by curbside collection. Marin Co, CA just completed a six-month pilot program testing the efficacy of curbside collection. Their program encouraged residents to put up to five gallons of either used oil or leftover paint or a combination into a box at the curb that was picked up by the refuse hauler. They are evaluating the results at this time., but it appears that they had roughly 25% of the

residents who used the service to collect paint. With these collection methods, as above, some programs send the individual containers directly to the manufacturer and some consolidate the paint themselves. The manufacturer does the blending, filtering, and upgrading, as required. In some cases, the manufacturer adds virgin materials to improve the quality of the end-product. Frequently, with high-tech recycling, the manufacturer will tint the batch to produce a greater range of color options. The paint is then repackaged and marketed. In Marin Co, CA, they have made some paint available to government purchasers through the GSA. In Portland, OR, the manufacturer sells the paint to contractors. In Sacramento Co., CA, the County took back the paint except for paint that sold within 90 days through the manufacturer's retail outlets.

How To Set Up Your Own Program

Based on our review of collection and recycling methods and on discussion with paint industry representatives, we have some encouraging news. Paint recycling seems to be a viable option in many areas. In your area, it is important to identify the potential manufacturers who might be interested in working with you. This can be done by looking primarily for smaller manufacturers and specifically for those without computerized or automated facilities. Another approach would be to solicit interest through the American Paint Journal or local trade organization.

Your program will be received best if you have also done some marketing to local government users and other potential users. The local governments can understand the benefit to them of not paying to treat the paint as HHW and therefore may be more willing to accept recycled paint, even on an experimental basis. State and Federal governments will be harder to reach for reason I will discuss in the next Paint Session. Potential government users include graffiti abatement groups, multi-family housing associations (wherever turnover is high and frequent repainting is required), and local government building and maintenance departments responsible for warehouses, garages, and maintenance facilities. Other users could include non-profit groups, theater groups, and contractors.

Another important step is to identify to the manufacturers what the potential sorting and testing protocols are that you are willing to use. This is important in sharing the risks and costs with the manufacturers. The manufacturers should be able to give some direction on markets they can find and what level of adjusting is necessary for those markets. Testing costs can run high at first (between $1 and $3 per gallon depending on batch size) but should be done extensively at first until all parties develop adequate comfort that the contamination levels are well within acceptable ranges for the products being produced.

If you are interested in setting up a paint recycling program and want more specifics, please call us; we are happy to help. Thank you.

PAINT TESTING AND SORTING

George Kinney
Environmental Supervisor, Dakota County, Minnesota

Paint and used oil vie for the title of highest volume waste brought to HHW collec-tion sites. Typically, each car at a one-day collection event in my county, Dakota County, MN, brought in about 2 gallons of latex paint and one and one-half gallons of solvent-based. At a 1,000 car collection event, this translates to over 60 drums of waste paint! This quantity of paint often overwhelms collection organizers, who shy away from collections rather than ever have to deal with the tremendous quanti-ties involved, and the staffing required to properly handle the waste.

The ratio between latex and solvent-based waste paints brought to collection events will vary due to the age of the community and the region of the country. In our area, latex to solvent-based usually follows a rough 3:2 ratio, until an event collection is held in an old community, in which the ratio may be reversed. In southern Cali-fornia, most paint is latex.

Collecting the paint gets HHW out of the residences, but then what? Shipping the paint with a hazardous waste management firm to proper treatment and disposal facilities is expensive due to the large amounts of waste handled, as well as the per gallon costs.

The first step in every paint management program is sorting. This is usually done on site, frequently while the resident is waiting, in order to return empty cans or other solid waste. During the sorting process, water-based paints are separated from solvent-based, and unacceptable wastes are removed from either category to be packed separately. These include Penta and other pentachlorophenol-containing wood preservatives, adhesives and mastics that are typically sold in cans very similar to paint cans, joint compounds and other non-paint materials. Some collection programs keep certain non-paints, such as latex grout additives, with the paints. Unacceptable wastes are removed and packed according to hazardous constituents present.

After sorting, most programs have an on-site exchange program, where very good, nearly full cans of paint are given away to the general public on an as-is basis. Most programs stir the paint to ensure its quality before placing for disposal. In some instances, only latex is offered for giveaway, many other programs include oil-based paints and stains. The paint not placed in the exchange area will be managed in one of several ways.

Solvent based paints

Solvent-based paints contain hazardous constituents. If generated by a regulated business, these waste paints would be handled as hazardous waste. In Minnesota, our state rules regulate all collectors of HHW as hazardous waste generators, and we must follow the state and federal hazardous waste regulations upon collection. Several other collection programs manage collected HHW as though the federal regulations apply.

The preferred management method for solvent-based paints in most programs I contacted is fuel blending. Fuel blending is a process of mixing high BTU-value solvents from a variety of sources to get a consistent feed mixture for a usable fuel. In our area, waste solvent-based paints, thinners and other flammable solvents are sent to be used as fuels in lime kilns.

In many programs, and in our Minnesota programs, all oil-based paint is tested for the presence of PCB's after bulking. PCB's, banned in industrial applications since the 1970's, were used as plasticizers in several types of solvent-based paint systems. These included marine and swimming pool paints and industrial paints needing a hard resin finish. The Minnesota experience shows levels of PCB's in bulked 55-gallon drums ranging from below detection limits to above 300 mg/l PCB. The waste management firm and hazardous waste facility used by your program will require certain testing

parameters and frequency. Usually, solvent based paints to be fuel blended undergo a waste profile initially, consisting of metals testing and analysis for other parameters required under the facility's EPA permit.

Latex paints

After sorting latex paint cans from other paints and non-paints, several successful paint recycling programs re-sort the paint again. The visual inspection done next by Metro of Portland, San Mateo, Ondanaga, and others consists of inspecting the can and label for old labels, presence of lead or mercury, rusty, dented cans, and very old product. These cans would be rejected. Next in many programs, the cans are opened to check for mold, freezing or hardened paint, which would also be rejected. The remaining paints would be sorted by whatever color sorting schemes in use by the program. Paint may then be reblended by a variety of means.

SORTING PROTOCOL

HOUSEHOLD HAZARDOUS WASTE

Waste Type	Recognition Traits	Reason to Exclude
Old Paint	Label Style	Risk of Heavy metals, biological activity, chemical reactions
Exterior Non-White Latex Paint	Label Style wording "Exterior"	Mercury
Solvent-Based Other Non-Latex	Label, Order, Looks	Contaminant
Red, Orange, Yellows	Color	Heavy Metals
Sour Paint	Odor	Biological Activity
Frozen Paint	Looks "Cottage Cheese"	Separated Solids are Out of Suspension
Solidified Paint or Excessive Levels of Solid or Semi-Solid Components	Looks	Not Mixable
Unknowns and Non-Paint Items	Odor, Looks	Contaminants

CASE HISTORIES

METRO, Portland

Contact: Jim Quinn (503) 221-1646

METRO has one permanent facility, and is preparing a second. Approximately 230 vehicles/week use the site, bringing nearly 3 gallons of latex and another 3 gallons of oil-base paint and flammable liquids. Latex is sorted following the above decision matrix, eliminating old or rusty cans, moldy, hard paints, and

obvious frozen paint. If the age of the labels indicate old paint, it is eliminated, as it may have higher metals levels. Similarly, paints that state high lead content are rejected, as are any paints labelled "mildew resistant". The individual cans are then stirred with a paddle on a drill to check for a smooth creamy consistency. Lumpy paints are rejected. Only 46% of received material is retained.

The latex cans are then sorted into 6 categories and bulked into 55 gallon drums, passing through screening to remove paint skins. The colors are interior white, off white, gray, brown, green, and mushroom. Paint is frequently taken at this point by local nonprofits and governments. The remainder is given to a local paint manufacturer (free) who finely screens the paint, blends in 300 to 700 gallon batches, may tint if desired, homogenizes and cans the paints. The paint is sold to contractors, primarily at this point to paint apartment buildings. To date, 1200 gallons have been sold, with between 4000 and 6000 gallons given away to the nonprofits and governments.

The discarded latex paint is separated into the high Pb and Hg fraction and the bad paint fraction. The high metals paint is handled as hazardous waste, while the unacceptable paint is solidified and landfilled. The oil-based paint is separated into the liquid fraction and solids fraction. The liquids are sent to a fuel-blen-der, and the solids are sent to a Vancouver, B.C. firm that ashes the solids, and sells the remaining ash (primarily pigments) to a paint manufacturer.

Tucson/Pima County

Contact: Anna Spitz (602) 740-3037

The collection program receives HHW at the main site every Friday and Saturday, with monthly outreaches - event collections at four other sites. The program usually averages 600-700/month. Approximately 20-25% of the latex paint must be discarded due to mold or other reasons. The paint is sorted into four colors; white, pastel, light gray and chocolate brown. It is stirred in the can and is bulked into 55 gallon drums. It is stirred, and then removed to 5 gallon pails. The paint is given to nonprofit and neighborhood associations only.

Snohomish County

Contact: Dave Shea (206) 388-6493

Four HHW roundups are done each spring and fall. Latex cans are inspected visually by volunteers or County work release workers. Paint is discarded if the label may indicate high metals, is old, or is unreadable. Cans are opened, checked for mold, etc., and stirred by hand to check consistency. Paint is mixed into 4 gallon pails to a wide variety of colors and gloss. Cans are labelled with specially developed labels. During 1992, the eight collection events served 7,298 vehicles, with 12,543 gallons of latex swapped and 2,820 gallons disposed. The unacceptable latex is mixed into "ecology blocks" used as road barriers and retention walls.

San Mateo County

Contact: Rick Miller (414) 363-4356

The best looking cans of latex paint received at the monthly collections are placed on the free shelving and given away. The remainder of the usable latex paints are shrink wrapped and shipped to Early American Paints for processing. The company checks viscosity, pH and adjusts the color of the mixed product, Navajo White and "dark"(beige, gray or brown). The product is packaged into 5 gallon buckets, and is given to non-profits. The County's cost is $2.85/gallon for the remanufacturing of the paint. In the past two years and 8 months, the program has recycled nearly 30,000 gallons of paint through the free shelving and processing.

REPROCESSING PAINT: A NEW METHOD

M. SCOTT HERBERT
PRESIDENT/H_2O COATINGS, INC./THE GREEN PAINT COMPANY
MANCHAUG, MASSACHUSETTS 01526

Imagine opening your morning newspaper to read that chemical companies dumped seven million gallons of paint in New England. What would be the fate of these companies? The company officials responsible would probably end up behind bars. Enormous fines and penalties would be assessed. Suffice it to say that a problem of major proportions would exist.

According to a recent study, the problem does exist. An estimated seven million gallons of paint are stored in New England households. What happens when those homeowners decide to dispose of all this paint?

Unfortunately, consumers don't have too many choices when it comes to dealing with these products. They can wait for that four hours a year when a household hazardous waste collection is held in their community, set the paint out to dry, or throw it in the trash. None of these options make it easy for the homeowner to get rid of old paint.

Household paints fall into two general categories--latex and solvent-based. Latex paint, for the most part, is considered non-hazardous, but regulations and recommendations for disposal vary by locality. Solvent-based paint is invariably considered hazardous. In reality, both types may contain hazardous ingredients, whether in the liquid or solid state. Solvent-based paint prior to 1972 often contained lead pigments as a primary constituent. Latex paints, even the newer ones, may contain mercury *even* when dried. In the liquid state latex paint often contains ethylene glycols and glycol ethers.

Source reduction is, of course, a necessary part of the solution, but source reduction does not get the paint out of the basements! Paint swaps of one type or another do help, but they are very labor intensive and cumbersome. Realistically, these kinds of programs can only address a very small part of the problem. Just try to picture your Aunt Emma searching through mountains of paint cans for a moonlight mauve paint to match her living room wall!

Waste disposal through household hazardous waste collection days is expensive to the point of being unaffordable to many communities. With a response rate of only 1-2%, it too is reaching only the very smallest tip of the iceberg. When

you also consider that disposal is lower on the EPA hierarchy, it makes for an even less desirable alternative.

The **GREEN PAINT COMPANY** is founded on the relatively new idea of recycling waste paints and stains. We are the only third-party private company that, to our knowledge, takes a comprehensive approach to paint recycling. That is, we are looking at the whole picture of collection, reprocessing and marketing in an comprehensive manner.

COLLECTION

Let's talk about an integral part of our plan--collection. The collection method dictates what types and quality of recycled product we can produce. Most collections are done by bulking paint at the site of collection. Let's take the easiest sorting protocol of all: Put all the latex in one drum and all the solvent-based in another. The result of mixing all the colors is a dull gray. The manufacturer gets the two drums back to the factory and guess what he makes? Utility gray latex and utility gray solvent-based--two products with marginal performance and marginal economic value.

Let me show you by illustration just how important this point is. I have here a number of drinks--some fruit juices and some milk drinks. Let's say for our purposes that the milks are latex and the juices are solvent-based. If we mix them all together we get one big mess that is of no marketable value. If we mix all the juices and all the milks, we may have a product of very low economic value that someone may want to buy. But if we take all the chocolate milk or all the chocolate and coffee milk and mix them together, we come up with *mocha*, a product of relatively high value. That is our objective with paint recycling.

We run our paint collection days just like household hazardous waste collections--the difference being that we collect only paint. We send a truck on site with a crew that collects the paint and removes it from the site the same day.

Our fee for this service is generally one-third or even one-fourth of the cost of disposal. We have successfully experimented with user fees at our collections. Surveys show that consumers are willing to pay reasonable fees for this kind of service. Given the current constraints on municipal budgets, user fees are the only alternative for some communities.

Our recycling permit with the Department of Environmental

Protection requires us to operate within the same parameters as a hazardous waste contractor when doing a household hazardous waste collection. The town must file with DEP 30 days prior to the collection date. It must also submit a site plan. We are required to retain a spill contractor and provide the same site precautions as a hazardous waste contractor. We are also required to report to DEP the quantities collected from each site. We cover all the bases.

We are also licensed to accept paint at our factory from any very small quantity generators. This of course includes most painting contractors. Our goal is to arrange to take their paint regularly and assist them with compliance. For an annual fee we will take all of their waste paint as long as they remain in the VSQG category and have registered as such with the Department of Environmental Protection.

What is unique about our operation is that we bring the paint back to the factory in the *original containers*. A preliminary sort is done on-site into three basic categories: All latex, oil paints, and oil stains. This reduces labor costs and time on-site.

From what we have observed we can recycle about 95% of the paints homeowners bring to a collection. We don't accept all paints. We have a list of paints and stains we don't accept, and among those are paints containing lead, or stains containing creosote.

REPROCESSING

Back at the factory the paint is further sorted. We view sorting as the most critical step of the whole operation. Obviously we don't want solvent-based paint mixed in with latex paint and vice-versa, as this could spoil the entire batch. As a result we specially trained key personnel to supervise the sorting process.

Once the paints are sorted and enough volume is accumulated we are ready to make a batch. The appropriate containers are then emptied into our batching tanks. Our final sort takes place at this point where we eliminate any defective paints such as frozen latex.

Some of you might be wondering what happens to the empty cans. We recycle them. The steel industry is way ahead of the paint industry and has been involved in recycling for quite some time. Some steel mills are more than happy to take the empty paint cans as long as they meet their requirements.

After the paint is processed, it is tested. Each type of paint has its own set of specifications. A floor paint, for example, requires different properties than a wall paint. Small amounts of virgin material may be added to bring the paint within our specifications.

When the lab is satisfied that the paint meets quality specifications, a sample is taken for chemical analysis. Since we are not using virgin raw material, this is a necessary step to insure that the final product does not contain dangerous levels of contamination. Each batch is tested, at a minimum, for heavy metals such as lead, mercury, and chromium. Solvent-based paints are also tested for PCBs and toxic solvents. This testing *exceeds* the types of testing normally done with virgin paint.

Contamination is generally an issue that pops up when discussing the recycling of paints. PCBs, heavy metals, etc., have all been found in paint collected at household hazardous waste collection days. Careful sorting eliminates this problem. For example, marine paints often contain PCBs. We don't accept these types of paints for recycling. When we come across them on site, we simply recommend that they be held for a HHW collection.

Once the paint meets our acceptable standards, we package it and market it as a high-quality product. To our knowledge, we have the highest recycled content on the market. Some of our paints will be 100% post-consumer recycled content. On average we expect to fall within 90-95% recycled material.

MARKETING

From a marketing standpoint, we believe the public is ready for recycled paint. With 22% of consumers being "premium green" we don't expect to have any difficulty selling our products. "Premium green" describes those consumers who are willing to pay a premium price for environmentally-responsible products. Of course, we are aware that we have to convince buyers that recycled paint is quality paint.

Our goal is also to work with companies and municipalities in promoting recycled paint. Many companies are members of the National Coalition for Recycling. Their corporate policies reflect an attitude which encourages the use of recycled products.

We would also like to involve municipalities that have collections in purchasing or specifying recycled paint for some of their own use. For our part, we are willing to give

incentives to those communities that are working with us to develop this market. Right now the market for recycled paints is minimal but growing daily.

Successful marketing is critical to the whole process, since you can ultimately only recycle as much as you can sell--unless, of course, you consider a warehouse full of partial paint cans a real business. Municipalities can assist in this vital arena by helping us promote recycled paint. We believe that demonstration sites and projects will be extremely helpful in getting across the idea of product quality and performance.

Retailers of paint products can also play a role in developing this market. Our objective is to recruit community-conscious retailers who could help subsidize collections and then sell the recycled product. The retailer would thus gain numerous benefits by helping to perform a real service for the community.

ISSUES

There are some areas that need to be addressed going forward. Certainly, the whole area of collection needs work. Regulations vary from state to state and this can cause some problems. But the real culprit is that 1-2% response rate to HHW collections days. We want to get those seven million gallons out of our New England basements! In order to go forward, we need that supply. **THE GREEN PAINT COMPANY** is committed to develop strategies in cooperation with local communities to get all that paint out of the basements.

Permanent collection sites are certainly a step in the right direction. Anything that makes it more convenient for the homeowner should increase the response rate. Regular curbside collections should do even more to get the old paint out. In Massachusetts we have set up a program with painting contractors whereby they can deliver their leftover paints to us on a regular basis. As long as they are VSQGs they can transport their own waste paint up to certain limits. Part of our job is educating the contractors, making them aware of the regulations surrounding the products they handle, and encourage them to register with DEP as VSQGs.

When addressing the area of collections, some regulations may have to be altered. For example, in one New England state we are not allowed by regulation to pick up or take paint even from VSQGs. When receiving paint from this state

we have to engage a hazardous waste contractor which defeats to some extent the goal of recycling. It results in higher costs simply because a middleman is involved.

Our recycling permit requires us to submit monthly as well as annual reports to DEP. The primary purpose of these reports is to prevent any speculative accumulation of waste paint. The bottom line is that we take in no more than we can realistically sell. Since we have no interest in becoming a Superfund site, we welcome this kind of monitoring. In fact, we consider it a benefit and a great selling point to tell our customers that we are regulated and required to report to DEP.

Education is a key ingredient to any successful recycling program. The National Paint and Coatings Association and the paint industry can play an important role. A recycling statement or symbol on their labels would be a very positive step in lending their "stamp of approval" to recycled products. In the long term, proper education is in the best interest of the industry since mandated recycling would remain as the only viable alternative. We welcome the opportunity to work with them on these issues.

Government agencies can also assist in developing this market. By participating in testing programs government can help get the word out by supporting recycled products. They can also begin to specify these items in purchasing programs.

Our ultimate goal is to develop a broad market for recycled paint. By emphasizing quality recycled products we believe that we are taking a significant step in this direction. Only through programs that make economic sense will we be able to drive down the cost of collection and make it easy and economical for consumers to get all that paint out of the basements and garages of America.

Nickel Cadmium Battery Collection and Recycling

Norm England, President Portable Rechargeable Battery Association

As the old man walked down a Spanish beach at dawn, he saw ahead of him what he thought to be a dancer. A young man was running across the sand rhythmically, bending down to pick up a stranded starfish and throw it far into the sea. The old man gazed in wonder as the young man again and again threw the small starfish from the sand to the water. The old man approached him and asked why he spent so much energy doing what seemed a waste of time. The young main explained that the stranded starfish would die if left until the morning sun.

"But there must be thousands of miles of beach and millions of starfish. How can your efforts make any difference?"

The young man looked down at the small starfish in his hand and as he threw it to safety in the sea, said, "It makes a difference to this one."

Today I would like to speak to you about an organization that was formed to help make a difference. The organization is The Portable Rechargeable Battery Association (PRBA). It was formed to help facilitate the collection and reclamation of small sealed rechargeable batteries. It founded in June of 1991 by five company's: Gates Energy Products, Inc.; Panasonic Industrial Company; Saft America, Inc.; Sanyo Energy (USA) Corporation; and Varta Batteries, Inc.; all producers of rechargeable nickel cadmium batteries.

Our membership has since expanded to over one hundred and fifteen company's including: American Telephone and Telegraph; Motorola, Skil; Black and Decker; Tandy Corporation and Compaq Computer Corporation to name a few.

In order to be quite clear and avoid any misconceptions, I believe it is necessary to define what I mean with regard to NiCd recycling. This will also explain why the Portable Rechargeable Battery Association is so interested in recycling all types of nickel cadmium batteries.

Currently, most uses for cadmium are dissipative; therefore, not much old scrap is available for recycling. Exceptions are the recycling of some cadmium bearing alloys and batteries. Cadmium from spent nickel-cadmium batteries and cadmium alloys can be recovered using a pyrometallurgical or hydrometallurgical process. Most of the battery recycling plants employ pyromettalurgical processes. Large cadmium batteries, normally heavier than 1 to 2 kilograms, are emptied of the electrolyte, dismantled mechanically, the separators removed together with the plastic casings, and

the cadmium is recovered by distillation of the plates in specially designed furnaces. The plastic casings and separators of the small sealed batteries are burned off at a lower temperature prior to a higher temperature treatment required for volatilization and condensation of cadmium content. This process eliminates the need to use landfill space and the risk of leaking of heavy metals. With cadmium recycled 100% from nickel cadmium batteries, the supply of cadmium will be stable and the industry will reduce its requirements to use virgin material.

Again, I am referring to an industrial process intended to separate the constituents of nickel cadmium batteries for further processing and refinement into usable raw materials for new products. These processes meet stringent emission limits.

Cadmium from spent batteries is being recovered in France, Japan, Sweden, and South Korea. Currently Denmark, Germany, the Netherlands, and the United Kingdom are planning to develop recycling facilities.

In 1990, INMETCO, located in Ellwood City, PA, started recovering cadmium from industrial type Ni-Cd batteries, mainly used in the railroad and telecommunications industries. INMETCO is a PRBA member company and is working with the membership and other end users to recycle spent batteries. They have the capacity to process 10,000 tons of spent batteries per year and they do accept household batteries. In 1991, INMETCO recycled approximately 56,000 tons of metal bearing waste, including 500 tons of nickel cadmium batteries.

Saft Nife Greenville has state and federal permits to receive, store and recycle spent batteries. For the time being, spent nickel cadmium batteries are shipped under hazardous waste manifest and EPA permit to the Saft Nife facilities in Sweden for recycling.

In Sweden, the batteries are processed in the following way:

> For industrial batteries, the cells are dismantled and the electrodes separated. The positive electrodes, containing nickel, iron and sometimes graphite, are sold to steelworks for stainless steel manufacturing. The negative electrodes, containing mainly cadmium and iron, are rinsed in water and then placed in a topping furnace where the cadmium is distilled. The cadmium can then be used as raw material in the production of new electrodes. The battery containers, if steel, are washed and sold to steelworks, if plastic jars, they are cleaned, ground to granules and used in new products.

For sealed portable batteries, spent battery packs are first dismantled and plastic components removed. The cells are then sent to a furnace to be treated in a two-step process. In the first step, the electrolyte and electrode separators are vaporized into gaseous forms, which are then "washed." In the second step, the temperature is increased to distill the cadmium. The cadmium is recovered in a pure enough form that can be directly reused in the manufacturing of new batteries. Residues from the distillation containing steel and nickel are sent to the steelworks for the manufacture of stainless steel.

The recycling of nickel cadmiun batteries results in the recovery of nickel, cadmium, steel and plastic.

Mercury Refining Company, Inc. (MERECO) in Latham, New York, has been involved in metals recovery from mercuric oxide and silver oxide button cells for over thirty-five years. MERECO accepts all types of household batteries; however, only the mercuric oxide and silver oxide cells are processed to reclaim metals. Nickel-cadmium batteries are accepted by MERECO. These batteries are sent to another facility for processing.

Tested and tried recycling processes for recovery of the constituents of all kinds of nickel cadmium batteries are available today! The problems are to collect and sort portable sealed consumer batteries, which count for the majority of cadmium being produced today.

PRBA is working diligently to urge the Office of Management and Budget to proceed with its review of the U.S. Environmental Protection Agency's proposed "universal waste rule" to be codified at 40 C.F.R. Part 273. This draft rule would establish special collection system regulations for used NiCd batteries and other products.

This proposed rule will facilitate the recycling of significant quantities of household hazardous waste, which would otherwise be discarded in the municipal solid waste stream in many states. Under current law, household hazardous wastes disposed of by consumers and not commingled with non-household waste are exempt from the Resource Conservation and Recovery Act's (RCRA's) Subtitle C requirements.

Under current rules implementing RCRA, state and local entities that collect and separate used batteries; recalled, cancelled, or suspended pesticides; fluorescent light bulbs for recycling are subject to hazardous waste management regulation under Subtitle C, unless they are able to certify that these are household wastes and have not been commingled with non-household wastes. This has presented major obstacles to the collection and reclamation of these materials from consumers and has prevented their capture from the municipal solid waste stream.

As the majority of these waste materials are derived from the municipal solid waste stream, the inability to establish viable collection and recycling programs without first obtaining hazardous waste treatment, storage and disposal permits has severely hindered state and local community efforts to separate and remove toxic constituents from the municipal solid waste.

The proposed regulations would establish a special collection system and provide a less burdensome alternative than current regulations for the management of these wastes. Elimination of unnecessary and burdensome

RCRA regulations will allow sate and local communities, as well as industry, to establish feasible and effective collection and recycling programs. These efforts will improve public health and protect the environment by removing sources of mercury, cadmium and other metals from the municipal solid waste stream.

PRBA was successful in obtaining the support of six (6) U.S. Senator's, Senator's Jeffords, Rockefeller, Duronberger, Lautenberg, Breuax, and Byrd, who wrote to OMB on November 17th, urging OMB to release the rule promptly to facilitate its immediate publication in the Federal Register.

PRBA is attempting to design and implement collection systems that will assure the purest possible stream of used Ni-Cd batteries to the final reclamation facility. It so happens that the Ni-Cd industry in the U.S. has one rather unique feature: We estimate that up to 70% of all Ni-Cds sold to Original Equipment Manufacturers (OEM's) are sold to only ten companies. Where appropriate and feasible, we want to work with our OEM's to develop reverse distribution collection programs.

We are also testing Focused Retail programs. There are a number of Ni-Cd only Points of Sales. For example, video camcorder packs, portable telephone replacement packs, power tool replacement packs are sold, generally, at Ni-Cd only Points of Sale. Both Household Hazardous Waste Management Programs and Curbside Collection Programs are infrastructures that already exist, and we are attempting to develop piggy-back programs, where feasible, although these two particular methods seem to present greater educationally challenges, as consumers may find it difficult to distinguish between Ni-Cds and other types of batteries.

PRBA formulated and implemented a Four Part Pilot Battery Collection Program in Minnesota, as required by Minnesota Law. This program was initiated in April of this year, and despite numerous obstacles, we have collected approximately 2,500 pounds of batteries in the first six months of the program. This was accomplished without one of the key elements of the program in place. That element was the collection on batteries through existing or new county collection programs in nine counties. We are continuing our efforts to get these parts of our program up and running.

PRBA has executed the contract with Hennepin County and is working out modifications with the Western Lake Superior Sanitary District and should be able to finalize the contractual agreements within the next week or two. Once the contracts have been signed, the P.R. activities will begin and we anticipate that there will be a tremendous increase in call to our toll free 800 number. A vast majority of the consumers can be directed to the various county collection locations, utilizing their zip codes. The convenience of this program will create a sharp increase in the pounds of batteries collected.

Of the 2,500 pounds collected thus far, most were returned through reverse distribution to member company service centers or authorized service centers. A small amount were returned through member company prepaid mailback programs.

I anticipate in the next six months, several companies will implement collection programs at retail locations, the Minnesota Consolidation Point for used rechargeable batteries will be operational and our publicity programs will be in place, generating increased consumer response.

PRBA, also, has a pilot collection program operating in Vermont. Working with the Vermont Agency of Natural Resources and the Central Vermont Public Service Corporation, rechargeable batteries are being collected at thirteen (13) CVPSC offices throughout the state. Each office has a collection box, PRBA poster, and brochures explaining the program. Brochures have also been given to solid waste districts for distribution and discussions are currently taking place to expand the program to an additional 200 drop-off points.

In mid-October, PRBA submitted its "Joint Battery Management Plan" to the New Jersey Department of Environmental Protection and Energy (DEPE).

An overly broad interpretation by the New Jersey Department of Environmental Protection and Energy (DEPE) of the state's 1992 Dry Cell Battery Management Act may result in a ban on the sale of nickel-cadmium or sealed lead rechargeable batteries in mid-January 1993. PRBA is working hard to avoid this result, but it appears that negotiations with the DEPE to thwart the ban will go down to the wire.

The New Jersey statute requires that producers of rechargeable dry cell batteries submit battery management plans for state approval in order to be exempt from the ban. Further, the statute stipulates that no person - whether a distributor, wholesaler or retailer - may sell the batteries covered by the Act after mid-January 1993, if the DEPE has not approved the submitted plans. To be considered for approval, plans must address "collection, transportation, recycling or proper disposal" of used batteries.

In order to meet its members' needs, the PRBA Operating and Recycling committees developed a plan similar to the Minnesota program. Additionally, PRBA representatives have been serving on New Jersey's Dry Cell Battery Advisory Council since March. Over the past nine months, agreement seems to have been reached with the DEPE on most of the plan elements PRBA has in mind. However, major disagreement still exists about who should bear the cost of transportation from the generators to a collection facility .

PRBA submitted a plan on behalf of its membership that I believe fully complies with - and, indeed, even exceeds - minimum statutory requirements. We are continuing to work to persuade the DEPE to reconsider its view. PRBA and individual battery cell manufacturers are also exploring the possibility of obtaining relief from the New Jersey legislature. If all else fails, PRBA's legal counsel has been asked to consider how an unfavorable final DEPE interpretation might be challenged in court.

ANTICIPATED ELEMENTS OF THE PRBA PLAN:

. Establish a Consolidation Point (Collection Center)

Cell manufacturers anticipate contracting with a service provider for a collection center and will be responsible for the cost of the center and the recycling of batteries.

Solicitation of potential service providers has begun via newspaper ads (RFQ).

Operation is estimated to begin in March 1993.

. Collection from Consumers

For counties collecting all batteries and sorting by chemistry, the PRBA collection center will pick up from a designated county location on a regular basis, pay for pick up cost, and develop a special county educational campaign.

For counties collecting, but not sorting all batteries, the PRBA will provide free collection containers, in-store informational posters and materials for a special county educational campaign.

For counties with no collection programs, the PRBA will provide free collection containers, in-store informational posters and a generic educational campaign targeting the "return to dealer" approach.

. Collection from Business/Institutional/Commercial Generators

Generators will package and ship batteries to the PRBA collection center and pay transportation costs.

Cell manufacturers will manage batteries once received at the collection center.

PRBA will work with product manufacturers, packaging manufacturers and distributors to educate generators on proper handling and shipping to the PRBA collection center.

. Statewide Educational Campaign

The campaign will include television and radio public service announcements, newspaper advertising, in-store posters, railroad and bus posters and bill stuffers.

. A PRBA 1-800 Number Will Be Established For Retailers

****

The rechargeable nickel-cadmium battery represents a battery system that most people are simply not very conscious of or very mindful of: Our image of a battery seems to be pretty much limited to that black, box-like device that sometimes fails to start our car or the small cylindrical or square-shaped objects that we generally buy on impulse for our childrens' toys, our flashlights, portable radios, or smoke detectors.

To better appreciate the Ni-Cd, we need, perhaps to focus more specifically on individual applications for a brief moment: video cameras, portable power tools and appliances, portable audio equipment. In essence Ni-Cds have made enormous contributions to the current affluent and comfortable lifestyles that so many of us now enjoy. Other important applications include emergency lighting, police and emergency dependable and plat quiet, behind-the scenes roles in our response to life-threatening emergencies.

Yes, Ni-Cds play very significant, if often unappreciated, roles in our lives. Ni-Cds can be one of the world's most environmentally friendly batteries:

They are reusable
They can be recycled
They are extremely economical
Nothing need be thrown away.

Primary Battery Reformulation, Collection and Recycling
Terry Telzrow, Eveready Battery Company, Ohio

The news' headlines say, "BATTERY INDUSTRY GETS RECOGNITION FROM THE FEDERAL EPA FOR LEADERSHIP ROLE IN APPLYING THE PRINCIPLE OF SOURCE REDUCTION"-- to make primary batteries environmentally benign.

By the end of 1992, it seems all common primary household batteries--AAA, AA, C, D, and 9V--will be produced with no added mercury in the United States, Europe, and Japan.

The mercuric oxide system is being phased out and replaced with the environmentally acceptable zinc-air system.

Are we through?

What about the conservation issue?

What about recycling?

EVEREADY BATTERY CO. is not philosophically opposed to recycling! We are, however, opposed to blindly accepting that recycling today with today's technologies will benefit society or our customers.

You will see that those technologies that are in the advanced state of development and many of those in pilot programs are extremely energy consumptive and costly. It doesn't make sense to us to expend 2 to 10 times the energy to recover battery materials that are in abundance, as compared to extracting these materials from their natural sources.

Let's look at these emerging technologies. The more 'advanced' ones are compared in detail from available data. The pilot project technologies do not have available data for detailed comparison; but on the surface, they do not appear to offer any real breakthrough.

Figure 1 lists the known technologies. Figure 2 briefly describes these technologies. Figure 3 provides schematics of the proposed technologies. Figure 4, 5, and 6 show more detail. Schematics of some of the other processes are also available but not provided here.

Energy consumption is a real concern. Figure 7 compares the Batrec (Sumitomo), Recytec, and Nuova Samim processes based on primary energy. These values might well be actually higher than shown, once the processes are up and running.

Figure 8 compares primary versus metered energy consumption. Figure 9 compares these energy requirements to the energy needed, to extract an equivalent amount of zinc metal from existing mines.

However, zinc is not the only material expected to be recovered. Figure 10 makes the comparison assuming the process will recover zinc, mercury, and ferromanganese.

Figure 11 provides the energy necessary for the primary metal production of these same materials for comparison purposes.

We believe there must be improvements in the technologies to reduce the energy consumption much closer to a 1-to-1 ratio before one considers mass recycling of the--now *environmen*tally benign--batteries.

What about costs? Our estimates, in U.S.$/KGm are as follows:

Batrec	$2.82 - $8.25
Recytec	$2.44 - $5.07
Nuova Samim (*)	$0.85 - $0.93 (Swiss)
Nuova Samim (*)	$0.85 - $1.00 (Italy)

(*) The difference is accounted for by labor rates and tax rates.

The large range is due to including items like maintenance expense, depreciation, and the variable value of the recovered materials.

Once can clearly see, from Figure 12, the impact the differing technologies have on costs. Energy costs and depreciation vary widely.

While it appears that Nuova Samim energy costs are very low, one must compare the costs on the same basis (gas versus electrical). See Figure 13.

On an annual basis, the costs, to process 100% of the past consumer batteries, would range from $450MM down to $150MM. If collection of post consumer batteries were only at a 40% level, then these costs would range from $180MM down to $60MM annually.

Capital costs in U.S.$ to build each facility, follows:

2000MT	Batrec (Sumitomo)		$25MM
3000MT	Recytec		$16MM
20,000MT	Nuova Samim	≈	$19MM

None of the costs above include collection of the post consumer batteries or their transportation to a "recycling" facility.

It doesn't make sense to us!

What needs to be done?

On October 1, there was a joint press release, Berne, Switzerland, which stated that the European, Americans, and Japanese have joined together to study the feasibility of recycling household batteries with a technology that is energy efficient and cost effective.

This study will be supported by the International Consulting Firm of A. D. Little and by Japanese Clean Japan Center.

Please note that even after all these advanced technology and costly studies, the results may show--it still doesn't make sense.

Battery Recycling

Company	Location	Status
BATREC AG	Switzerland	Start-up scheduled for June, 1992
RECYTEC	Switzerland	Start-up in 4Q91.
NUOVA SAMIM	Italy	Start-up scheduled for mid-1992. Start-up delayed indefinitely.
VOEST-ALPINE	Austria	"Pilot plant/lab"
TNO	Netherlands	"Pilot plant" for NI-Cd and primary cells.
BASALT INDUSTRIES	U. S.	500 ton plant In operation.
MOLTEN METAL TECHNOLOGY	U. S.	Patent and technology only
ANSALDO S.p.A.	Italy	Patent position
DETOX INTER.	U. S.	Patent position.

FIGURE 1

BATTERY RECYCLING TECHNOLOGIES

COMPANY	PROCESS
NUOVA SAMIM	Thermal - Pyrolysis at 600-700°C. Byproduct gases are burned at 1100°C. Batteries are converted to feedstock for existing metal recovery plant.
RECYTEC	Thermal/plating. Pyrolysis at 550°C. followed by magnetic separation of ferrous components and plating of other metals.
SUMITOMO (BATREC)	Thermal - No Ni-Cd or Pb-acid batteries. Shaft and melting furnace >750°C. Zinc recovered by carbothermic reduction and vapor condensation. Iron and manganese recovered as FeMn alloy.
BASALT INDUSTRIES	Shredding, drying, and physical separation. Components sold for recovery.
TNO	Hydrometallurgical - Leachate followed by electrolysis or precipitation.
VOEST-ALPINE	Thermal/plating. Sorting, magnetic separation followed by pyrolysis. Acid leach and plating for zinc recovery.
MOLTEN METAL TECHNOLOGIES	Catalytic extraction in molten iron bath. Technology & patents on recovery of wastes in molten metal baths.
ANSALDO S.p.A.	Catalytic extraction in molten iron bath. Patent on disposal of batteries in a molten iron bath.
DETOX INTERNATIONAL	Catalytic extraction in molten aluminum bath. Patent on disposal of wastes in molten metal bath.

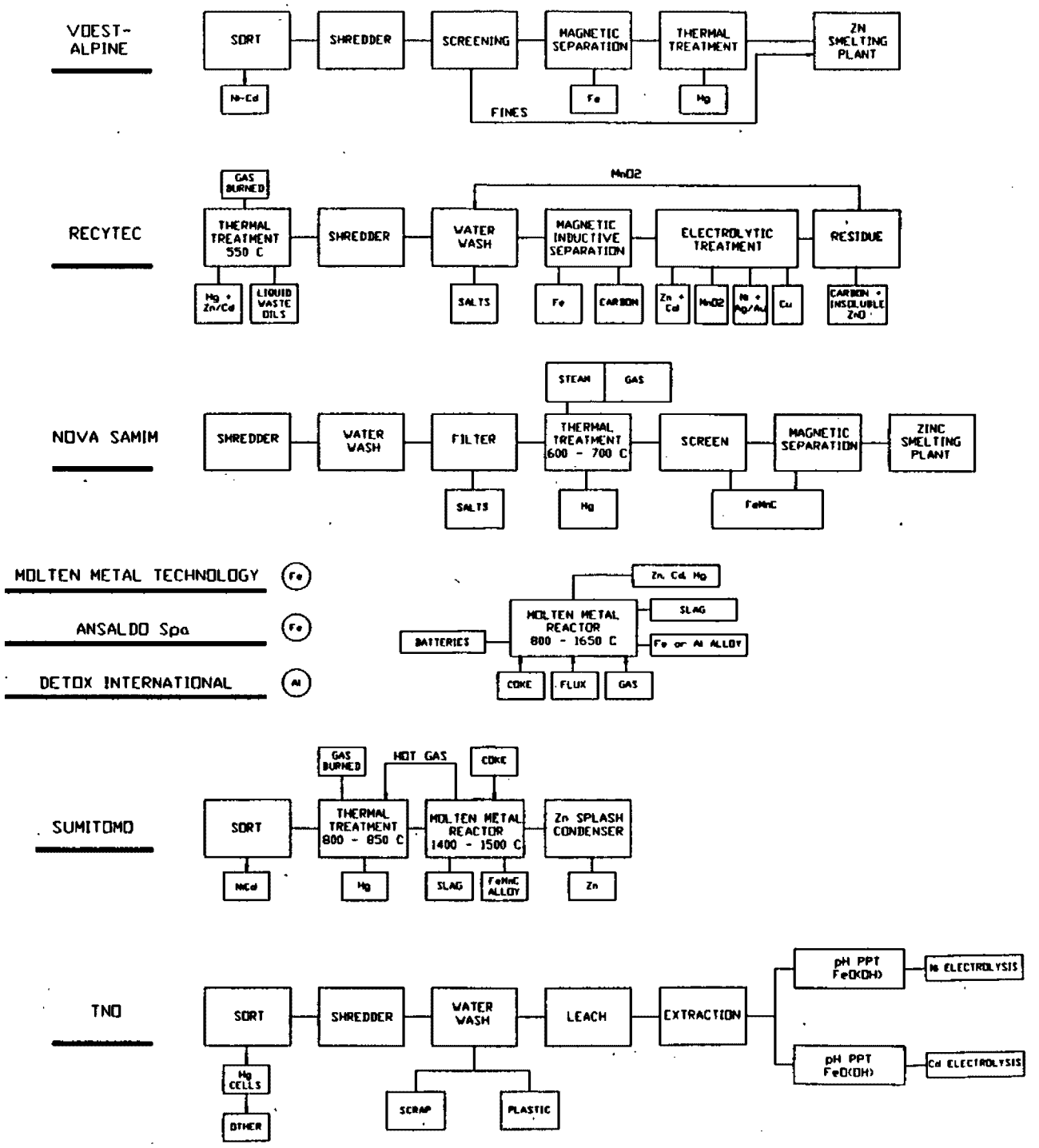

VOEST-ALPINE
SORT
SHREDDER
SCREENING
MAGNETIC SEPARATION
THERMAL TREATMENT
ZN SMELTING PLANT
Ni-Cd
FINES
Fe
Hg
RECYTEC
GAS BURNED
MnO2
THERMAL TREATMENT 550 C
SHREDDER
WATER WASH
MAGNETIC INDUCTIVE SEPARATION
ELECTROLYTIC TREATMENT
RESIDUE
Hg + Zn/Cd
LIQUID WASTE OILS
SALTS
Fe
CARBON
Zn + Cd
MnO2
Ni + Ag/Au
Cu
CARBON + INSOLUBLE ZnO
NOVA SAMIM
STEAM
GAS
SHREDDER
WATER WASH
FILTER
THERMAL TREATMENT 600 - 700 C
SCREEN
MAGNETIC SEPARATION
ZINC SMELTING PLANT
SALTS
Hg
FeMnC
MOLTEN METAL TECHNOLOGY
Fe
ANSALDO Spa
Fe
DETOX INTERNATIONAL
Al
Zn, Cd, Hg
MOLTEN METAL REACTOR 800 - 1650 C
SLAG
Fe or Al ALLOY
BATTERIES
COKE
FLUX
GAS
SUMITOMO
GAS BURNED
HOT GAS
COKE
SORT
THERMAL TREATMENT 800 - 850 C
MOLTEN METAL REACTOR 1400 - 1500 C
Zn SPLASH CONDENSER
NiCd
Hg
SLAG
FeMnC ALLOY
Zn
TNO
SORT
SHREDDER
WATER WASH
LEACH
EXTRACTION
pH PPT Fe(OH)
Ni ELECTROLYSIS
pH PPT Fe(OH)
Cd ELECTROLYSIS
Hg CELLS
OTHER
SCRAP
PLASTIC

FIGURE 3

SPENT DRY CELLS OVERALL TREATMENT PROCESS FLOW CHART

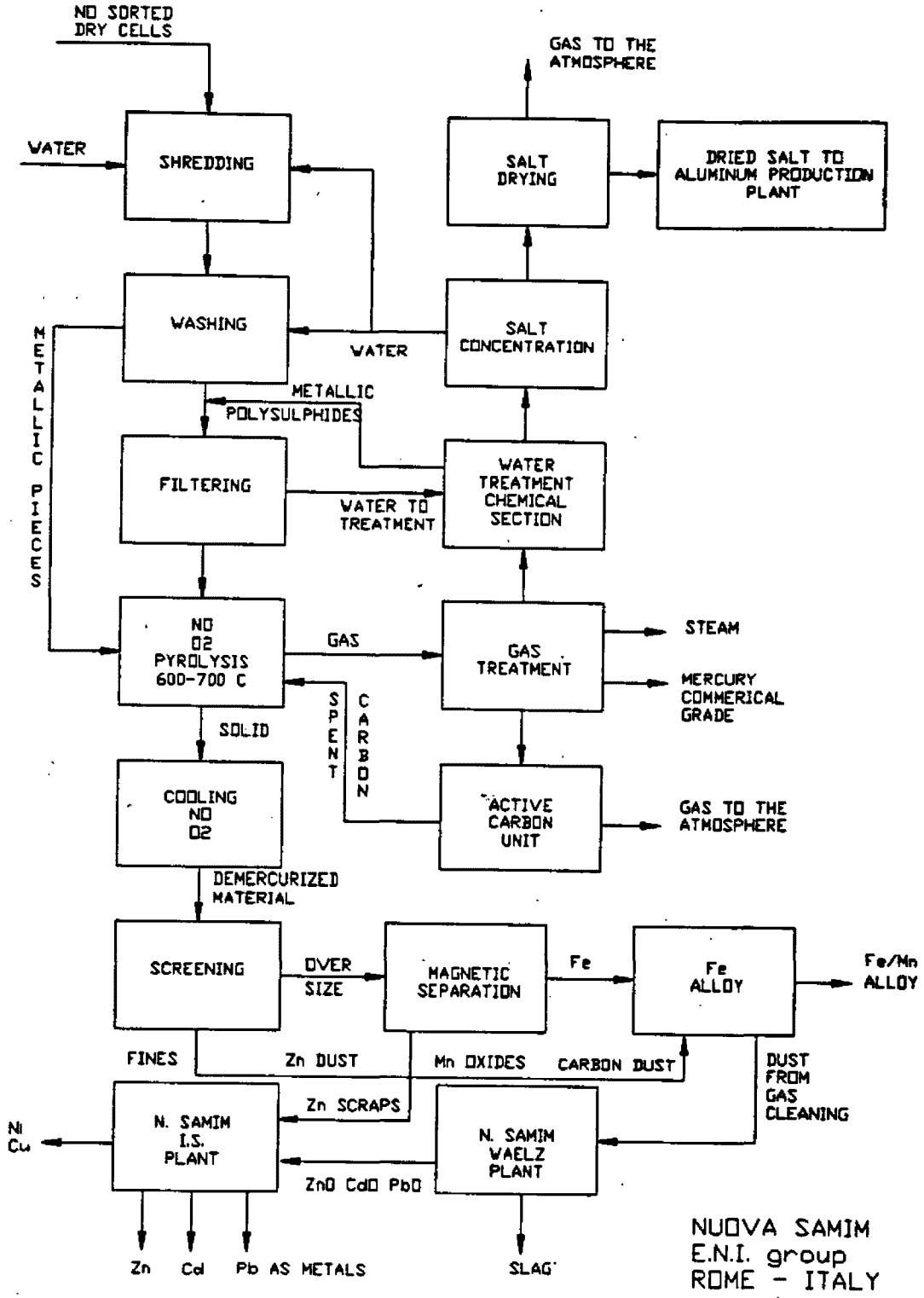
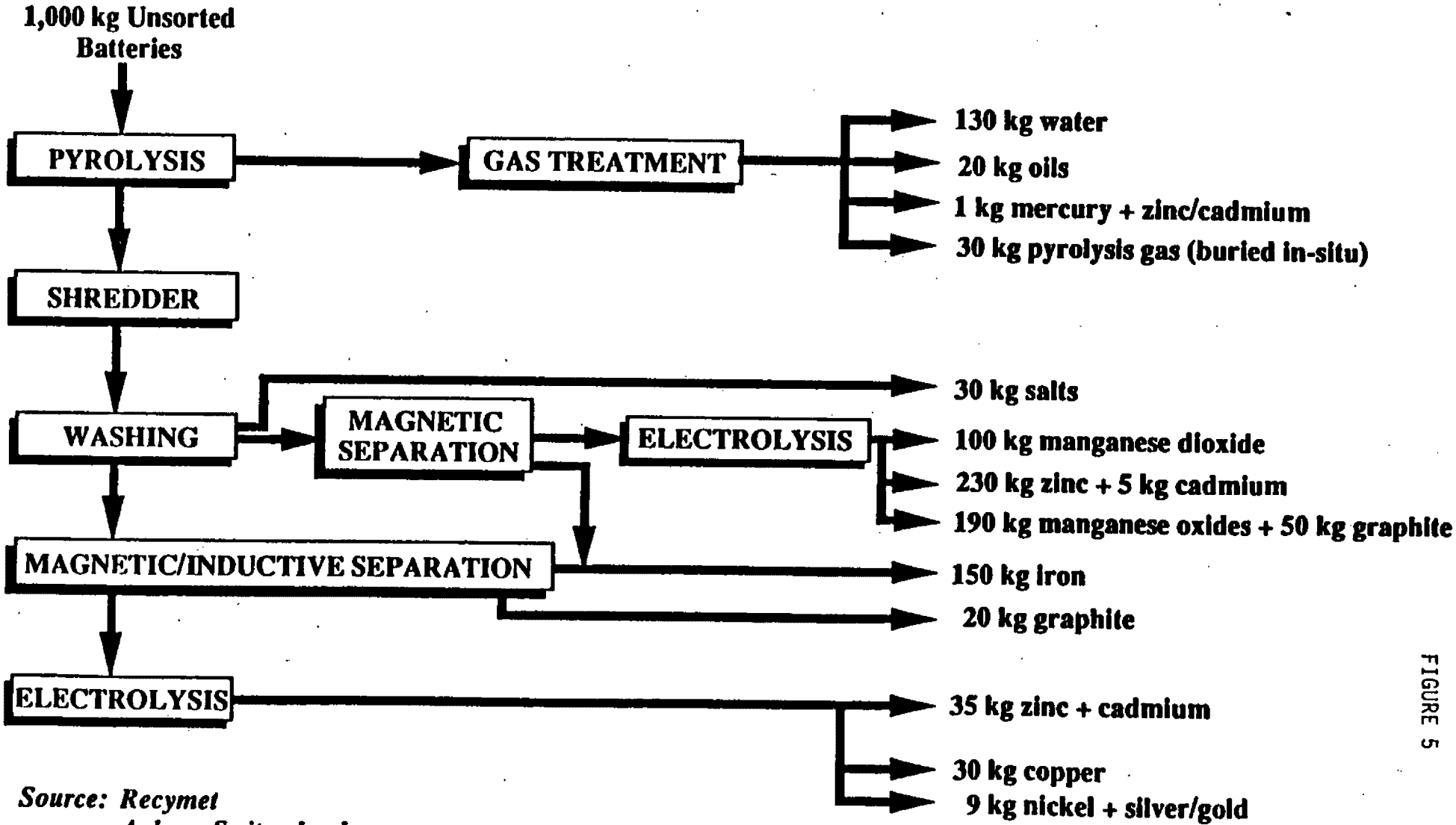


EXHIBIT 1: MATERIAL BALANCE AND FLOWSHEET DIAGRAM FOR THE RECYTEC BATTERY RECYCLING PROCESS



Source: Recymet
Aclens, Switzerland
Fall 1991

FIGURE 5

MOLTEN METAL PROCESS

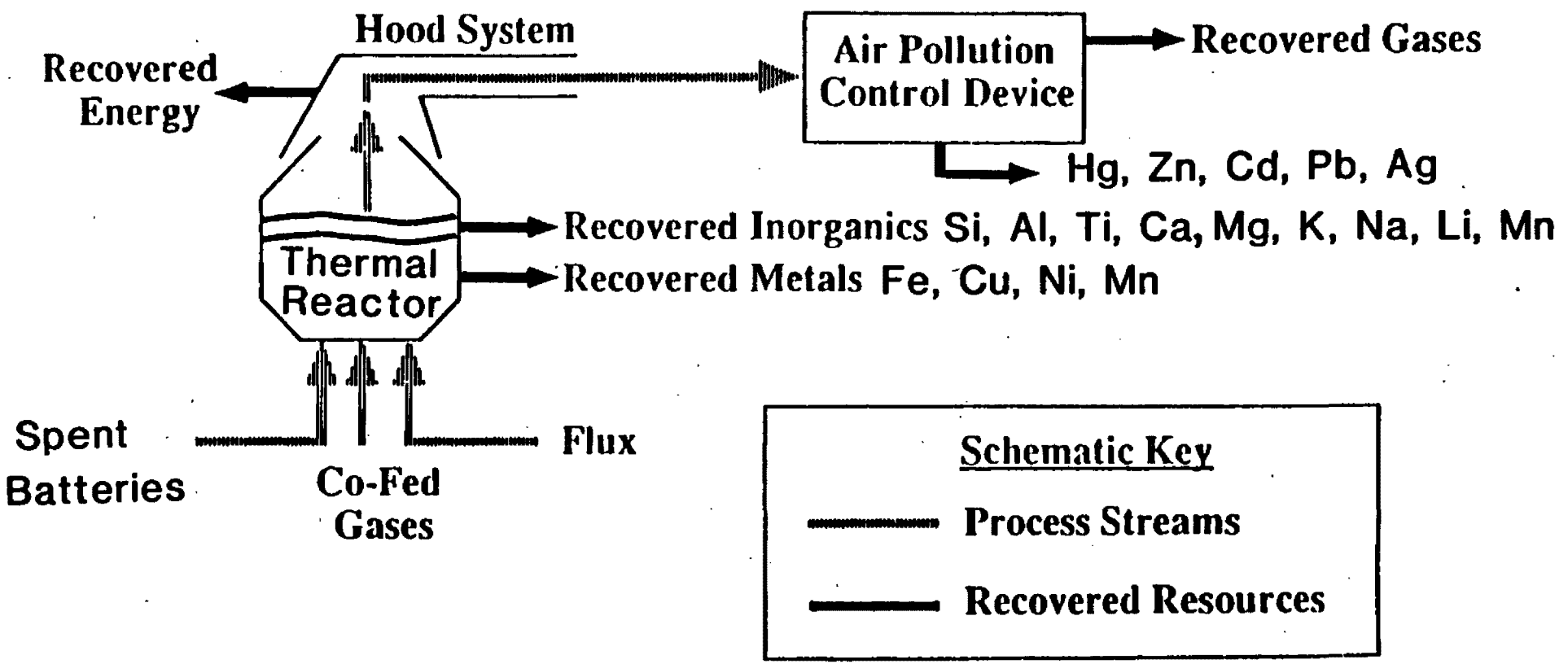


FIGURE 6

FIGURE 7

Battery Recycling
Total Primary Energy, MJ/MT Batteries

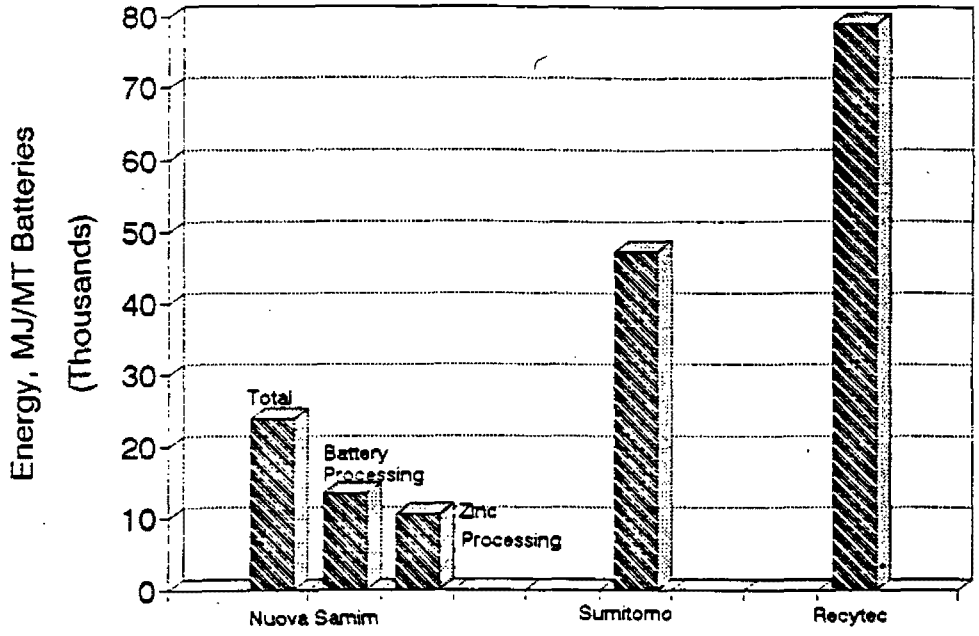


FIGURE 8

BATTERY RECYCLING
PRIMARY & METERED ENERGY REQUIREMENTS

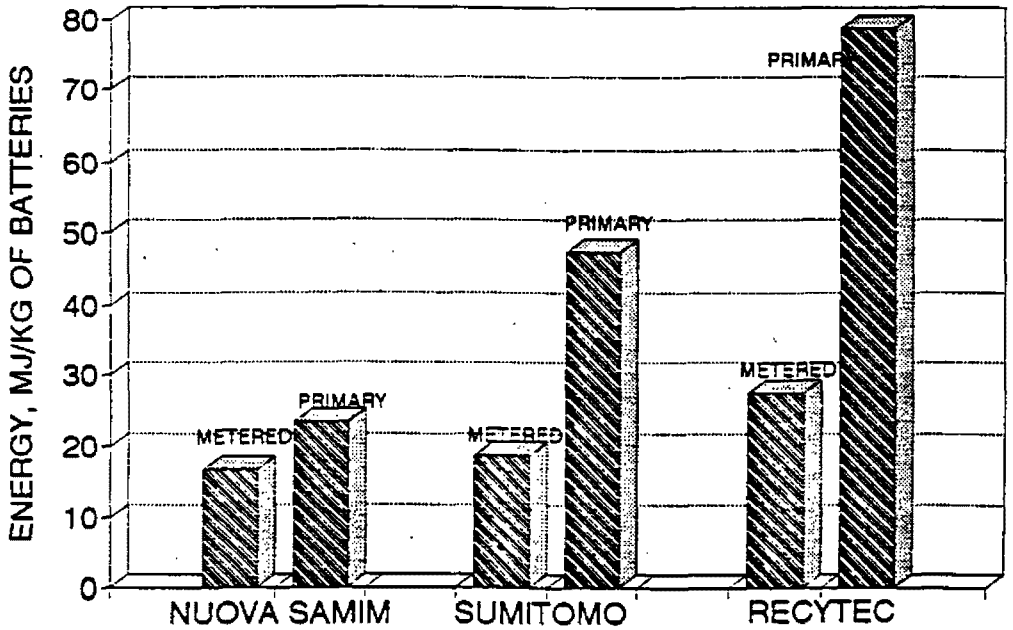


FIGURE 9

BATTERY RECYCLING

Primary Energy Requirement, MJ/Kg Zn

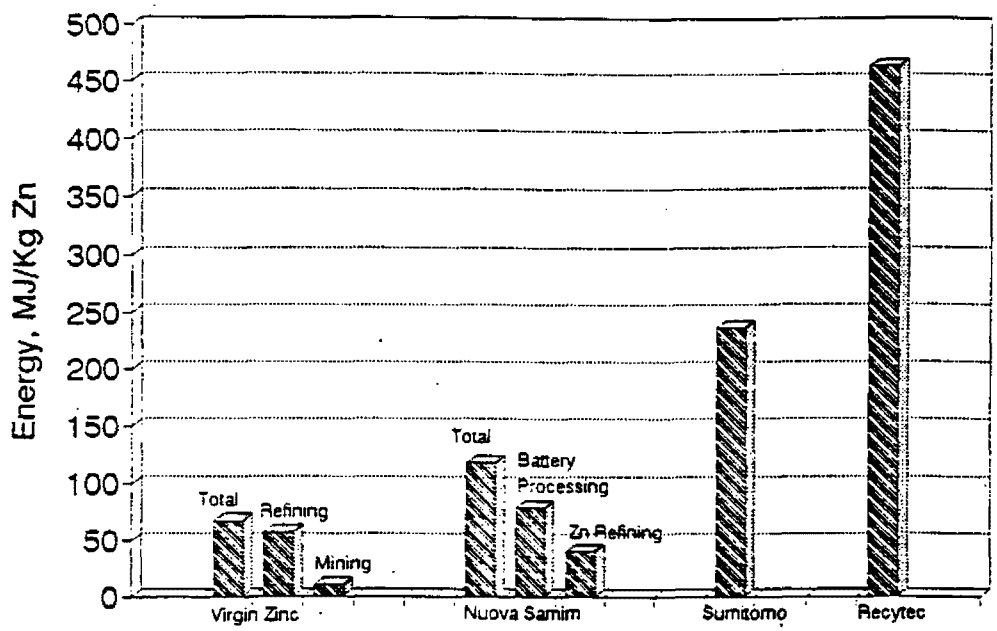
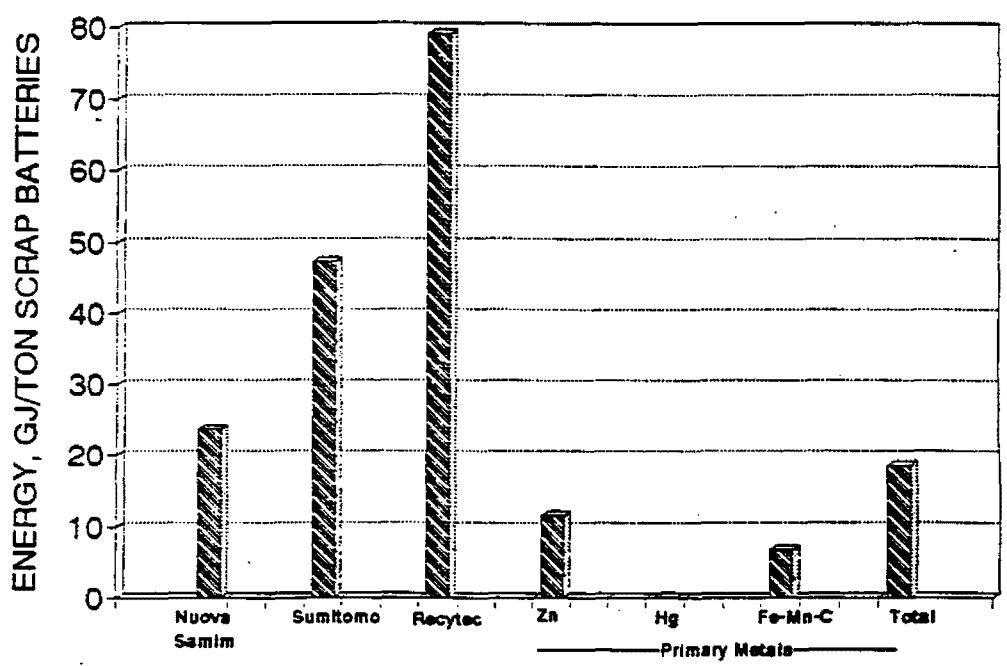


FIGURE 10

PRIMARY ENERGY COMPARISON

EQUIVALENT ENERGY/MT SCRAP BATTERIES



Primary Energy Comparison

Primary Metal Production, MJ/Kg Metal

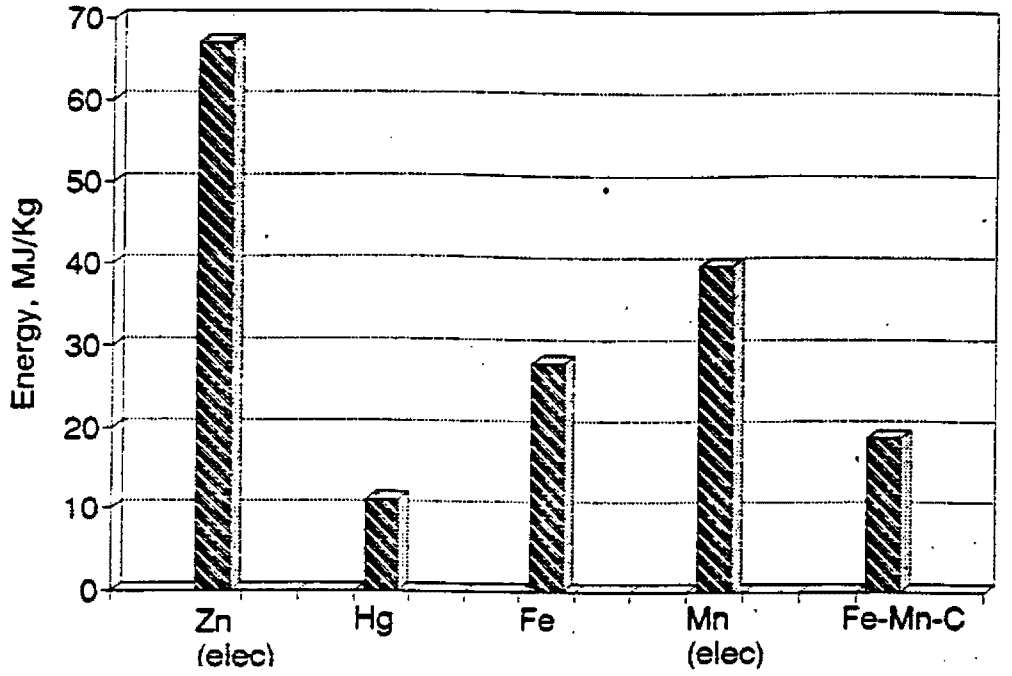
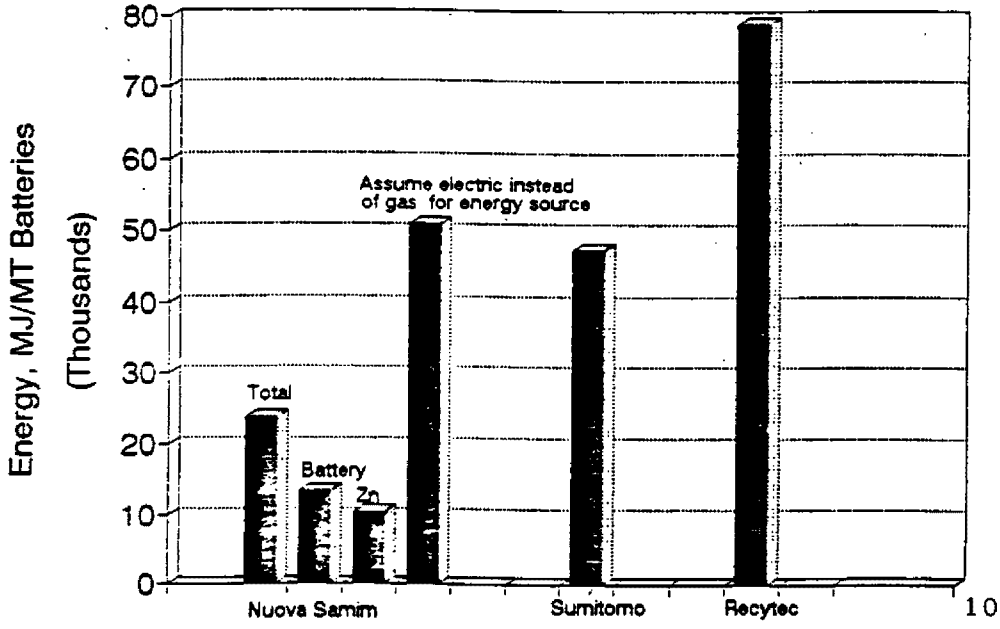


FIGURE 13

Battery Recycling

Total Energy, MJ/MT Batteries



Total Plant Cost + Depreciation

Major Cost Contributors (Swiss Basis)

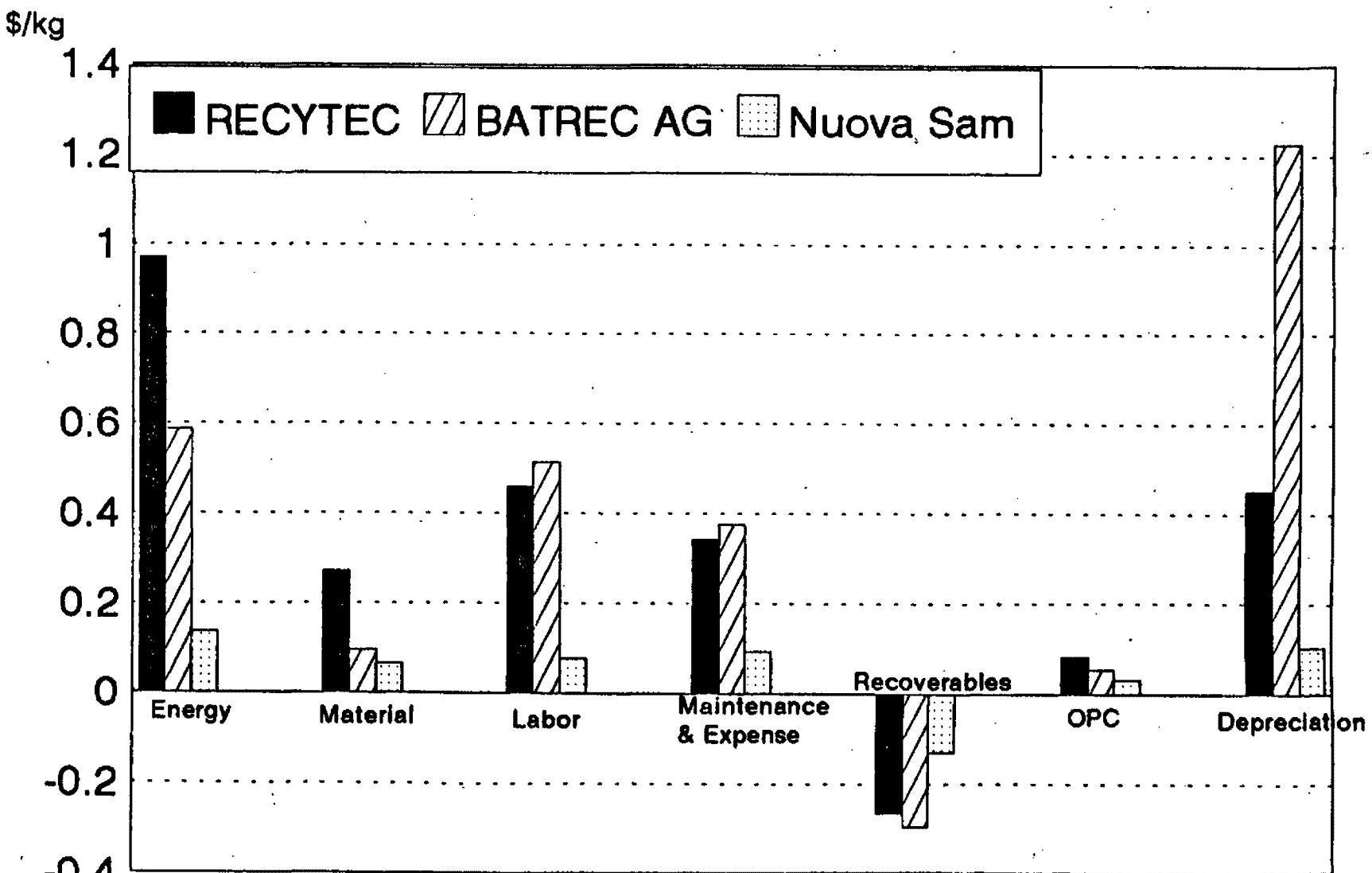


FIGURE 12

Battery Waste Management: A California Study

Fernando Berton, Manager HHW Section CIWMB

INTRODUCTION

The management of household batteries in the solid waste stream is a very complex matter, particularly in California. Because household batteries comprise only 0.005 percent by weight of California's municipal solid waste, the concern over household batteries is not with the volume, but with the amount and toxicity of their heavy metal components. However, millions of household batteries are sold annually in California.

Because millions of batteries are sold annually in California, there was concern as to how these batteries were being managed. The result was the passage of Assembly Bill 3530 during the 1991 Regular Session of the Legislature. This legislative bill required the California Integrated Waste Management Board (Board) to conduct a study on the disposal and potential recyclability of household batteries. The overall purpose of the study was to:

Identify potential risks of used household batteries in the waste stream.

Assess waste management options available to reduce potential risks caused by household batteries. These options include:

Source Reduction
Reuse
Alternative methods of disposal
Recycling

Develop policy recommendations regarding household batteries.

The information contained in the Study will be used for future legislative proposals in the next Regular Session of the California Legislature.

STUDY METHODOLOGY

In conducting this study of household batteries and developing recommendations for legislation, we utilized the following methods to research and analyze household battery issues:

Collected and reviewed background documents of the battery industry and battery collection programs, including:

- Operating data, where available, of current local collection and processing programs, including information on numbers of household batteries collected, and operating and start-up costs of collection programs.

Conducted a review of current legislation, including:

- Source reduction requirements which must be fulfilled by manufacturers

- Collection, processing or recycling programs which are to be managed by municipalitities and other local agencies

- Examined historical battery sales data and projected sales based on industry and consumer trends

- Assessed the relative contribution of toxic metals in household batteries to the solid waste stream, including identifying other sources of metals and the relative proportion contributed by household batteries

- Identified the potential pathways from a variety of waste management processes which metals from household batteries can enter the environment, including landfilling, incineration, composting, collection and transfer, and recycling

- Determined whether used household batteries are considered hazardous waste, and the extent which hazardous waste regulations apply to household battery waste management

- Assessed the state of battery design and technology, including the identification of new battery developments or types, the stage of development, degree of substitution within current battery types, and potential toxic metals contained in new battery designs

- Reviewed the roles of local and state government and household battery manufacturers in battery waste management

BATTERY SALES IN CALIFORNIA

To understand the breadth of the potential problem with the management of household batteries, it was necessary to obtain sales figures specific for California. The data used was provided by the National Electrical Manufacturers Association to derive California household battery projections through the year 2000.

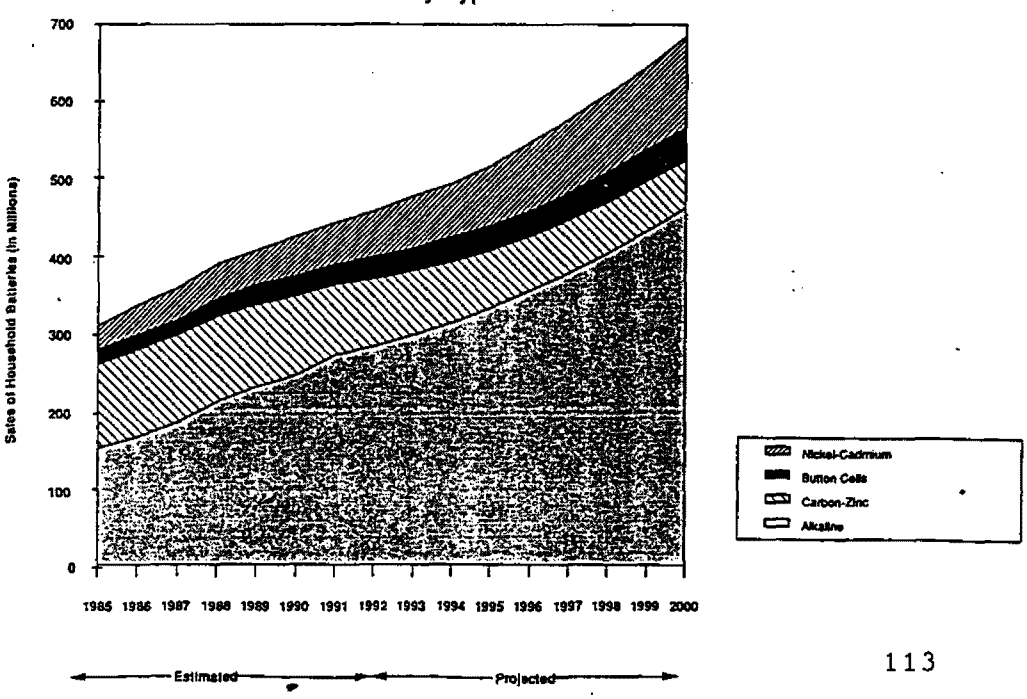
In 1985, California's population was 11.1% of the nation's population. This percentage increased to 12.0% in 1990, and by the year 2000, census projections indicate that California's population will be 12.6% of the total United States population. According to the Study, population growth between 1985 and 2000 accounts for approximately 25% of the growth in household battery sales within California.

For sales forecasts in the Study, it was conservatively assumed, for the lack of better information, that 8% of alkaline, 32% of carbon-zinc, and 35% of nickel-cadmium battery sales will be to non-residential consumers. This is significant since a relatively large number of both primary and secondary batteries are consumed and disposed by non-residential users. The following table presents estimates for household battery sales by type and size for the period between 1985 and the year 2000. Projected sales data are adjusted from national figures to represent those batteries purchased and used in California. This is accomplished by prorating national sales data for each year based on California population projections relative to the population of the United States.

Annual Sales of Household Batteries in California
(Millions of Batteries)

Type/Size	Estimated								Projected							
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Alkaline																
D	32	33	31	35	36	37	41	39	39	39	40	41	41	42	43	44
C	26	29	32	34	34	37	35	37	37	36	37	38	38	39	40	40
AA	73	80	98	110	126	138	151	161	172	184	196	210	229	246	266	288
AAA	9	11	12	16	20	20	25	27	31	34	38	42	47	53	59	66
9V	12	14	15	17	17	17	19	20	21	21	22	24	25	26	27	29
Subtotal	152	167	188	212	233	249	271	284	300	314	333	355	380	406	435	465
Carbon-Zinc																
D	47	46	45	45	42	38	35	33	31	30	28	27	25	24	23	21
C	23	22	22	22	20	18	14	14	13	12	11	10	9	8	7	7
AA	31	37	35	36	34	36	34	33	31	30	29	28	27	27	26	25
9V	9	9	9	9	9	9	8	8	8	8	8	8	8	7	7	7
Subtotal	110	114	111	112	105	101	91	88	83	80	76	73	69	66	63	60
Button Cells																
Mercuric Oxide	7	7	6	6	6	6	5	5	5	5	4	4	4	4	4	4
Silver Oxide	9	9	9	9	10	10	11	11	11	11	12	12	13	13	13	13
Zinc Air	2	3	5	6	7	9	10	12	13	14	15	16	17	19	21	22
Lithium	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2	3
Subtotal	18	19	20	21	24	26	27	29	30	31	32	34	36	38	40	42
Nickel-Cadmium																
All Sizes	32	35	39	43	47	51	57	60	66	71	77	83	90	99	107	117
TOTAL	312	335	358	388	409	427	446	461	479	496	518	545	575	609	645	684

Sales of Household Batteries in California By Type



CLASSIFICATION OF HOUSEHOLD BATTERIES AS HAZARDOUS WASTE

Household batteries contain metals which are known to have adverse effects on human health and the environment. Mercury and cadmium are toxic metals of primary concern in household batteries. However, nickel, silver, and zinc are regulated metals in California. As a result, regulatory criteria for determining whether batteries are hazardous or not differs in California than in other parts of the country. California's criteria for hazardous waste is more restrictive than federal requirements. In addition to the Toxicity Characteristic Leaching Procedure(TCLP), California also has requirements under the Waste Extraction Test (WET), which is used to determine the hazardousness of waste.

While low-mercury alkaline and carbon-zinc batteries could pass the TCLP test, according to the California Department of Toxic Substances Control (DTSC), these batteries could possibly fail the WET limits for zinc and possibly mercury. While data are not available on the performance of each battery type using the WET procedure, the DTSC considers all types of household batteries to be hazardous and equally subject to hazardous waste regulation.

In addition to the more stringent criteria for defining hazardous waste, California does not have the household waste exclusion from hazardous waste designation. In order to facilitate the collection and reclamation of household batteries, the State of California enacted the Management of Small Household Batteries Act of 1989. The Act provides that any collection location or intermediate collection that receives, or any person that transports used household batteries, is exempt from the requirements regarding the receipt, storage, and transport of hazardous waste <u>if</u> the batteries are sent to a metal reclamation facility for the purpose of metal recovery. There are only two facilities that reclaim metals and they are located on the East Coast and do not accept the predominant type of battery sold or collected in California (alkaline). Most existing household battery collection programs dispose of household batteries in a hazardous waste landfill. Therefore, the exemptions provided for by the Act would not apply to these efforts and the collection, storage, and transport of the batteries would be subject to hazardous waste regulation.

The specific requirements for handling hazardous waste are complex and suffice it to say that because of the complexity of these regulations, requirements to handle collected household batteries as hazardous waste may inhibit the establishment of household battery collection programs.

CURRENT DISPOSAL METHODS FOR HOUSEHOLD BATTERIES

As stated before, millions of household batteries are sold annually in California. It would be safe to say that the majority of these batteries are being illegally disposed of in California. There are currently no specialized collection programs aimed at household batteries. Any collection of batteries is currently being

accomplished by utilizing existing HHW collection programs. Unfortunately there is no data available on the number of batteries collected at collection events but it would be safe to say that it is minuscule.

ECONOMICS OF HOUSEHOLD BATTERY COLLECTION AND DISPOSAL

The cost of collection and disposal of household batteries as hazardous waste may presently cost on the order of up to $4,000 a ton in California. This includes approximately $2,000 a ton for collection and $2,000 a ton for disposal. The cost per ton to collect and reclaim the applicable metal from household batteries is generally equal to, or greater than, the $4,000 per ton figure.

The development and implementation of household battery collection and disposal programs in California can create an additional financial burden on local governments. For a community of 100,000 people with a household diversion rate of only 10 percent, the annual costs for collection and disposal of just household batteries as hazardous waste could equal $20,000 or more.

The cost to dispose of household batteries as hazardous waste will be the same for each type of battery. The exception to this may be lithium batteries. Because of the potential for lithium in its metallic state to react violently with water, some battery collection program operators report that these cells should be deactivated prior to disposal. Reported costs for deactivating lithium batteries range from $4 to $15 per pound or $8,000 to $30,000 per ton of batteries.

Since mercury and cadmium are the major metals of concern in household batteries, it is illustrative to examine the costs for diverting these metals from the waste stream through battery collection and disposal. Each battery type contains varying amounts of mercury and cadmium. The following table shows the approximate cost incurred of removing a single pound of mercury and cadmium from batteries.

Cost of Diverting Metals From Municipal Solid Waste Through the Collection and Disposal of Household Batteries

Battery Type	Metal of Concern	Metal Content	Cost of Metal Diversion[a/] ($/lb of metal)
Alkaline	Mercury	0.025%	$8,000
Carbon-Zinc	Mercury	0.0001%	$2,000,000
Mercuric Oxide	Mercury	37%	$5
Silver Oxide	Mercury	1%	$200
Zinc Air	Mercury	2%	$100
Nickel-Cadmium	Cadmium	12.5%	$16

a/ Assumes $4,000 per ton household battery hazardous waste collection and disposal costs.

The following table shows the number of batteries required to be diverted for each pound of the applicable metal avoided. These data indicate that it would require over nine million carbon-zinc batteries to be collected in order to divert a pound of mercury from the municipal solid waste stream.

Number of Batteries Collected
For Each Pound of
Hazardous Material Diverted

Battery Type	Metal of Concern	Metal Content	Average Weight Per Battery[a/] (Grams)	Required Number of Batteries Diverted (Batteries/ Pound of Metal)
Alkaline	Mercury	0.025%	46	39,391
Carbon-Zinc	Mercury	0.0001%	49	9,244,897
Mercuric Oxide	Mercury	37%	2	612
Silver Oxide	Mercury	1%	1	45,300
Zinc Air	Mercury	2%	2	11,325
Nickel-Cadmium	Cadmium	12.5%	44	82

a/ 453 grams per pound Avoirdupois Weight.

Given the current financial pressures on local governments, the costs of collecting and disposing each type of battery, the varying metal content levels for each type of household battery, the need for cost-effective and pragmatic approach in the management of battery waste, and the evidence that nickel-cadmium batteries may pose a relatively larger potential risk to health and the environment, an appropriate battery management strategy may require targeted efforts directed primarily at nickel-cadmium batteries.

RECOMMENDED HOUSEHOLD BATTERY WASTE MANAGEMENT STRATEGIES

As a result of the research and findings of the Battery Study, specific recommendations included. Some of the recommendations will require new legislation and regulations and some recommendations may require modifications to existing State regulations. The following are five major recommendations of the Battery Study.

1. **Develop Specific Legislation for Household Battery Management**

   It is recommended that California develop broad based legislation for regulation of household batteries. This kind of legislation is similar to what is already occurring in other states. Recommended legislative general provisions include (1) mercury content limitations, (2) standardized product labelling requirements, (3) a targeted battery product ban, and (4) specifications that batteries be removable from products.

   The following table contains specific provisions for recommended household battery legislation:

Recommended Household Battery Legislation

Battery Type	General Provision	Specific Provision
Alkaline	Mercury Content Limitation	Limit mercury content in alkaline batteries to 0.025 percent, by weight, by July 1993
Alkaline	Mercury Content Limitation	Limit mercury content in alkaline batteries to 0.0001 percent, by weight, by January 1996
Carbon Zinc	Mercury Content Limitation	Limit mercury content in carbon-zinc batteries to 0.0001 percent, by weight, by July 1993
All Button Cells	Product Labelling	Require button cell batteries and packaging to identify the type of battery and need for proper disposal by July 1993
Mercuric Oxide	Product Ban	Ban sale of mercuric oxide button cell batteries by January 1996
Nickel-Cadmium	Product Labelling	Require nickel-cadmium batteries and packaging to identify the type of battery and need for proper disposal by July 1993
Nickel-Cadmium	Product Labelling	Require battery-operated products using nickel-cadmium batteries and packaging to identify battery type used and the need for proper disposal by July 1993
Nickel-Cadmium	Batteries Removable from Products	Require that all battery-operated products using nickel-cadmium batteries to be manufactured so that the batteries are easily removeable by the consumer

2. **Facilitate Dialogue With Department of Toxic Substances Control and Battery Industry**

The Board will act as facilitator between the Battery Industry and the Department of Toxic Substances Control to discuss topics that affect the management of household batteries. Such include the regulation of zinc in California, permitting and transportation issues, labelling, etc.

3. **Review and Revise Existing California Regulations Which Affect Household Batteries**

Regulations that affect household battery management in California should be reviewed to determine if they act as an impediment to local governments and private industries who need to collect, store, and transport household batteries for proper hazardous waste disposal.

4. **Develop and Implement Statewide Education Program for Hazardous Household Batteries**

The State should develop and implement a statewide education program on the various types of household batteries, and the special requirements for disposal. The education program should include the following areas:

- Description of the various types of household batteries
- The varying contribution of toxic metals in different battery types
- Proper disposal of button cells and nickel-cadmium batteries

The State needs to help relay a consistent message to California consumers regarding the collection and disposal of household batteries. If consumers are advised to collect certain household batteries, there needs to be provided a proper form of disposal.

5. **Further Develop Hazardous Household Battery Collection and Disposal Strategies**

Existing HHW programs sponsored by local governments should be the present primary mechanism for household battery collection. These battery collection programs should focus on the required collection and handling of nickel-cadmium and button cell batteries. However, if additional battery collection efforts are considered necessary, such as a community with a waste-to-energy facility or a mixed-waste compost operation, then collection programs should encompass retail outlets and curbside collection programs.

The ultimate decision on what type of household batteries to collect may affect decisions on how best to collect batteries. Return to retailer collection may be highly suited for button cell batteries and nickel-cadmium batteries where consumers are looking for a specific type and replacement battery.

The Household Battery Waste Management Study provides much more detail than the paper you just read. If you would like to obtain a copy of the Battery Study, submit a written request to the following address:

Fernando Berton, Manager
Household Hazardous Waste Section
California Integrated Waste Management Board
8800 Cal Center Drive
Sacramento, CA 95826

Hennepin County's Battery Program

Cheryl Lofrano-Zaske
Planner, Hennepin County Department
Department of Environmental Management

Hennepin County has a population of over 1 million or approximately one quarter of Minnesota's population. Hennepin County has 47 communities, with the City of Minneapolis being its largest community and County seat. An integrated solid waste management system is utilized which includes transfer stations, a waste to energy plant and refuse derived fuel plants, household hazardous waste collection center and recycling centers. Programs include recycling, hazardous waste, solid waste, conservation and problem materials. Problem material management includes household hazardous waste, liquid mercury items, fluorescent tubes, high intensity discharge lamps, consumer electronics, major appliances, and the Hennepin County battery program. There are three main methods for battery collection in the Hennepin County program:

1. **Button Batteries**: Collected at over 500 retail and public drop-off locations. Program started in 1989 and has collected approximately 2,000 pounds of batteries. Batteries are collected in small Hennepin County boxes and transported to central collection site by common carrier.

2. **Mixed Household Batteries**: Collected at over 150 collection sites and curbside in the City of Minneapolis. Program started fall of 1990 and has collected over 175 tons of batteries. Batteries are collected in 7 or 33 gallon size collection containers. Containers are transported to the central collection site by People Unlimited, a non-profit organization.

3. **Rechargeable Appliances:** Collected at the recycling and transfer station in Brooklyn Park. The batteries are removed from the appliance and are managed with the mixed household batteries.

The central collection site for the batteries is Hennepin County Vocational Services, a rehabilitiation facility serving people with disabilities. The batteries at the central site are sorted by chemical composition and packaged for disposal and are managed in accordance to the hazardous waste rules.

Sorted Battery Categories	Management Method
Alkaline	hazardous waste landfill
Carbon-Zinc and Zinc-Air	hazardous waste landfill
Nickel Cadmium	send for metal reclamation
Lead-Acid	send for metal reclamation
Button Batteries	send for metal reclamation and disposal
Lithium	hazardous waste incineration
Mercury	send for metal reclamation
Silver	send for metal reclamation

If you would like information on our programs, please contact Hennepin County Environmental Management, 417 North Fifth Street, Minneapolis, Minnesota 55401-1309.

12/08/92

Hennepin County
Residential Battery Collection and Disposal by Shipments

	1990		1991		1992 as of 11/30		Totals (2/90 – 11/92)	
Alkaline	38.16%	1,760 lbs.	57.24%	81,089 lbs.	62.20%	124,196 lbs.	59.85%	207,045 lbs.
Zn/Carbon	32.52%	1,500 lbs.	34.74%	49,215 lbs.	31.71%	63,308 lbs.	32.96%	114,023 lbs.
Nicd	22.98%	1,060 lbs.	6.89%	9,757 lbs.	2.75%	5,483 lbs.	4.71%	16,300 lbs.
Merc./button	6.33%	292 lbs.	0.57%	803 lbs.	0.00%	0 lbs.	0.32%	1,095 lbs.
Lithium	0.00%	0 lbs.	0.00%	0 lbs.	1.08%	2,148 lbs.	0.62%	2,148 lbs.
Lead Acid (non vehicle)	0.00%	0 lbs.	0.56%	800 lbs.	2.27%	4,540 lbs.	1.54%	5,340 lbs.
All Batteries	100.00%	4,612 lbs.	100.00%	141,664 lbs.	100.00%	199,675 lbs.	100.00%	345,951 lbs.
								172.98 tons

Hennepin County
Residential Battery Costs for Processing and Disposal

	Collection	Sorting	Disposal	Totals
1990	Unknown	$970	$1,500	$2,470
1991	$5,855	$26,742	$74,892	$107,489
1992 (as of 11/15/92)	$5,001	$36,614	$107,387	$149,002
Totals	$10,856	$64,326	$183,779	$258,961

SAN FRANCISCO'S SAFE NEEDLE DISPOSAL PROGRAM

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Of all the hazards associated with the collection and disposal of solid waste in San Francisco, the garbage workers' greatest fear is the possibility of being stuck by a used hypodermic needle hidden in the trash. Diabetics and other home treatment patients use an estimated 15,000 to 20,000 needles every day in the City and drug addicts are thought to account for as many as 10,000 more. All used needles, if disposed of improperly, have the potential to stick and possibly infect anyone with whom they come into contact. Sanitary Fill Company, owner and operator of the San Francisco Solid Waste Transfer & Recycling Center, and the San Francisco Household Hazardous Waste Collection Facility (HHWCF), is committed, along with the City and County of San Francisco, to protect its workers from injury and disease by reducing the number of used needles entering the municipal waste stream.

The Problem

According to a 1990 EPA report to congress on medical waste management, approximately 1.4 billion needles and lancets, collectively known as *sharps*, are used and discarded into domestic waste streams each year. Laid end to end, 1.4 billion 4.5" insulin syringes would circle the globe four times at the equator. Efforts to curb rising health care costs are resulting in shorter hospital stays which in turn leads to an increased reliance on home health care alternatives, and an increase in the number of sharps and other home generated medical wastes.

Traditionally, used sharps from the home have been disposed of in the regular garbage. Some are flushed into the sewer system where they endanger plumbers and city workers. A survey of San Francisco garbage workers found that 80% of survey respondents reported having found sharps and other medical waste in the garbage.

Health and Safety Hazards of Needle Sticks

Discarded needles can be infectious because they may contain small amounts of blood. If the blood on a needle contains a viable pathogen then a stick from that needle has the potential to transmit disease. Two bloodborne pathogens are of special concern: Hepatitis B Virus (HBV); and the Human Immunodeficiency Virus (HIV) which causes AIDS.Other diseases capable of transmission by needle stick are hepatitis C, hepatitis non-A non-B and malaria.

The hepatitis B virus causes a severe, potentially fatal liver disease that causes destruction of liver cells, extreme weakness and yellowing of the skin. People who are fortunate enough to recover from a painful bout with HBV face an increased risk of liver cancer later in life. HBV is found in virtually all body secretions and excretions of infected individuals and can be transmitted sexually. Some people who recover from the disease go on to become chronic carriers, and pregnant women infected with the virus may pass it on to their babies.

The Human Immunodeficiency Virus that causes AIDS can also be transmitted through a needle stick, though this is considered very unlikely for garbage workers because the HIV virus dies so quickly once it leaves the body of an infected person. A study of healthcare workers who accidentally stuck themselves with infected needles found the more resilient hepatitis B virus was 66 times more likely to cause an infection than the relatively fragile HIV.

Realistically, a garbage worker would have to come into contact with an infectious needle moments after it was used for HIV infection to be remotely possible. Exposure to air and the cool, dry conditions of a garbage receptacle, relative to the human body, quickly destroy the HIV and render it non-infectious. But regardless of the small probability of contracting HIV from a needle in the trash the average garbage worker may perceive this risk to be great and perception cannot be taken for granted. One of the reasons Magic Johnson gave for retiring from professional basketball after cutting his arm in a pre-season game was an acknowledgment of the perception of risk, justified or not, that other players felt while playing on the same court. The concept of risk is abstract, but the anxiety and emotional suffering of a needle stuck worker and his or her family as they wait for symptoms is very real.

At present, there are no federal regulations regarding the disposal of medical waste from any source.

California regulates medical waste from hospitals and clinics but sharps and other medical waste generated in the home are specifically exempt. In lieu of disposal regulations, the EPA has published guidelines recommending that needles, syringes, lancets and other sharps from the home be placed in tightly closed, hard plastic or metal containers before disposal in household trash receptacles. This is an improvement over loose needles discarded in the trash, but it is an imperfect solution because needle containers often break when they are compacted in the back of a garbage truck and needles may scatter throughout the load. Once dispersed, these needles again pose a threat to collection, vehicle maintenance and landfill workers.

Needle Collection in San Francisco

The San Francisco Household Hazardous Waste Collection Facility began accepting medical waste from San Francisco residents shortly after it opened in 1988. The facility, located at the southern boundary of the city, accepts waste delivered by residents eight hours a day, three days a week. Medical waste is stored at the facility for pick-up by a licensed hauler for destructive incineration.

In order to make safe sharps disposal more convenient, and thus increase the number of sharps collected, Sanitary Fill and the two local garbage collection companies created the Residential Needle Collection Program. For a nominal fee of $5.00, a customer may arrange for a red plastic sharps container to be delivered to their home. When the container is full, the customer contacts the garbage company and a collector retrieves it for incineration. Sanitary Fill Company informs residents of these provisions for safe needle disposal through flyers and other garbage company public outreach programs. We also contacted local hospitals and asked them to contact their diabetic and home care patients about safe needle disposal.

Waste Acceptance Control Program

Sanitary Fill Company developed the Waste Acceptance Control Program (WACP), in 1987 to keep hazardous waste from entering of the city's waste stream. The WACP also works to eliminate needles from the waste stream by conducting waste inspections, training employees, and developing community education and outreach programs. As with other hazardous wastes, when WACP technicians discover sharps during waste inspection, or receive a report of sharps from a garbage collector, they contact the sharps user, if possible, and help arrange for a safe disposal alternative.

Hepatitis B Inoculations

In response to employee concern, the San Francisco Garbage Companies made hepatitis B inoculations available, free of charge, to all of their employees who may potentially come into contact with needles in the solid waste stream. This group included collection workers, materials handlers, mechanics and hazardous waste program staff. Trainings were held for all eligible employees to explain the risk associated with needle sticks and to answer questions about HBV vaccinations. Workers were encouraged to avail themselves of the vaccine but the choice was left to them. A majority of workers signed up for the series of three injections.

The San Francisco Safe Needle Collection Program (SFSNCP), inaugurated on July 1, 1991, is the culmination of our efforts to remove sharps from the waste stream. The goal of the program is to provide San Francisco residents with convenient, free needle collection and disposal available at the same locations where they purchase their needles and medicine. The Program enables City residents to pick up free plastic sharps containers at 34 pharmacies throughout the City and return them, when full, to any one of the same locations. The pharmacies temporarily store the filled containers and call designated, licensed medical waste haulers for pick-up and disposal.

The SFSNCP is the result of a creative coalition of civic officials and solid waste and health care professionals working together for a common goal. Members of the coalition encompass a broad range of knowledge and experience from every aspect of a medical sharp's "life cycle," including its manufacture, distribution, use, disposal and regulation.

The coalition was assembled by Mel Seid, a medical waste inspector for the San Francisco Department of Public Health. Seid had experience working with the garbage companies resolving medical waste incidents at the Solid Waste Transfer and Recycling Center and was well versed on the hazards

sharps pose to garbage workers. Emphasizing the concepts of volunteerism and public/private partnership, Seid used his contacts in the medical community to bring to the table players with a stake in the problem. The members of the task force included the following:

• **The Office of the Chief Administrative Officer (CAO), City & County of San Francisco.** This office is involved in overseeing all aspects of solid waste management in the City. Initially, the CAO committed $15,000 for the development and distribution of educational materials during the pilot phase of the program. Later, the CAO committed funds to purchase sharps containers on an ongoing basis. This year's supply of sharps containers will cost approximately $12,000.

• **Sanitary Fill's Waste Acceptance Control Program.** With direct experience managing hazards in the garbage, the WACP staff provided insight into local waste handling procedures and represented the interests of the garbage workers at risk. After the pilot phase, Sanitary Fill assumed responsibility for the administration of the program.

• **Sharps Container Companies: Becton-Dickinson; Sage; and American Environmental.** These companies manufacture sharps and/or sharps containers, integral elements of both the problem, and the solution. The companies donated sharps containers for the six month pilot phase of the program. They divided the program outlet locations amongst themselves and delivered the containers using their normal systems of distribution.

• **Walgreen's Pharmacy**. With 27 stores, Walgreen's is the largest pharmacy chain in San Francisco and is the logical place to anchor a point-of-purchase collection program. Walgreen's, along with 5 public health centers and 2 hospital pharmacies, distributed empty containers and program information, collected and stored full containers and contacted haulers for disposal. Walgreen's also contributed $1000 to help start the program.

• **Waste Haulers: Integrated Environmental Services (IES), American Environmental (AE) and Browning Ferris Industries (BFI).** These companies provide collection, treatment and disposal at no cost during the pilot phase. IES and BFI agreed to continue donating their services on an ongoing basis.

• **The American Diabetes Association and the San Francisco Bay Area Association of Diabetes Educators.** These non-profit groups helped coordinate the program and educate the public regarding sharps disposal. They also provided critical insight into the practical needs of diabetics who are the needle program's largest target audience.

The program started with a six month pilot phase from July 1 to December 31,1991. During this phase, operational difficulties were ironed out and data were collected for evaluation.

Public Education

Program outreach, sponsored by the CAO's office, and pre-program education for pharmacy staff started on June 1, one month before the pilot program's start date. A promotional brochure entitled "Don't Needle Your Garbage Collector or the Environment" was printed in English, Spanish and Chinese and distributed at all Program outlets. The American Diabetes Association and the San Francisco Bay Area Association of Diabetic Educators addressed their constituencies in newsletters and through other established avenues of communication. Public Service Announcements were written and bus placards were posted referring people to Walgreen's for containers and brochures explaining the program.

The participation of a prominent company such as Walgreen's with its high visibility and large number of locations in San Francisco was crucial to the success of the program. Walgreen's serves as a hub for the distribution of both information and containers. Some people refer to the San Francisco Safe Needle Collection Program as the "Walgreen's Program," which underscores the public relations benefit that accrues to companies that donate products and services for the public good. Medical supply companies and haulers trying to dispel the negative associations between their products and reported instances of medical waste washing up on the nation's beaches may also be interested in the public relations benefits of participating in such programs. All of the companies and agencies that donated time, service and products to the Program continue to receive recognition in press releases and printed promotional materials.

The program was introduced to the media at a press conference featuring a garbageman who had been stuck by a needle. The strong emotional appeal of the garbageman's story attracted representatives from major local television, radio and print media working in English, Chinese and Spanish. *Newsweek* and several national medical journals picked up the story and ran it nationwide. The excellent coverage that

attended the press conference was an auspicious beginning and invaluable to the quick success of the program.

Pilot Phase Results

By the end of the six month pilot phase of the program, 3,413 sharps containers had been distributed throughout the city and 1,224 (36%) returned. Possible explanations for the low rate of return are: some containers were not yet full (in order to save money, some needle users re-use syringes two or more times); some full containers were stored in homes before being returned to an outlet pharmacy. In an effort to encourage the return of containers to Program outlets, stickers were produced and affixed to the containers instructing people to return them when full.

Encouraged by the number of participants during the first six months, the coalition looked for ways to institutionalize the Program and make it permanent. Walgreen's, and the other Program outlets were satisfied with the structure of the Program as it was established and were committed to continued participation. One of the haulers, American Environmental, dropped out of the Program but the remaining two, IES and BFI agreed to split AE's collection points in half and continue to service all Program outlets for free. A problem arose when the sharps container companies decided they could no longer provide free containers on an indefinite basis. A source of revenue had to be found to purchase containers for the program to continue.

Having come this far, Sanitary Fill Company and the CAO's office refused to let the Program die for lack of resources. Sanitary Fill incorporated administration of the program into the WACP and the CAO committed funds for containers.

By making needle disposal both convenient and free, the San Francisco Safe Needle Collection Program is safely managing a significant number of used needles that otherwise might have endangered public health. From the garbage companies' point of view, the truest measure of success of the San Francisco Safe Needle Collection Program can be seen in the faces of the garbage workers. They are grateful for the serious consideration and resources that the Program coalition has focused on a problem that, for the longest time, they have had to bear alone.

WHITE GOODS: STATE MANAGEMENT ISSUES AND PROBLEMS

Catherine A. Wilt
Energy, Environment and Resources Center
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White goods are one of the category of so-called "problem wastes" named for the difficult environmental and management problems that they cause. White goods are any large appliances such as refrigerators, freezers, air conditioners, stoves, microwave ovens, washers, dryers, garbage disposals, etc. The U.S. Environmental Protection Agency estimates that as much as three million tons of the annual waste stream is made of white goods, with less than a ten percent recycling rate.

Compared to the other problem wastes such as used tires, waste oil, lead-acid batteries and household hazardous wastes, the problems associated with white goods can be more nebulous. Since appliances are bulky, they take up considerable landfill space. They also pose an aesthetic concern, particularly in rural areas of the country where they are dumped in ditches or beside barns. The primary environmental issues of white goods management are the toxic constituents present in some white goods which are released with improper disposal. Items such as air conditioners, furnace blowers, refrigerators and freezers manufactured or repaired prior to 1979 have electrical capacitors which contain polychlorinated biphenyls (PCBs), a known carcinogen. When capacitors are not removed prior to recycling or disposal, the capacitors can crack and contaminate landfills or the metal by-products created in scrap recycling operations. This is currently a peak time to consider white goods management since many of the appliances in question are reaching the end of their useful lifespan and are requiring disposal options. Further, white goods with refrigeration systems contain chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) which have been linked to stratospheric ozone depletion; these chemicals now need special management according to the Clean Air Act.

Historically, most consumers and communities dealt with older appliances by taking them to landfills, or relying on local scrap dealers to accept them and segregate them into the second-hand appliance market or process them into scrap metal. Appliances contain large quantities of steel and are an excellent source of ferrous scrap metal. In order to recover the steel and scrap metal in appliances, they must be shredded with equipment akin to automobile shredders. Once shredded, the stainless steel and nonferrous metals can be separated from non-metallic components such as plastic, rubber and glass.

However, when white goods are improperly processed several problems arise. White goods with PCB-contaminated capacitors can taint leftover metal wastes, or "fluff," to unacceptable high levels. As the regulatory atmosphere surrounding white goods management became more strict, most small scrap dealers found themselves unable to comply with federal regulations. In a 1988 bulletin to all its constituents, the Institute of Scrap Recycling Industries (ISRI) stated:

"For environmental reasons, the Board recommends that the industry:

1. Discontinue receiving and processing through any means all appliances and fluorescent light fixtures unless the processor has taken steps to ensure that, as far as possible, no PCB capacitors or ballasts are present in a material when processed.

2. Refuse to market or handle any commodities containing appliances or fluorescent lighting fixtures unless steps have been taken to ensure that, so far as possible, no PCBs are present in the commodities."

State Issues

As the problems inherent with white goods management are pushed to the forefront, several states have taken the lead in requiring appropriate management for these items. Thirteen states including Connecticut, Florida, Illinois, Louisiana, Massachusetts, Minnesota, Missouri, North Carolina, North Dakota, Oregon, South Carolina, Vermont and Wisconsin have legislated requirements for white goods management. However, many programs have met with varying degrees of success due to the potential liability problems associated with their management. The extent of many states' programs is to simply restrict appliance disposal from landfills, with no promulgated rules or regulations to define alternate disposal.

Connecticut

Connecticut legislated requirements under their 1988 Mandatory Recycling Act that ban the disposal of scrap metals. State regulations define scrap metal as "used or discarded items of predominately ferrous metals, aluminum, brass, copper, lead, chromium, tin, nickel or alloys thereof, including but not limited to, white goods and metal food containers." Scrap metals, including white goods, have been banned from landfills and incinerators since January, 1991.

The responsibility for collection and segregation of white goods and the removal of capacitors and refrigerants falls upon towns in Connecticut. The state Department of Environmental Protection has developed an education and training program to train individuals to identify, locate, remove and dispose of PCB capacitors. Capacitors are placed in 55-gallon drums (it takes about three years for most Connecticut towns to fill a barrel) until filled; at that point the drum is sent to a facility permitted under the Toxic Substances Control Act. The cost per barrel for disposal is approximately $900. If contractors are hired to clip capacitors themselves, they charge approximately $5-10 per appliance.

An agreement with New England's largest utility has given another option to Connecticut citizens. Northeast Utilities (NU) made an offer to remove and recycle old appliances at no cost to their utility customers. NU contracted with Appliance Recycling Centers of America, Inc. (ARCA) of St.Paul to build a new facility in Hartford, Connecticut; the ARCA facility takes customer calls, receives appliances, strips capacitors and removes refrigerants. In 1991, NU and ARCA removed and recycled over 14,000 appliances, recycled 6,000 pounds of CFCS and providing more than 1,200 tons of scrap metal. The program also saved NU an estimated 14 million kilowatts.

Florida

An estimated three million used refrigerators, stoves and other appliances are generated annually in Florida. White goods have been prohibited from landfill disposal since January, 1990. Under Florida's program, it is the financial responsibility of counties to appropriately manage white goods. They are stored in designated areas at landfills until they can be picked up for recycling. Most counties in Florida contract with commercial waste handling companies to handle their white goods.

Maine

While Maine does not specifically ban the disposal of white goods, they do charge an advanced disposal fee of $5 on all appliances weighing more than ten pounds. The revenues go to a designated fund to finance the state's solid waste projects.

Missouri

Over one million appliances are disposed of in Missouri annually. Effective January, 1991, all major appliances were banned from landfill disposal in Missouri. As a portion of Missouri's waste management law, SB 530, the Department of Natural Resources (DNR) recommends that citizens contact second-hand stores or appliance repair facilities if their appliance is in working condition. If the appliance is in irreparable condition, the DNR has compiled a list of appliance collection centers around the state that will take white goods.

North Carolina

In accordance with North Carolina's Solid Waste Management Act of 1991, white goods cannot be landfilled after January, 1991.
As a component of the solid waste stream, cities and counties in North Carolina are responsible for management of white goods. There are no state funds available to assist communities in developing white goods management programs; however, the state Department of Environment, Health, and Natural Resources has prepared an informational bulletin to assist the development of recycling programs.

North Dakota

No major appliance shall be collected or transported for disposal to any disposal facility unless that facility is permitted for intermediate storage and recycling of the materials. White goods, as well as all other special wastes, must be included in district solid waste management plans.

South Carolina

As part of the South Carolina Solid Waste Policy and Management Act of 1991, several conditions were placed on the management of white goods. In 1994, it will be illegal to include white goods with other municipal solid waste intended for transport to a disposal facility. Since November, 1991, an advanced disposal fee of $2 has been imposed for each appliance delivered by wholesalers to any retail outlet in the state. Regulations governing the proper management of white goods are expected in early 1993.

Wisconsin

Wisconsin's 1989 Recycling Act 335 established prohibitions on landfilling or burning white goods as of January, 1991. The law also directs local governments to implement solid waste management plans that comply with that ban. If managed as part of an "effective recycling program," state grants are available for the creation of programs that recycle components of the waste stream, including white goods. According to state officials, almost all of the approximately 500,000 appliances generated in Wisconsin annually are recycled either by contracts with ARCA or other appliance recycling centers.

Refrigerant Recovery

Paul Smith — Sanitary Fill Company — San Francisco, CA

INTRODUCTION

Sanitary Fill Company (SFC), a subsidiary of Norcal Waste Systems, Inc., owns and operates the San Francisco Solid Waste Transfer and Recycling Center (SFSWTRC) which receives and manages San Francisco's municipal solid waste. The facility receives debris at two sites on property: The Public Disposal Area, which serves as a dumping area for the public, and the Recycling Pad, which is adjacent to the Transfer Station and where recyclable materials from construction and demolition loads are segregated from garbage that goes into the Transfer Station Pit and then to landfill. SFC also receives white goods (household appliances) which largely consist of refrigerators. Most refrigerants used in refrigerators contain chlorofluorocarbons (CFCs), known ozone depleters. This paper will describe SFC's new program which was designed to safely and cost-effectively remove CFCs from refrigerators brought for disposal.

CHLOROFLUOROCARBONS

CFCs were developed in the 1930s as the result of a long search for the perfect coolant for ice-free refrigeration. Tests were conducted since the early 1800s with a variety of chemicals that easily changed from a liquid to a gas, but most had serious drawbacks. Ammonia was tried but it could cause serious acute health problems (including death) if it leaked, and sulfur dioxide was tested, but its unpleasant smell made it a bad choice.

Freon seemed like the perfect answer. The fluorine atoms make the compound stable and inert, whereas other coolants degrade over time. Other advantages of freon were that it is non-corrosive, non-flammable and relatively non-toxic.

It wasn't until the mid-1970s that CFCs were found to have a harmful effect on the atmosphere's ozone layer, which protects humans and animals on earth from skin cancer, blindness, and weakened immune systems. A hole in the ozone is also believed to damage the marine food chain.

A 1987 U.N. environmental agreement called for a 50 percent reduction in the production of ozone-depleting compounds by 1998, and it was subsequently agreed to phase out CFCs altogether by the year 2000. With recent scientific evidence though, the time for elimination of CFCs and carbon tetrachloride has been moved up to Jan. 1, 1996, four years ahead of schedule. Halons are scheduled to be eliminated by 1994, four years ahead of schedule, and methyl chloroform is to be banned by 1996, nine years earlier than previously agreed.

CLEAN AIR ACT

Effective July 1, 1992, section 608 of the Clean Air Act prohibits individuals from knowingly venting ozone-depleting compounds used as refrigerants into the atmosphere while maintaining, servicing, repairing or disposing of air conditioning or refrigeration equipment. Technicians releasing "de minimus" quantities of refrigerant in the course of making good faith attempts to recapture and recycle or safely dispose of refrigerants are not subject to the prohibition.

The government is currently developing criteria for certifying technicians and equipment involved in servicing refrigerators and air conditioners, but these proposed regulations are not a part of the Clean Air Act's rule on venting refrigerants. They will only take effect if the EPA publishes a final rule on them.

PROGRAM DEVELOPMENT

Sanitary Fill has begun an in-house program to extract and recover refrigerants in a timely manner when refrigerators are received at the facility. This program was developed by the company's Waste Acceptance Control Program (WACP), one of the three hazardous waste programs at SFC. The main purpose of the WACP is to keep prohibited waste out of the municipal solid waste stream, thereby preventing its eventual disposal in landfill. Because of the training and technical expertise of its staff, the WACP is responsible for addressing special waste issues such as refrigerant recovery that arise at Sanitary Fill or any of Norcal's San Francisco garbage companies.

EQUIPMENT

Many different companies manufacture freon recovery equipment. Sanitary Fill purchased a Katy Instruments K-3337 Refrigerant Recovery System in part because its weight (16 pounds.) and size (16" x 16" x 16") satisfied our requirement for mobility. Since the company receives refrigerators at two locations that are about 100 yards apart at different elevations, a light, compact recovery unit was needed. To transport the unit, SFC purchased a used utility cart (golf cart) and mounted the recovery equipment on the back. The following is a complete list of equipment used in the refrigerant recovery process:

- Gasoline-powered utility cart
- Katy Instruments K-3337 Refrigerant Recovery System (mounted on gasoline-powered utility cart)
- Manifold and gauge set with hoses
- Vacuum pump
- Piercing valve with control valve
- Tool kit including hammer, screwdriver set, Allen wrench set, and open end wrench set
- Two 25-pound and one 50-pound refrigerant storage cylinders with 80% shut down sensor
- Container for waste compressor oil
- Tool box for storage of loose equipment
- J/B DV-85-142 series deep vacuum pump

PROGRAM COSTS

The initial capital investment in the Refrigerant Recovery Program was less expensive than anticipated. The cost of the equipment and used utility cart combined were less than $2,000. The filters, which cost $5-$10 each, used in the recovery unit can process approximately 100 pounds of refrigerant before a new filter is needed.

SAFETY

The WACP is responsible for training the technicians who perform the refrigerant recovery. These technicians are given instruction on the hazards of refrigerants including routes of exposure, protective clothing, and eye protection. Refrigerants are hazardous, but the risks of handling freon are minimal if done properly. Freon can cause frostbite on contact with unprotected skin or blindness if splashed into the eyes. Fluorocarbon vapors are heavier than air and tend to accumulate in low lying areas. They replace the breathable air in an enclosed area and can cause a loss of consciousness, cardiac arrest, or even death if inhaled.

Technicians performing refrigerant recovery are required to wear a full face shield, gloves, long sleeve shirt, work pants, and steel-toed boots. Neither respirators nor self-contained breathing apparatus is necessary since the recovery process is only done outdoors in well-ventilated areas.

Although most refrigerators processed through the facility contain only a small amount of refrigerant and relatively low pressure, the technician assumes that each refrigerator is fully charged and may have 20 pounds of pressure in the coil where the piercing valve is attached. The refrigerants are stored in DOT-approved cylinders marked for the specific type of refrigerant (R-12 or R-22) and the cylinders are not filled to capacity in order to allow for increases in pressure.

Occasionally, the facility receives ammonia-cooled refrigerators. These can be identified by an evaporation tray on top of the refrigerator, and a condenser larger than those on most refrigerators. Ammonia-cooled refrigerators are generally about forty or fifty years old and can be extremely hazardous if not identified properly. Handling an ammonia-cooled refrigerator the same way as a CFC-cooled refrigerator can cause serious acute health problems, including death.

PROCEDURES

Appliances containing refrigerants are unloaded at SFC's Recycling Pad or Public Disposal Area and put in an upright position to facilitate oil and CFC separation. It is preferable that appliances stay upright

for at least twenty-four hours but removal can still be accomplished upon receipt of the appliance. Refrigerants can be drained as either a liquid or a vapor. The recovery procedures are as follows:

1. SFC Material Handlers inspect the identification plate on the appliance to determine the refrigerant type. Two types of refrigerants are used in small appliances, R-12 and R-22, and at no time should they be mixed in the same cylinder (contaminated cylinders cannot be recycled and must be destroyed). All cylinders used for collection should be labeled with the refrigerant type. If an appliance contains an unknown type of refrigerant, a WACP staff person will be called to assist in identifying the refrigerant.
2. If the collection cylinder on the refrigerant recovery unit is empty, attach the vacuum pump to the blue or red valve to produce a negative vacuum. This maximizes the full storage capacity of the cylinder. This step is not performed if the collection cylinder is already partially full.
3. Connect the yellow overfill protector cable to the storage tank. The unit will turn off automatically and the TANK FULL light will indicate when the cylinder fills to 80% of its capacity. The overfill protector cable must be connected for the unit to operate.
4. Attach a hose to the suction access port on the appliance's refrigeration system and attach the other end of the hose to the suction valve on the recovery unit. This hose should be attached to a manifold gauge to monitor the recovery pressures in the system, The high and low side of the manifold gauge set can be used to recover refrigerant from two points on the appliance simultaneously.
5. Connect a second hose from the discharge valve on the recovery unit to the blue valve. The blue valve is the liquid port and allows the recovered refrigerant vapor to bubble up through any cold liquid in the cylinder and facilitates the transfer of heat. This hose should be kept as short as possible to reduce refrigerant emissions when it is disconnected.
6. Open all valves in the line except the DISCHARGE and VAPOR valves on the recovery unit.
7. Turn the POWER switch on, then open the DISCHARGE valve and the SUCTION valve. Opening the DISCHARGE valve before turning the unit on causes pressure to build against the compressor. The pressure between the unit compressor and the recovery cylinder must be equal before the unit can start.
8. The refrigerant recovery should continue until the pressure in the unit is reduced below zero. The unit must then be turned off manually by first turning off the POWER switch then closing both the SUCTION and DISCHARGE valves. If the unit is left on when the pressure is below zero, the cylinder will fill with air.
9. When the 25 pound cylinder mounted on the cart has been filled to 80 percent capacity, the refrigerant is transferred to a 50 pound cylinder for transportation to a local recycling facility.

SUMMARY

SFC developed the Refrigerant Recovery Program to meet the company's needs for mobility, versatility, and cost-effectiveness. Other organizations such as disposal, recycling, auto repair or refrigeration companies that have not had to address the issue of freon recovery before the change in the Clean Air Act may find a similar program equally successful.

HOUSTON AEROSOL CAN RECYCLING EVALUATION

Greg Crawford, Vice President of Recycling Operations
Steel Can Recycling Institute, Pittsburgh, Pennsylvania

The Steel Can Recycling Institute (SCRI) is an industry association dedicated to promoting and sustaining steel can recycling. Supported by six domestic and two Canadian steel companies and the American Iron and Steel Institute (AISI), SCRI has fostered the nationwide growth of steel can recycling. Through its seven regional recycling managers, SCRI offers assistance to communities and recyclers to ensure that steel can recycling is implemented in their programs.

For the past four years, SCRI's efforts have focused on building the steel can recycling infrastructure. Initially concentrating on steel food and beverage cans, SCRI has achieved a 1991 steel can recycling rate of 34%. The 1992 rate is expected to be even higher.

In the last two years, the recycling focus has broadened to encompass steel general purpose cans, which include paint and aerosol cans. These containers comprise more than 10% of the total steel can population. By their recycling, more materials are diverted from the landfill and additional steel scrap is made available to the steel industry.

SCRI recommends that residential empty paint and aerosol cans be recycled along with food and beverage cans in curbside and voluntary drop-off programs. SCRI also recommends that aggregate quantities of full or partially full paint and aerosol cans be processed appropriately so that the scrap steel can be recovered. The seven regional managers have been meeting with local recycling officials, curbside operators and recycling processors throughout the United States to secure their participation in this new and highly positive initiative. As might be expected, many questions were asked and answers given before commitments have been obtained. Progress was slow at first because there were very few peer referrals available. This has fortunately changed over the last year as more and more communities improve their recycling programs by adding empty paint and aerosol cans to the mix.

Amid the earliest of these initiatives was the Houston, Texas curbside recycling program, which unexpectedly required an aerosol can recycling evaluation. This paper provides an overview of the Texas steel aerosol can recycling program final report submitted to the Texas Waste Commission (TWC). The report was approved by the TWC on December 21, 1992. The issues, findings and conclusions of the report strongly support the advocacy of recycling empty steel aerosol cans together with food, beverage and empty paint cans.

THE HOUSTON AEROSOL CAN RECYCLING EVALUATION

Early in January 1991, the Steel Can Recycling Institute (SCRI) and the city of Houston reached an agreement to begin accepting empty steel aerosol cans as part of the city's curbside recycling program. The collection was set to begin in April 1991. The motivation for the inclusion of aerosol cans was threefold. First was to prevent them from being landfilled, thus saving landfill space and achieving a cost avoidance. Second was to reduce the cost and increase the effectiveness of household hazardous waste collection and disposal by eliminating empty containers from unnecessary and inappropriate inclusion. Third was to increase the flow of steel can scrap to the steel industry for recycling.

The implementation of the program was postponed after questions were raised as to whether or not the empty aerosol cans should be treated as a hazardous waste under Texas Water Commission (TWC) and Texas Administrative Code (TAC) regulations.

An operations plan was prepared by SCRI and approved by the TWC and city of Houston. It was to evaluate a sample of steel aerosol cans collected on each Tuesday through the city's curbside recycling program over a period of six weeks. The purpose of the evaluation was to demonstrate the desirability of recycling steel aerosol cans in a curbside recycling program as well as validate the absence of potential safety issues involved in collection and processing. The operations plan provided an initial public education program to advise residents on the preparation instructions for recycling steel aerosol cans. The city would collect the aerosol cans along with the other recyclables and bring them to the city's Post Oak Intermediate Processing Facility. The aerosol cans collected on Tuesdays were separated from the other steel cans for evaluation. Those aerosol cans collected on Mondays, Thursdays and Fridays were routinely processed with other steel food and beverage cans and shipped to a local scrap dealer for sale to

the steel industry.

The evaluation process provided that the aerosol cans be numbered, coded by product type, weighed and emptied. Through a series of measurements, three residual levels were determined: the product residual, the propellant residual and the combined residual. The collection and evaluation began on August 4, 1992 and concluded on September 8, 1992.

ACKNOWLEDGMENTS

The curbside aerosol can evaluation was conducted by Dr. Kenneth Voss, Vice President of Palmer of Houston. Dr. Voss spent 19 years as a chemist with S. C. Johnson Wax, for which he was Director of Research and Development. He served on the Board of Directors for the Chemical Specialties Manufacturers Association and served as the Vice Chair for their Aerosol Division. Dr. Voss has served on the Scientific Affairs Committee of the Cosmetic, Toiletries and Fragrance Association. He also holds several patents in the aerosol industry.

The statistical analysis of the evaluation data was conducted by Dr. Joe Ensor, a partner in Empirical Science, a consulting firm in Houston. Dr. Ensor received his B. S. and M.S. in Mathematics from Arkansas State University and his Ph.D. in Statistics from Texas A&M University in 1989. He has served as a Visiting Teaching Professor at Rice University as well as the University of Houston. Most recently, he served as an Assistant Epidemiologist, Department of Patient Studies at the University of Texas M. D. Anderson Cancer Center in Houston.

The Steel Can Recycling Institute appreciates the support provided by Mr. Ulysses Ford and Mr. Ed Chen at the city of Houston during the preparation and execution of the operations plan.

The Steel Can Recycling Institute is also grateful to the Texas Water Commission and the Texas Department of Health who were instrumental in the preparation and approval of the Operations Plan and review of the final report.

EVALUATION AND ANALYSIS SUMMARY

A total of 1,722 aerosol cans were evaluated from cans collected on Tuesdays. During this period, as many as 5,000 additional aerosol cans were routinely collected on Mondays, Thursdays and Fridays. They were not evaluated but, instead, were shipped with other steel food and beverage cans to a local scrap dealer for processing and shipment to the steel industry.

The following is the evaluation and analysis of residual amounts in the aerosol cans collected on Tuesdays. They are shown by product code as described in Appendix A.

PRODUCT CAN CODE	TOTAL NUMBER OF CANS COLLECTED	MEAN COMBINED RESIDUAL - PERCENT*	MEDIAN COMBINED RESIDUAL - PERCENT*
100	252	2.48%	1.18%
200	161	4.56%	2.06%
300	642	2.52%	1.28%
400	297	3.59%	1.57%
500	6	2.79%	.77%
600	268	1.20%	0.00%
700	72	3.09%	2.02%
800	24	1.21%	.85%
TOTALS	1,722	2.69%	1.18%

* Includes product and propellant residuals.

The mean combined residual of product and propellant is 2.69%, well below the 3% established by the 40 Code of Federal Regulations, §261.7 (b)(1)(iii)(A). The credibility of the 2.69% is firmly established by the statistical procedure of the "standard error." The "standard error" provides a level of confidence that if the total population of curbside aerosol cans could have been tested at once, the results would be similar. Using two "standard errors," it is statistically established that the level of confidence is 97.75% that if all curbside aerosol cans could have been tested at once, the true mean combined residual would not be more than 2.95%.

When reviewing the standard deviation of 5.49%, it is observed that the data points are fairly spread out, suggesting that an examination of the median might provide a better estimate of the data than the mean. The median combined residual, or center point of the data, is 1.18%. This means that half of the data has a mean combined residual below 1.18%, while the other half is greater. The significance of this is amplified when the top 2% and 5% of the combined residuals are trimmed or isolated from the sample. Trimming the top 2% and 5% removes those cans that are not representative of the empty can population and would be considered statistical anomalies. This trimmed data reinforces that very few cans appear as full or partially full, while the normal condition is empty or nearly empty. It is a truly rare occasion that a full or partially full can appear in the collection, and such cans were demonstrated as being safely processed without incident within the mix of all steel cans.

COMBINED RESIDUAL

MEAN	2.69%	MEDIAN	1.18%	STANDARD DEVIATION	5.49%
TRIMMED 2%	2.10%	TRIMMED 2%	1.18%	TRIMMED 2%	2.71%
TRIMMED 5%	1.76%	TRIMMED 5%	1.13%	TRIMMED 5%	1.99%

When the results on the mean, median and standard deviation are examined with the top 2% and 5% trimmed, the extent to which they are affected by a few, non-representative cans with high combined residual levels becomes clear. The median remains largely unchanged, but the mean changes noticeably. This suggests that the sample contains a very few cans with an unusually large amount of residual which is not characteristic of the vast majority of cans.

Two other important points should be considered beyond just the statistical data presented. The first is the fact that the collection and evaluation of the aerosol cans began within two weeks of the distribution of the public education information, providing consumers little time to be exposed to the program. This can be seen in the week to week mean combined residuals. Secondly, during the last three weeks, a marked and consistent reduction in the mean can be seen. In other words, it would appear that residents began to respond to the instructions requiring the aerosol cans to be empty. Even without further reduction, the typical aerosol can is virtually empty.

EVALUATION & ANALYSIS DETAIL

The city of Houston collected the commingled curbside recyclables from the individual residences and brought them to the Post Oak Intermediate Processing Facility (IPF). Among the recyclables collected were steel food and beverage cans as well as the emptied aerosol cans.

After unloading at the IPF, the steel and aluminum cans were run through a conveyer system with a magnetic head pulley at one end. The magnet pulled off all the steel cans and dropped them into bins under the conveyor. After they were magnetically separated, several employees removed the aerosol cans from the other steel cans collected on Tuesdays. The aerosol cans were placed into separate bins for transport to Palmer of Houston for evaluation. All aerosol cans collected, regardless of condition, were sent for evaluation.

The aerosol cans collected and separated from the other steel cans on Tuesdays were transported to Palmer of Houston by city personnel. The cans then underwent a seven step process to determine the residual levels. This process is outlined below.

1. Each can was individually numbered.
2. The net product weight as printed on the can was recorded.
3. The aerosol can was weighed to determine a gross weight of the can and its contents.
4. A small hole was punctured in the dome of the can to allow the remaining propellant to escape.
5. The can was weighed again to determine an intermediate weight.
6. The top of the can was removed and the contents emptied.
7. The can was weighed again to determine the final weight.

A sample data collection sheet is at Appendix B. Data was entered into a spreadsheet program in order to calculate the following information. A sample data spreadsheet can be seen at Appendix C.

- Propellant Residual Weight was determined by subtracting the intermediate weight from the gross weight.
- Product Residual Weight was determined by subtracting the final can weight from the intermediate can weight.
- Combined Residual Weight was determined by subtracting the final can weight from the gross weight and dividing this difference by the net product weight as printed on the can.

This process was continued for the six week evaluation on a week to week basis. At the conclusion of each weekly evaluation, the data was entered into the spreadsheet computer program. After the results of the sixth week were entered, the total compilation of data was presented to Dr. Ensor for statistical evaluation. His statistical analysis and discussion appear in Appendix D. The percent combined residual mean is presented graphically at Appendix E, demonstrating the 2.69 percent mean. The percent combined residual by percent is also presented graphically at Appendix E, showing that about 78% of all aerosol cans collected and evaluated were very empty with three percent or less residual.

As noted earlier, in addition to the evaluation of the 1,722 cans collected on Tuesdays, as many as 5,000 aerosol cans were collected on Mondays, Thursdays and Fridays along with other steel food and beverage cans and were sent without incident to a local scrap dealer for processing and shipment to the steel industry.

CONCLUSIONS

The mean combined residual falls well below the 3% specified by 40 CFR §261.7 (b)(1)(iii)(A). It has been shown that if all curbside aerosol cans could have been taken for evaluation at once, there would be a 97.75% confidence that the true mean would also fall below 3%.

Additional statistical evaluation shows that the data is closely distributed around a median combined residual of 1.18% and has a mean of 2.69% with only a few cans over 3%. It has been demonstrated that collection and processing has occurred without incident fulfilling the objectives of the operations plan. Thus, it was recommended to the TWC and subsequently approved that steel aerosol cans be recycled.

Appendix A

Chemical Specialties Manufacturers Association, Inc.
Food and Non-Food Aerosol Can Product Classification

100	INSECT SPRAYS
101	Space insecticides
102	Residual insecticides (personal and surface repellents, moth proofers, etc.)
200	PAINTS AND VARNISHES
201	Paints, primers and varnishes
202	Other related products (strippers, graffiti removers, snow and other decorative products)
300	HOUSEHOLD PRODUCTS
301	Room deodorants and disinfectants
302	Cleaners (glass, oven, rug, fabric, wall and tile, etc.)
303	Laundry products (starch, fabric finish, pre-wash, etc.)
304	Waxes and polishes
305	Other household products (shoe polishes, dyes, leather dressings, fuels, drain openers, anti-stats, caulking and sealing compounds)
400	PERSONAL PRODUCTS
401	Shaving lather
402	Hair sprays
403	Other hair products
404	Medicinals and pharmaceuticals (vaporizers, fungicides, burn treatments, antiseptics, contraceptives, etc.)
405	Colognes, perfume, etc. and after-shaves
405	Personal deodorants, antiperspirants, powders and deodorant colognes
406	Other personal products (suntan preparations, lotions, breath fresheners)
500	ANIMAL PRODUCTS
501	Veterinarian and pet products (shampoos, insecticides, repellents, etc.)
600	AUTOMOTIVE, INDUSTRIAL AND MISC. HOUSEHOLD LUBES
601	Refrigerants
602	Windshield and lock spray de-icers
603	Cleaners (auto upholstery, leather, vinyl, tire, etc.)
604	Engine degreasers
605	Lubricants and silicones (penetrating oils, demoisturizers, rust proofing)
606	Spray undercoating
607	Tire inflator and sealants
608	Carb and choke cleaners
609	Brake cleaners
610	Engine starting fluid
611	Other automotive and industrial products (adhesives, etc.)
700	FOOD PRODUCTS
701	All types (including pan sprays)
800	MISCELLANEOUS
801	Other products not listed above

Aerosol Can Data Collection Log

Inspection Date: 8/4/92
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	Aerosol Can Code	Net Product Weight* (oz.)	Gross Can Weight (oz.)	Inter-mediate Weight (oz.)	Final Weight (oz.)	Residual Weight (oz.)
24	304	14oz	102g	102g	99	
25	301	18oz	147g	144g	140	
26	301	12oz	130g	129g	96	
27	301	12oz	99g	97g	95	
28	304	7oz	65g	65g	62	
29	301	6oz	67g	66g	63	
30	305	16oz	99g	96g	94	
31	301	15oz	120g	116g	111	
32	301	12oz	128g	128g	100	
33	302	10oz	95g	95g	92	
34	302	21.25oz	154g	148g	137	
35	304	12.5oz	93g	93g	90	
36	301	6oz	67g	67g	64	
37	301	12oz	97g	96g	93	
38	305	16oz	110g	108g	103	
39	302	7oz	71g	70g	65	
40	303	22oz	141g	139g	134	
41	301	4oz	64g	65g	62	
42	303	13oz	103g	102g	96	
43	302	17oz	112g	109g	99	
44	301	12oz	96g	96g	95	
45	302	25oz	137g	132g	138g	
46	305	24oz	160g	164g	137	
47	304	12.5oz	93g	92g	89	
48	304	12.5oz	93g	93g	90	

* Product weight as printed on the can.

Houston Aerosol Residuals - Week Of August 25, 1992

Can Code	Can Number	Net Product Weight		Gross Can Weight		Propellant Residual Weight			Intermediate Can Weight		Product Residual Weight			Final Can Weight		Combined Residual Weight			Residual By Can Code
		Grams	*Ounces*	*Grams*	*Ounces*	*Grams*	*Ounces*	%	*Grams*	*Ounces*	*Grams*	*Ounces*	%	*Grams*	*Ounces*	*Grams*	*Ounces*	%	
						(E-J)	(F-K)	(E-J)/C			(J-O)	(K-P)	(J-O)/C			(E-O)	(F-P)	(E-O)/C	
101	187	170	6	66	2.33	1.00	0.04	0.59%	65	2.29	1.00	0.04	0.59%	64	2.26	2	0.07	1.18%	
101	188	170	6	80	2.82	11.00	0.39	6.47%	69	2.43	1.00	0.04	0.59%	68	2.40	12	0.42	7.05%	
101	189	170	6	74	2.61	0.00	0.00	0.00%	74	2.61	1.00	0.04	0.59%	73	2.57	1	0.04	0.59%	
101	192	170	6	209	7.37	2.00	0.07	1.18%	207	7.30	1.00	0.04	0.59%	206	7.27	3	0.11	1.76%	
101	193	170	6	69	2.43	0.00	0.00	0.00%	69	2.43	2.00	0.07	1.18%	67	2.36	2	0.07	1.18%	
101	198	340	12	108	3.81	8.00	0.28	2.35%	100	3.53	1.00	0.04	0.29%	99	3.49	9	0.32	2.65%	
101	111	624	22	115	4.06	8.00	0.28	1.28%	107	3.77	0.00	0.00	0.00%	107	3.77	8	0.28	1.28%	
101	170	454	16	112	3.95	0.00	0.00	0.00%	112	3.95	11.00	0.39	2.43%	101	3.56	11	0.39	2.43%	
101	178	454	16	110	3.88	3.00	0.11	0.66%	107	3.77	1.00	0.04	0.22%	106	3.74	4	0.14	0.88%	
101	182	142	5	74	2.61	4.00	0.14	2.82%	70	2.47	2.00	0.07	1.41%	68	2.40	6	0.21	4.23%	
101	183	142	5	76	2.68	7.00	0.25	4.94%	69	2.43	1.00	0.04	0.71%	68	2.40	8	0.28	5.64%	
101	184	142	5	70	2.47	2.00	0.07	1.41%	68	2.40	0.00	0.00	0.00%	68	2.40	2	0.07	1.41%	
101	185	142	5	73	2.57	1.00	0.04	0.71%	72	2.54	16.00	0.56	11.29%	56	1.98	17	0.60	11.99%	
101	190	170	6	58	2.05	0.00	0.00	0.00%	58	2.05	2.00	0.07	1.18%	56	1.98	2	0.07	1.18%	
101	191	170	6	58	2.05	0.00	0.00	0.00%	58	2.05	2.00	0.07	1.18%	56	1.98	2	0.07	1.18%	
101	194	170	6	59	2.08	0.00	0.00	0.00%	59	2.08	2.00	0.07	1.18%	57	2.01	2	0.07	1.18%	
101	195	170	6	61	2.15	1.00	0.04	0.59%	60	2.12	4.00	0.14	2.35%	56	1.98	5	0.18	2.94%	
101	196	170	6	60	2.12	1.00	0.04	0.59%	59	2.08	1.00	0.04	0.59%	58	2.05	2	0.07	1.18%	
101	197	170	6	62	2.19	1.00	0.04	0.59%	61	2.15	1.00	0.04	0.59%	60	2.12	2	0.07	1.18%	
101	199	170	6	58	2.05	0.00	0.00	0.00%	58	2.05	2.00	0.07	1.18%	56	1.98	2	0.07	1.18%	
101	200	170	6	56	1.98	0.00	0.00	0.00%	56	1.98	2.00	0.07	1.18%	54	1.90	2	0.07	1.18%	
101	201	326	12	81	2.86	0.00	0.00	0.00%	81	2.86	13.00	0.46	3.99%	68	2.40	13	0.46	3.99%	2.61%
102	113	425	15	298	10.51	5.00	0.18	1.18%	293	10.34	183.00	6.46	43.03%	110	3.88	188	6.63	44.21%	
102	114	425	15	121	4.27	3.00	0.11	0.71%	118	4.16	7.00	0.25	1.65%	111	3.92	10	0.35	2.35%	
102	115	425	15	140	4.94	7.00	0.25	1.65%	133	4.69	0.00	0.00	0.00%	133	4.69	7	0.25	1.65%	
102	116	454	16	123	4.34	7.00	0.25	1.54%	116	4.09	4.00	0.14	0.88%	112	3.95	11	0.39	2.43%	

Trimmed Analysis of Combined Residual

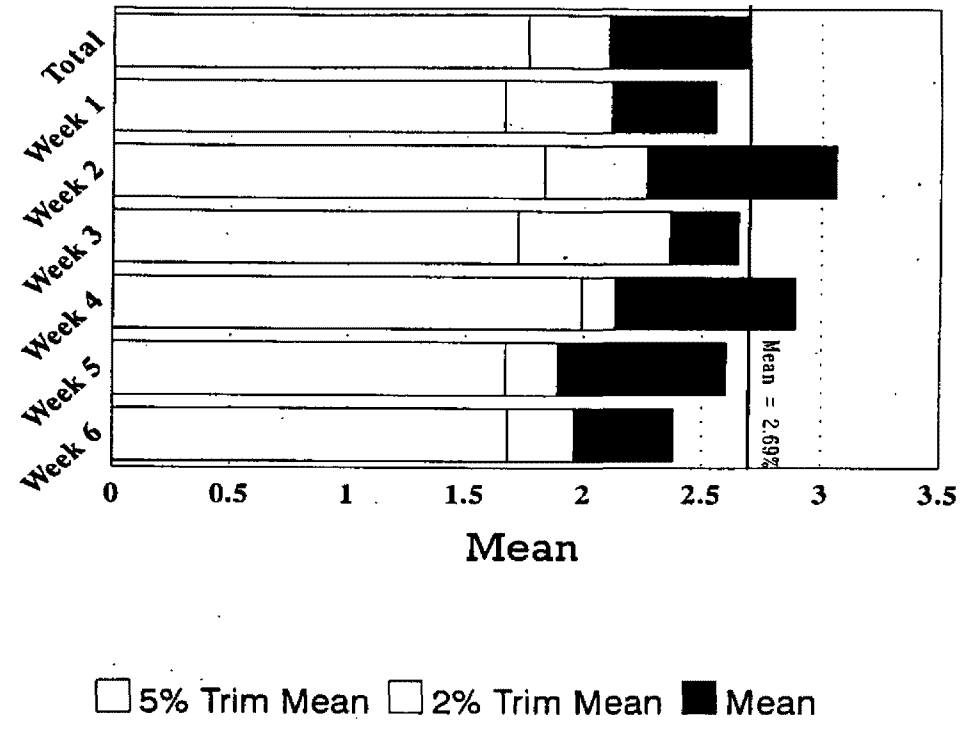
	TOTAL	WEEK 1	WEEK 2	WEEK3	WEEK 4	WEEK 5	WEEK 6
MEAN .	2.69%	2.55%	3.06%	2.65%	2.89%	2.60%	2.38%
TRIMMED 2%	2.10%	2.11%	2.26%	2.36%	2.13%	1.89%	1.96%
TRIMMED 5%	1.76%	1.66%	1.83%	1.72%	1.99%	1.67%	1.68%
MEDIAN	1.18%	1.18%	1.18%	1.18%	1.47%	1.16%	1.13%
TRIMMED 2%	1.18%	1.13%	1.18%	1.16%	1.44%	1.10%	1.12%
TRIMMED 5%	1.13%	1.10%	1.12%	1.12%	1.44%	1.06%	1.04%
ST. DEV.	5.49%	4.32%	5.98%	4.09%	6.46%	5.62%	5.26%
TRIMMED 2%	2.71%	2.89%	2.96%	3.30%	2.15%	2.46%	2.60%
TRIMMED 5%	1.99%	1.66%	2.10%	2.16%	1.85%	1.92%	2.00%

Obviously, trimming the top 2% or 5% of the percentage of combined residual has an enormous effect on th mean *(the arithmetic mean or average of a population is simply the sum of the measurements divided by the number of measurements)*. To illustrate the large amount of skewness in the data, compare the standard deviation of the raw dat and the top 2% trimmed data. The standard deviation is reduced by 50% (5.49 vs. 2.71). If one compares the median of the different methods, one sees almost no change even between the raw data and the top 5% trimmed data. Sinc the mean is greatly affected by extremely large *(or small)* observations and the median is not, the median is preferre in locating the center of skewed distributions *(i.e., distributions that are asymmetric and tail off rapidly to the right or left)*. This mandates using the median to measure the center of the distribution of percentage of combined residua because the median measures the point in the data in which exactly half of the ranked data lies below and half above. The estimated mean of the percentage of combined residual is 2.69%. This estimate plus twice the standard error,

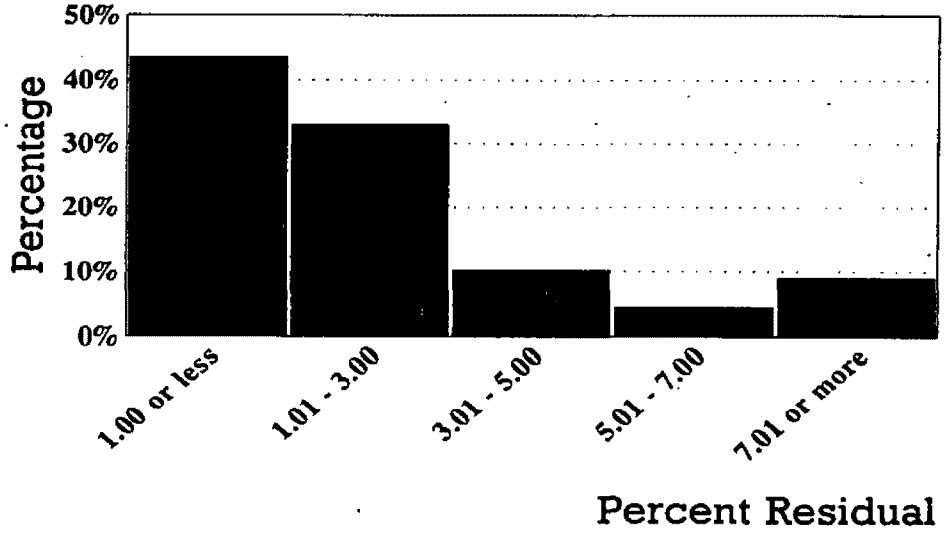
$$2.69 + 2\frac{5.49}{\sqrt{1722}} = 2.95\%,$$

does not exceed the 3% level. Recall, when the standard deviation of a statistic is estimated from the data, the result i called the standard error of the statistic. One realizes that 2.69% is only a point estimate of the true mean percentage of combined residual; that is, it only an unbiased estimate of the true mean percentage of combined residual. Larg sample theory of statistics tells us that the probability that the true mean is actually more that 2 standard errors above the point estimate is only .0225. Hence, there is only a very small chance that the true mean residual is 3% o more.

Percent Combined Residual



Percent Combined Residual



Mean = 2.69, Median = 1.2.

The Estimated Probability that the Combined Residual is less than 3% is 0.763.

FEDERAL LIABILITY ISSUES FOR HHW COLLECTION PROGRAMS

John Fogarty -- U.S. EPA Office of Enforcement

(The views expressed herein do not necessarily represent the official position of EPA)

Introduction

- The principal Federal laws governing liability for household hazardous waste (HHW) are the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).
- There are other laws and liability issues that will affect HHW collection programs, such as local siting regulations, compensation for workers' injuries, accidental spills, etc. As a matter of Federal environmental law, however, RCRA and CERCLA are the two laws of primary importance for municipal liability purposes.

The HHW Liability Problem

- All municipal wastes present a potential liability problem for municipalities because of the small percentage of hazardous constituents ordinarily contained in such wastes. While there is always a liability potential for these wastes no matter how disposed, there are steps that can be taken which will minimize that risk.
- The clear message of the structure of the Federal laws is that HHW collection programs, by diverting hazardous wastes out of the municipal waste stream (and away from CERCLA liability) and into RCRA-permitted facilities, are the best thing that can be done to minimize potential Federal liability.
- Under RCRA municipalities are basically exempt from liability for HHW, while under CERCLA municipalities are generally liable for their hazardous wastes. Therefore, by diverting the wastes into the RCRA system the potential for liability is diminished.

RCRA

- Under RCRA, wastes are classified as hazardous, in which case they must be disposed of in accordance with Subtitle C requirements for hazardous waste facilities, or classified as non-hazardous, in which case the less stringent disposal requirements of Subtitle D apply.
- Most importantly RCRA liability purposes, HHW is unconditionally exempt from the definition of hazardous wastes subject to the Subtitle C disposal requirements.
- HHW is exempted not because the wastes are not hazardous, but because the source of the wastes is households (which includes single and multi-family residences, hotels, campgrounds, etc.). For the exemption to apply, the wastes must be derived from these sources only. The same substances, if derived from commercial or other sources, are classified as hazardous wastes under RCRA.
- While RCRA does not require that the hazardous constituents be separated out of the municipal wastestream, not doing so is risky.
- The risk is presented by the potential for CERCLA liability where the HHW is disposed of in municipal landfills regulated under Subtitle D. The exclusion of HHW from the definition of hazardous wastes applies only to RCRA--it does not translate into an exclusion under CERCLA.[1] Under CERCLA, it is the hazardous character of the substance, and not its source, that is important. If the hazardous constituents of household wastes are not separated out from the municipal wastestream, the potential for CERCLA liability increases.

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[1] In recent CERCLA litigation the RCRA exclusion has been unsuccessfully argued to provide an exemption from CERCLA liability. See B.F. Goodrich v. Murtha, 754 F. Supp. 960 (D. Conn. 1991).

CERCLA

- Management and collection of HHW under RCRA can be a complex and sometimes expensive undertaking. However, if municipal wastes cause or contribute to an environmental problem, the potential for liability under CERCLA is far greater than under RCRA.
- Under CERCLA, if there is a problem, there are several key liability principles that mean a potentially large exposure for a municipality:
  - 1st: The principle of strict, joint and several liability for all costs of cleanup. Of the 1200-plus CERCLA sites on the National Priorities List for cleanup, about 25% are municipal landfills. The cost to remediate these landfills usually runs into the tens of millions of dollars.
  - 2d: Standard "reopeners" in CERCLA settlement agreements--which require additional work if the initial cleanup is insufficient--mean that a cloud of potential liability will remain even after court settlement.
  - 3rd: Under best circumstances, a municipality may be treated as a de minimis contributor of waste, or may be required to pay a proportionately smaller amount under an allocation scheme with other contributors of waste. However, because of the usually high costs to remediate municipal landfills, even a de minimis settlement can be expensive.
  - 4th: Under an EPA policy issued December 12, 1989 (Vol. 54 Federal Register, page 51071), EPA ordinarily does not prosecute municipalities under CERCLA where the only evidence of disposal by a municipality is of solid wastes. However, the EPA Policy does not affect contribution or third-party actions, and the number of such cases is increasing. EPA has recently undertaken a "municipal initiative" to protect cities and towns from unfair lawsuits filed against them by private parties for MSW.
- If the hazardous component of municipal wastes are diverted into the RCRA wastestream, the potential for liability diminishes.

RCRA & HHW Collection Programs

- The liability issues for HHW collection programs center on how the waste is collected and packaged for disposal. In general, to minimize both the legal and environmental risks, it is recommended that HHW be handled in the same manner as any fully regulated RCRA Subtitle C waste.
- After this, the biggest liability challenge is to ensure that the waste being collected is in fact from households, and is of a type and quantity expected to be used by households. The exclusion for HHW does not apply to wastes from small businesses or other small generators of hazardous wastes, because these wastes are not from households. These commercially-derived wastes are considered hazardous and are subject to the RCRA Subtitle C requirements.
- Once collected, to minimize legal and environmental threats it is recommended that HHW be disposed of in a properly permitted RCRA hazardous waste facility. Occasionally the RCRA facility accepting the HHW will want the collection program sponsor to sign the RCRA manifests showing the sponsor as the generator. This is not required by RCRA and the collection sponsor cannot legally be considered to have generated a RCRA hazardous waste because HHW exempted under RCRA. Therefore, it is permissible to sign the manifests when requested because doing so will not change the fact that HHW is an exempted waste, nor does it alter a sponsoring municipality's liability.
- Some more aggressive HHW collection programs accept hazardous wastes from small businesses, schools, and other entities that generate small quantities of hazardous wastes. "Small quantity generators" (SQGs) are defined as those that generate less than 100 kg/month (220 lbs/month). Wastes from SQGs are considered hazardous under RCRA, but if disposed of in a Subtitle C hazardous waste facility they are conditionally exempt from some of the RCRA

permitting and manifesting requirements. It also means that if the HHW collec-tion program is sending its wastes to a Subtitle C facility, it can also accept the SQG wastes.

- o If both HHW and SQG wastes are collected, they must not be mixed. If mixed, a new waste is created, and both the unconditional exemption for HHW and the conditional exemption for SQG wastes do not apply. If mixed, the program sponsor may be considered to be a waste generator subject to some or all of the Subtitle C requirements, and fully liable on that basis.

Limiting the Liability Potential

- o Under CERCLA, a municipality is largely without protection from liability for its disposal of hazardous substances. Under RCRA, in the case of a failure of the facility containing HHW and SQG wastes, there are several protective layers insulating a municipality from liability.
- o HHW collection programs divert hazardous wastes to a facility that is designed to handle such wastes. Consequently, it is unlikely that an environmental problem will be created in the first instance.
- o If there is a facility failure and environmental harm, the owner or operator of the RCRA facility is primarily liable, and the RCRA structure is intended to ensure that the owner/operator is sufficiently well-funded to afford the necessary cleanup activities.
- o Even if the RCRA owner/operator cannot undertake cleanup, the RCRA system has financial assurances built in to it so that closure funds should be available.
- o Therefore, by diverting HHW from disposal in ordinary solid waste landfills and instead arranging for such wastes to be disposed of in a reputable RCRA Subtitle C facility, a municipality will minimize the potential liability it faces for HHW.

Special Note for Permanently-Sited HHW Collection Facilities--

Emergency Planning & Community Right-to-Know Act (SARA Title III)

- o EPCRA was enacted in response to the 1984 Bhopal, India chemical disaster in which over 2000 people were killed as the result of a leak of methyl isocyanate from a Union Carbide fertilizer plant. EPCRA establishes a network of state and local system of emergency response teams (Local Emergency Planning Committees or LEPCs, and State Emergency Response Commissions, or SERCs) to enable communities to better respond to a chemical hazard emergency. LEPCs are made up of community representatives, including the local community's emergency responders (citizens, police, fire, hospital officials, etc.).
- o EPCRA requires periodic reporting by certain covered "facilities" of the presence, location, and quantities of listed "extremely hazardous substances" (EHSs).
- o Although there is little chance that a permanently-sited HHW collection facility will aggregate sufficient quantities of EHSs to trigger the EPCRA reporting requirements, because hazardous substances (even in small quantities) may present some danger, it is advised that information about the HHW facility be provided to the SERC and LEPC so that local authorities can include the facility in their emergency response plans.

The Resource Conservation and Recovery Act and Household Hazardous Waste

Charlotte Mooney
U.S. Environmental Protection Agency, Washington, D.C.

1. Introduction

The Resource Conservation and Recovery Act (RCRA), which was signed into law in 1976, was enacted to address a problem that more and more communities were recognizing as a serious dilemma: how to safely dispose of increasing volumes of municipal and industrial wastes generated by our society. Subtitle D of the statute assists states in developing plans for management of primarily nonhazardous municipal waste. Subtitle C of RCRA directs the Environmental Protection Agency (EPA) to develop federal regulations controlling management of hazardous waste. This paper describes how household hazardous waste (HHW) is addressed under the Subtitle C regulations and how the hazardous waste regulations may affect collection programs.

2. History of the Household Hazardous Waste Exclusion

In 1980 EPA first promulgated a comprehensive set of regulations governing hazardous waste management from "cradle to grave," or from the waste's point of generation through storage, transportation, treatment, and final disposal. These regulations set up a two track system for identifying which wastes are regulated as hazardous. First, a number of industrial wastes were specifically listed as hazardous. Second, four characteristics were defined to identify nonlisted hazardous wastes. The four characteristics are ignitability, corrosivity, reactivity, and toxicity. Wastes that exhibit these characteristics are regulated as hazardous wastes.

As part of the 1980 regulations, however, a number of wastes were specifically excluded from being considered regulated hazardous wastes. Household waste was one of these excluded wastes. The regulatory exclusion, which has been expanded somewhat since 1980, is found in Section 261.4(b)(1) of Title 40 of the Code of Federal Regulations (CFR) and reads as follows:

> § 261.4(b) *Solid wastes which are not hazardous wastes.* The following solid wastes are not hazardous wastes:
>
> (1) Household waste, including household waste that has been collected, transported, stored, treated, disposed, recovered (e.g., refuse-derived fuel) or reused. "Household waste" means any material (including garbage, trash and sanitary wastes in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds and day use recreation areas)....

The regulation goes on to address the status of wastes and residues managed by resource recovery facilities.

The household waste exclusion was not expressly identified as an exclusion in the statute as were many of the other exclusions promulgated in 1980. However, the fact that Congress did not intend for household waste to be regulated as hazardous was documented in the Senate Report for RCRA which reads, in part:

> [The hazardous waste program] is not to be used to control the disposal of substances used in households or to extend control over general municipal wastes based on the presence of such substances. (S. Rep. No. 94-988, 94th Congress, 2nd Session at 16)

It should be noted that the common term "household hazardous waste" may be somewhat confusing -- in that household waste is specifically excluded from the regulatory definition of hazardous waste. Thus, HHW actually is not hazardous waste in the regulatory sense, although it may nevertheless be dangerous or pose a threat to human health or the environment.

3. Scope of the Household Hazardous Waste Exclusion

EPA has interpreted the 40 CFR 261.4(b)(1) household waste exclusion to include materials that meet both of two criteria: first, they must be generated by individuals on the premises of a temporary or permanent residence for individuals; second, they must be composed primarily of materials found in the wastes generated by consumers in their homes.

The first criterion limits household waste to materials generated at single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic areas and day-use recreation areas. Wastes generated by establishments such as retail stores, office buildings, restaurants, shopping centers, and small commercial operations clearly are not generated on the premises of a residence for individuals, and thus are not excluded under the household waste exclusion. If these wastes are listed or exhibit characteristics they must be managed in compliance with the Subtitle C hazardous waste regulations. The second criterion limits household waste to materials composed primarily of materials found in wastes generated by consumers in their homes.

Since household wastes are specifically excluded from being considered hazardous wastes by 40 CFR 261.4(b)(1), they are not regulated as hazardous waste even if they exhibit any of the four characteristics, i.e., if they exhibit the characteristics of ignitability, corrosivity, reactivity, or toxicity. Thus, the same wastes that would be regulated as hazardous when generated by a nonhousehold (i.e., commercial or industrial) establishment, are not regulated as hazardous when generated by a household. Examples of such wastes that may be generated in both household and nonhousehold settings include pesticides, photographic chemicals, pool maintenance chemicals, and cleaning solutions, each of which may exhibit the characteristics of toxicity, corrosivity, and/or ignitability.

4. Managing Household Hazardous Wastes

Since 40 CFR 261.4(b)(1) excludes household waste from the definition of hazardous waste, HHW is not subject to the hazardous waste regulations throughout all phases of its management. Consequently, the householder generating the waste is not subject to the hazardous waste generator regulations (40 CFR Part 262), any persons or organizations transporting the waste are not subject to the hazardous waste transporter regulations (40 CFR 263), and any persons or organizations treating, storing, or disposing of the waste are not subject to the hazardous waste treatment, storage, and disposal facility regulations (40 CFR Parts 264 and 265). In addition, household waste is not subject to the land disposal restrictions regulations (40 CFR Part 268) which require that hazardous wastes be treated to meet specified standards prior to any land disposal.

Thus, household hazardous waste collection programs collecting, storing, treating, transporting, and disposing of household waste are not required to comply with the hazardous waste regulations as long as they ensure that all waste collected actually is household waste.

EPA however, recommends that programs collecting HHW nevertheless manage the collected HHW as hazardous waste.[1] Management as hazardous waste is recommended to ensure the greater level of protection provided by Subtitle C controls. The Agency recommends that program managers follow the following waste management hierarchy: first, reuse and recycle as much waste as possible; second, treat in a hazardous waste treatment facility; and third, dispose of remaining waste in a hazardous waste disposal facility. The Agency further recommends the use of licensed hazardous waste transporters who will properly identify, label, manifest, and transport the collected waste from the collection location to treatment or disposal facilities.

HHW collection programs that decide to avoid any requirement to comply with Subtitle C regulations by managing only waste excluded under the household waste exclusion should develop and implement procedures to ensure that all received waste is actually household waste. Because the exclusion

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[1]Letter dated November 1, 1988 from J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, U.S. EPA, to Waste Management Division Directors, Regions I-X.

is based on the source of the material, determining whether a specific waste is covered by the 40 CFR 261.4(b)(1) household waste exclusion may be difficult if the origin of the waste is not identified. This difficulty highlights the importance of educating users of household hazardous waste collection programs, and of checking the origin of waste received. Without questioning individuals bringing waste to a collection program it may be impossible to verify that the waste is actually household (rather than commercial or industrial) waste.

The following examples illustrate this difficulty.

- Spent photographic solutions generated by a recreational photographer in his or her home are household waste and are excluded from the hazardous waste regulations, because they are generated by an individual at a residence, and could be considered similar to wastes generated by a consumer at home in the course of daily living.
- Spent photographic solutions generated by a recreational photographer while using rented space and equipment at a professional photographic studio are not household waste because they are not generated at a residence, but at a commercial place of business.
- Spent photographic solutions generated by a small photo developing shop in a shopping mall are not household waste because they are not generated at a residence, but at a commercial place of business.

As can be seen from these examples, distinguishing between excluded household wastes and nonexcluded wastes is not necessarily easy. Thus, programs planning to manage only exempt household waste should educate their staff, as well as users of the programs, in the kinds of wastes that can be accepted and those that can not. Such programs should develop and implement procedures to identify and accept only household wastes.

5. State Regulations

Although household waste is excluded from the federal hazardous waste regulations, in many states the hazardous waste program is implemented by state agencies, using state regulatory analogues rather than the federal regulations. Thus, HHW collection programs should check with their state hazardous waste regulatory agencies to determine whether there are any additional requirements under state hazardous waste regulations.

In addition, program managers should be aware that nonhazardous waste (solid waste) management may be regulated by states under state law. Thus, there may be state solid waste management regulations that are applicable to the management of HHW within the state.

Marketing Recycled Paint

Anne Thorson, Environmental Health Specialist
Washington County Department of Public Health, Stillwater, Minnesota

Before you can begin marketing recycled paint, you must first have an understanding of what marketing is. Markets is defined as "sets of actual or potential buyers who have a willingness and the means to purchase and demand products". First of all, there has to be a demand or a need for the recycled product. If there is not a use or demand for the material, recycling will not work.

Successful marketing depends on your knowledge of what and how much is coming in (or supply) and what and how much is going out (demand). You have to know what you are going to get in and what people want. (Attachment A) On the supply end of market development, you must know where your supply is coming from (HHW Collections, VSQG), how much will be coming in and in what form it will arrive in. On the demand end, you must identify end users of the paint, what they want in terms of type of paint and color, how often they will need it, what size of container they want the paint in and the cost (free or for a price).

The type of collection method and the type of recycling process you use depends on the resources available, and the commitment to recycling in the local area. There are many ways to market recycled paint, depending on how elaborate the recycling process is. It can be as simple as a give away or reuse program. This can occur at one day collections or at permanent HHW facilities. Paint can be consolidated into 5 gallon pails or it can remain in gallon or quart containers. End users include: painting contractors, waste haulers, small businesses, golf courses, homeowners, 4-H groups, cities, or counties. It is important to locate end users of paint before a one day collection, so you're not stuck with good paint at the end of the day - especially if you do not have a place to store it. In Ithaca NY, the Recycling Coordinator sent letters to potential paint users before the collection. The letter offered them the opportunity to receive free, good quality paint. Reservations for paint were taken, and the number of orders exceeded the amount of paint that came into the collection. Contact: Barbara Hotchkiss, Tompkins County, 607-273-6632)

At permanent sites, usable paint can be offered to people on a regular basis - orders can also be taken and filled as needed. Tri-County Solid Waste Management Commission in St. Cloud, MN has a Product Exchange at their permanent HHW facility. Residents and businesses are invited to take, free of charge, what they wish from the product exchange. Over 2445 gallons of paint have been reused at Tri-County's Product Exchange. A staff person at Tri-County Solid Waste Commission actively markets the paint and other materials to residents and groups such as the Children's Home, St. Cloud Housing Coalition, recycling and waste haulers, schools, greenhouses, wildlife and conservation groups, senior citizen centers and farms. (Contact: Kent Dahlquist, Tri-County Solid Waste, 612-255-6142)

A city in New Hampshire is setting up a clearinghouse for paint and other usable materials. The city doesn't actually handle the material, but tells residents to call the Public Works Department if they have usable material to give away. They enter the information into a data base - if someone calls in wanting paint, they given them the donor's telephone number. (Contact: Town of Exeter, Department of Public Works, 603-778-0591)

Some communities are offering a more sophisticated approach to paint recycling. In Portland Oregon, staff at the HHW facility follow a very detailed sorting protocol. Following sorting, the paint is poured into 55 gallon drums after it has been screened and filtered. Currently they are offering this paint to government agencies and non-profit organizations, such as:

-Project 2000 - Low income housing
-Arbor Neighborhood Association - Grafitti removal
-Historic Kenton Hotel - paint interior rooms
-Salvation Army
-Grant's Pass Gospel Mission - exterior of 3 church buildings
-Yamhill County Fairgrounds - Fairground buildings

Between 5 and 10 different colors are available. The new county office building will be painted with recycled paint. (Attachment B) Portland is also working with a local paint manufacturer. The manufacturer accepts usable paint in 55 gallon drums from the HHW facility at no charge. He may or may not add virgin material to the paint, depending on the quality of the paint. The paint is then sold to contractors for $5.00/gallon (in 5 gallon buckets) or for $6.00/gallon (in 2 gallon buckets). The paint is being used by contractors as a primer or surface paint. Portland's program is an example of how government and private industry can work together to produce and market recycled paint. (Contact: Jim Quinn, Portland METRO, 503-221-1646)

The State of California is considered by many to be leaders in the area of paint recycling. In the Sacramento area, recycled paint has been used to paint bus benches, forestry service buildings, fairgrounds, apartment buildings and other items that have to be painted routinely. Recycled paint is also used to cover up graffiti. They view recycled paint as a "utility" paint, not as a substitute for virgin paint. The government primarly markets the paint. (Contact: Masood Mesbah, California Department of General Services, 916-445-1846)

Marin County, California is working with a local paint manufacturer. The paint is consolidated into 55 gallon drums (no sorting by color takes place) and is transported to Standard Brands Paint Company. Standard Brands then transports the paint to their Southern California paint manufacturing plant where the paint is combined with wash water generated from plant operations. Chemicals are then added to produce a basic recycled paint. The basic paint is either given away to the community or is used by Major Paint as a "base" for producing recycled product lines for exterior use. "Cycle II" Recycled Latex Paint is available in flat, semi-gloss and as a primer. (Attachment C,D) Latex flat is available in 11 colors, semi-gloss in 9 colors and 1 color is available in the primer. The County of Marin gave away 3,713 gallons of recycled paint to 19 businesses, 62 individuals and 23 federal, state and local government agencies, in exchange for providing feedback on the performance of the paint. All responses received to date have indicated they are satisfied with the overall performance of the paint. Standard Brands is currently selling the Cycle II paint in retail stores. Marin County and Standard Brands is another example of government and private industry producing and marketing recycled paint. (Contact: Gina Purin, Marin County 415-499-6647 or Hubert Kim, Major Paint Company, 310-542-7701)

A fairly new recycling paint company is now operational in Massachusetts. The Green Paint Company accepts latex and oil paint in original containers. Once the paint arrives at the factory, it is sorted by trained staff. The paint then goes through a reformulation process and is available in a quality form. The Green Paint Company intends to market the paint to four sources:

> The first market is those businesses that are "into recycling", as they have already demonstrated a commitment to use recycled products.
>
> The second market will be businesses that have expressed an interest in promoting recycling through their association with organizations involved in recycling, such as the National Recycling Coalition.
>
> The third targeted group is federal, state and local governments - they are under pressure to "buy recycled". They are also a large user of paint products.
>
> The fourth market is the mass merchandise store. Once the word catches on that recycled paint is good, homeowners will want to purchase the paint at the retail level.

The Green Paint Company is the first private company to take a comprehensive approach to paint recycling - as primary recyclers they will collect, process and market a quality, recycled post-consumer product. (Contact: Steve Greenberg, Green Paint Company, 508-655-8560)

In summary, remember that it is vital to have a need or demand for the recycled product. You can't sell ice to an eskimo. People will not buy it if it the wrong color or finish. Find out what the needs are and know who will buy or use it. The actual marketing can be done by the government agency, the paint manufacturer, or a combination of both.

PLAN FOR MARKETING RECYCLED PAINT

SUPPLY

Supplier	*How Much Will They Supply?*	*In What Form?*
HHW COLLECTIONS VSQG's		ORIGINAL CONTAINERS OR 55 GALLONS DRUMS

DEMAND

Who Will Use It?	*What Do They Want?*	*How Much and How Often Do They Need?*	*Size of Container*	*Cost*
Contractors Farms Parks Homeowners Businesses Non-Profit Organizations Cities Counties Schools	Latex or Oil - Flat - Semi-gloss - Primer - Interior - Exterior Colors		1 Gallon 5 Gallons 55 Gallons	

Recycled Paint Market Prospects

Updated September 28, 1992

Portland METRO
(503) 221-1646

Project	Contact	Contact phone	Referred by	Date referred	Paint type	Date needed	Scale	Status
Central City Concern	Avery Loschen	294-1681	Pat Merkle	8/13/92	N/A	N/A	More than 100 houses	No action to date
Dominion Capital Houses	Kent Romney, City of Portland	N/A	Chris Rasmussen	8/13/92	IL, EL, ED	N/A	30 of 350 houses interior and exterior = 900 total gallons.	No action to date
Town of Moro	Ore. Trl. Coord. Comm.	N/A	Chris Rasmussen	8/10/92	Ex	N/A	Couple hundred gallons.	Sale pending
Christmas in April	John Ries	283-7470	Katie Dowdall	6/92	Ex	4/92	Interior and exterior of senior and handicapped houses.	In process
Grafitti Removal	Nancy Zimmer, Arbor Neigh. Assoc.	823-4524	Katie Dowdall	N/A	All colors and all types	Ongoing	Houses, buildings, everything.	In process
Hist. Kenton Hotel	John Condon; James Kaufman	223-2321	Katie Dowdall	8/92	IL	N/A	330 gals. interior.	In process
N. Port. Neig. Assoc.	Sang Choi	N/A	Katie Dowdall	8/92	Ex.	N/A	25 gals eggshell, 25 gals. mushroom.	In process
Project Linkage	Karen Kim	249-8215	Katie Dowdall	N/A	Ex	N/A	35 gals. for low-income homes.	In process
Project 2000	Don Robey	286-5382	Katie Dowdall	N/A	Int., Ext.	N/A	Interior and exterior low-income homes	In process
Wherehouse	Jerry Green	285-0116	Self	7/92	Ex.	N/A	1,110 gals.	Received paint from HHW prior to 9/10.

Project	Contact	Contact phone	Referred by	Date referred	Paint type	Date needed	Scale	Status
Here Today House	Mike O'Brien	636-5885	Debbie Palermini	8/92	Ex.	11/92	One 2,000 s.f. sustainable bldg. model s.f.d. built in conjunction with PGE Super Good Cents Prog.	Verbal committment to use.
Audubon Cntr.	Scott Aldridge	648-7805	Debbie Palermini	8/92	N/A	11/92	7,000 sf. commercial structure.	Expressed interest; no action to date
Rose City Cemetery	Jeff Myers, Blumenauer's Staff	228-3270	Pat Merkle	8/5/92	ED	ASAP	15 gals. for small shed	Completed
Low-income Day Care	Deborah Kinne	N/A	Pat Merkle	8/13/92	Interior	ASAP	N/A	N/A
Env. Haz. Was. Mng. Institute	Amy Cabaniss	(606) 868-1547	Philip Morley	8/20/92	N/A	N/A	Wants to do article in national newsletter	No follow-up to date.
Rose Comm. Dev.	Marie Anderson	232-0010	Self	8/26/92	N/A	N/A	N/A	Referred to HHW; no action to date
Vernon Presb. Church	John Rogers, 5425 NE 27th, Portland, 97211	282-5366	Self	8/26/92	IL	9/29	21 gals.	Received paint from HHW 8/29
Penninsula Children's Center	N/A	280-0534	Katie Dowdall	8/26/92	N/A	N/A	N/A	Referred to HHW
Grant's Pass Gospel Mission	Phil, PO Box 1371 Grants Pass, 97526	479-8869	KGW TV	8/27/92	ED	N/A	110 gals. for exterior of three church buildings	Referred to HHW
King Co.	Dave Herrick	(206) 296-4363	Self	8/24/92	N/A	N/A	The King. Co. Comm. For Marketing Recyclable Materials seeks to encourage the use of recycled products in King County.	Sent info. packet 8/24/92
Clean Washington Center	Ron Grulick; Susan St. Germain	(206) 464-7126	Andy Sloop	8/24/92	N/A	N/A	The CWC is the recycling market development branch of the Wash. State Dept. of Trade and Econ. Dev	Sent info. packet 8/24/92

Project	Contact	Contact phone	Referred by	Date referred	Paint type	Date needed	Scale	Status
Wash. Dept. of Ecology	Kathy Emmett	(206) 438-7876	Andy Sloop	8/24/92	N/A	N/A	WDOE is equivalent to Oregon's DEQ.	Sent info. packet 8/24/92
EPA	Lauris Davies	553-6522	Andy Sloop	8/24/92	N/A	N/A	Davies represents EPA Region 10, which includes OR, WA, ID, AL and MT.	Sent info. packet 8/24/92
Priv. Ind. Cncl	Amos Harris	N/A	Katie Dowdall	8/24/92	Ex;Int.	N/A	15 gals. for graffiti cover and low-income housing projects	Ongoing
Crime Prev. Penninsula Neighbors	Vada Grimrud, 8107 N. Wabash	823-4524	Katie Dowdall	8/15/92	Ex.	N/A	25 gals. graffiti cover	Received from HHW 8/21. Included in KGW TV news report.
KGW TV	Pat Cruise	226-5066	Katie Dowdall	8/24/92	N/A	N/A	News report	Aired 8/24/92
OR/WA Carpenters App. Prog.	Garry Goodwin	287-3708	Katie Dowdall	9/1/92	N/A	N/A	App. carpenters may team up with other trade and citizen volunteers to repair and upgrade senior and handicapped housing, including using recycled paint.	Will start after November
Metro Cntrl. Stat. Enhanc. Committees	N/A	N/A	Katie Dowdall	N/A	N/A	1/93	Paint can be marketed during grant proposal application process	Program will begin Jan. 1, 1993.
Salvation Army	N/A	N/A	Self	8/92	Ex	8/92	115 gals	Received paint from HHW prior to 9/10.
Live and Let Live	N/A	N/A	N/A	N/A	Ex	8/92	20 gals.	Received paint from HHW prior to 9/10.
Yamhill Co. Fairgrounds	N/A	N/A	Maggie Conley, DEQ	N/A	EL	8/92	1,980 gals.	Received paint from HHW prior to 9/10.
Warren Stenhouse's Church	N/A	N/A	N/A	N/A	Ex	8/92	115 gals.	Received paint from HHW prior to 9/10.
Project	Contact	Contact phone	Referred by	Date referred	Paint type	Date needed	Scale	Status

Hillsdale Terr. Neigh. Day Care	Michele Wiining, 9029 N. Dana, Portland, 97203	285-5150	N/A	N/A	EL; IL	8/92	5 gals. ext. light; 2.5 gals. int. light	Received paint from HHW 9/9
Youth Gang Outreach Prog.	Robbin Mayfield, 4815 NE 7th Ave., Portland, 97211	823-4112	Andy Sloop	9/17/92	Ex.	Ongoing	N/A	Distributed fact sheet at Multifamily Housing Council Conference session on Gangs and Graffiti.
Bldg. Owners and Maintenance Assoc.	N/A	N/A	Andy Sloop	9/24/92	All types	Ongoing	N/A	Distributed fact sheet at seminar on sustainable building concepts.
Center for Resourceful Bldg. Tech.	Steve Loken	(406) 549-7678	Andy Sloop	9/24/92	N/A	N/A	Tours country speaking to diverse audiences about resourceful building, including recycled building materials such as paint.	Gave fact sheet and color samples.
Bldg.for an Environmentally Sustainable Tomorrow	Kurt Nichols, City of Portland Energy Office	823-7418	Andy Sloop	9/24/92	N/A	N/A	BEST provides information about, and promotes success stories related to, environmentally responsible construction materials and techniques.	Gave fact sheet.
Metro demo.	Andy Sloop	N/A	N/A	N/A	N/A	IL	10 individuals are using 2 gallons each in residential applications.	Distributed paint in August. Will gather and compile surveys in October.

* Eight individuals received 125 gallons of free reprocessed paint from the HHW facility before access to this product was limited to non-profit organizations.
** N/A = Information not applicable or not available.

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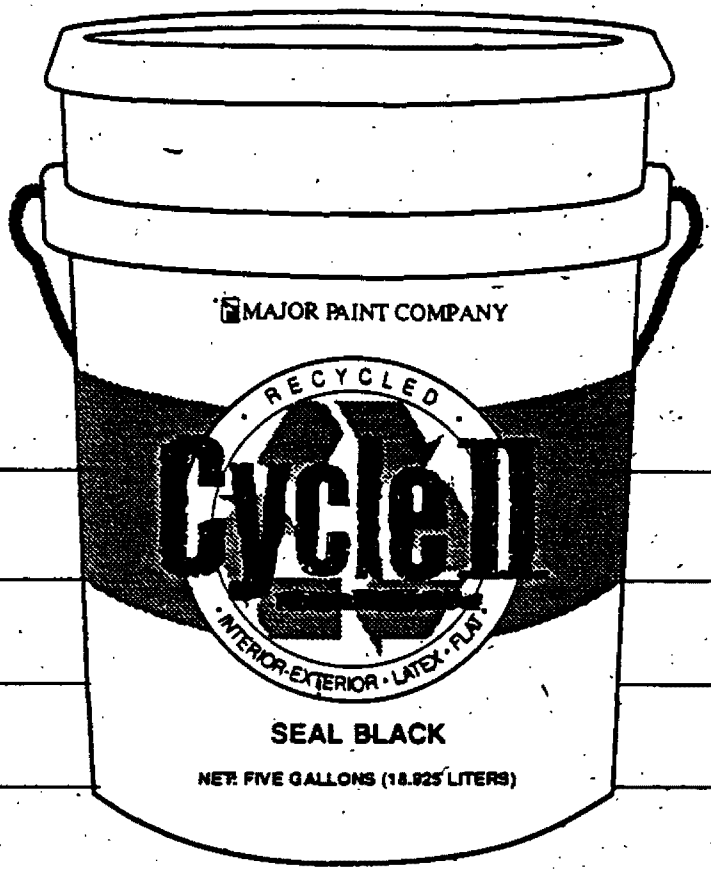
09/28/92

INTRODUCING



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PAINT REUSE AND RECYCLING CONSENSUS MEETING

Tracy Bone

Paint, by volume, is the largest wastestream brought into household hazardous waste collection programs (HHWCP). Much of the paint is either useable (40 to 90 %) and/or of low environmental concern (as compared to HHW in general). Disposal (as a hazardous waste) is the largest cost of a HHWCP. In the interest of reducing the disposal costs of HHWCPs and facilitating resource recovery of our resources, EPA has targeted paint as a wastestream to be considered for innovative management strategies.

Several communities around the country have found ways to manage the paint they collet other than as a hazardous waste. EPA brought these people as well as representatives from the paint industry together to identify and discuss the barriers to paint management.

The group quickly and unilaterally agreed that source reduction is the most important tool for solving the excess paint problem. Several paint manufacturers are considering putting on their paint labels language to indicate that the consumer should, "buy only what you need, use it up if possible, and give away any paint that can not be used up." HHWCP managers agree that they must continue to push source reduction through their community outreach mechanisms.

Toxicity reduction (through paint reformulation) and source reduction education have made and will continue to make great strides in reducing the excess paint problem. However, there will continue to be, to some extent, excess paint for HHWCPs to deal with. While waste-to- energy incineration is a management option for some paints and some HHWCPs, this is not an options for some programs. The discussion then turned to paint recycling, specifically discussed were the existing programs and the barriers to paint recycling.

Industry representatives pointed out some of their concerns connected with paint recycling: contamination of manufacturing equipment, product liability, consumer satisfaction, labeling, permitting, marketability, and disposal of wastes created during or received for paint reprocessing. Additional barriers brought up by HHWCP sponsors included: color availability, cost to the program and consumer, cost of contamination testing and paint sorting protocols. The group then broke into 3 smaller discussion groups: Markets and Funding, Regulatory Barriers, and Technical Barriers.

There were several points that came out in the summary session:

Source reduction deserves highest priority in any paint waste management plan;

HHWCPs are a better collection strategy than for paint to be returned directly to the manufacturer or distributor;

There are acceptable sorting protocols available (they need to be made widely available);

Testing for contaminants is necessary in many cases, however, it must not be prohibitively expensive;

Recycling should not be mandatory for every paint manufacturer -- smaller non-automated paint firms are the best candidates;

There is no single type of paint recycling program that will ensure success -- the program should be designed at the local/regional level with input from local paint manufacturers and distributors.

Government Procurement Procedures for Recycled Paints

Carolyn Dann — The Waste Watch Center

Military and Non-Military Procurement

There are two major groups of buyers within the Federal government procurement system: the Defense Logistics Agency (DLA) and the General Services Administration (GSA). The DLA orders military-related supplies such as guns, tanks, and airplanes, and supplies that are critical for them, including paint for airplanes and tanks. The military may also use more household-variety supplies but these are purchased through the GSA, such as chairs, toilet paper, and general building paint. Other agencies within the Federal government also contract with GSA to supply them with their basic supplies.

Public Building Services and Federal Supply Services

Within GSA, there are two groups that both supply materials and both can order paint, the Public Building Service (PBS) and the Federal Supply Service (FSS). The PBS is responsible for providing real estate for other Federal agencies. This group contracts for the maintenance of the buildings and grounds for the 1,600 or more buildings owned by the Federal government and the roughly 5,500 other buildings that are leased by the Federal government. These buildings can include offices, warehouses and a wide variety of other types of buildings. Potentially, PBS could require the use of reformulated paints in its maintenance contracts.

The FSS is the group that contracts for general goods and services that are used by agencies, military bases, and other groups within the Federal government. The FSS is responsible for setting up contracts for and developing and maintaining specifications for thousand of commercial, common use items including paint. FSS negotiates and sets up large contracts for items and purchasing agents throughout all Federal agencies can then use these large contracts to buy what they need. A group that needs paint, for example, can order it off a GSA supply list by referring to its National Stock Number (NSN), which for the category of products known as latex paints is NSN-8010. The NSN numbers refer to specific types of paint that have been tested and are known to have met a certain set of specifications. FSS stores many items in large warehouses and ships to customer agencies. Other items are shipped directly from the vendor to the ordering agency.

The procedure for ordering involves entering a request into a computer system by using the NSN number. The system sends all paint requests to a certain computer listing which gets transferred to a paint supply warehouse that ships the requested quantity of the particular product to the requesting group's warehouse. The request for recycled paint has to originate with the requesting group; just having an supply of recycled paint available does not necessarily mean that anyone will use it. As it true with the rest of the world, someone must create a demand for the product. We have just recently contacted people within the military to notify them that this recycled paint is available through FSS and to encourage them to use it for certain types of projects.

The procedure for supplying paint to the FSS involves developing and testing a type of recycled paint against existing specifications, TTP-19 (LP) and TTP-29 (SBP). If the recycled paint meets these specifications, the manufacturer should contact the Paint and Chemical Commodities Supply Center (Patricia Pearson, 206-931-1720) in Auburn, WA and ask to get on the bidders list for the next paint procurement. The bidding often is for large quantities and it may not be feasible for a recycled paint

manufacturer to supply enough but getting the requests for proposals will give them the option. The government will contract with the bidder with the lowest price that is reasonably able to provide the requested product.

One important factor in getting a recycled paint product listed by the FSS is shelf life. The government needs to have products that have at least a two-year shelf life. The Major Paints Cycle II paint has been guaranteed by the company to have a three-year shelf -life or they will take it back. If a company can not guarantee a two-year shelf life, they can agree to accept it back.

Another procurement approach is also available to government purchasers. They can buy their supplies directly and locally by buying off a schedule. In this case, the NSN numbers are not used. A schedule is a contract that the government has arranged with certain suppliers to provide a specified type of product at an agreed-upon price. GSA puts out a listing of contractors that have products that meet certain specifications and have negotiated a price for the government. The manufacturer needs to submit certain forms and certifications and agree to give their best price to the government purchasers. Then the manufacturer can market to the purchasing people and they can buy it from the manufacturer directly. This avoids the need to get materials shipped into the warehouse. It may be more suitable for recycled paint than the FSS system because it is often the chosen route for smaller purchases.

For purchases under $5,000, the agencies can buy in any way they wish. This again requires marketing to the purchasing people.

Market Demand Within Government Agencies

Whichever way is used, marketing is required to create the demand. The military bases with engineering and construction battalions are prime targets for marketing efforts because they are responsible for building maintenance and construction on the base. Also bases with young troops or where the housing turns over quickly require frequent repainting. These painting projects do not require paint that will withstand 10 years of exposure; they need to be painted every year or two because of the wear and tear from people and equipment moving in and out and damaging or marking the walls.

It is important to consider, however, that FSS does not have a captive selling market. FSS operates as a semi-independent business, i.e., it is responsible for generating its own source of income for personnel and operating expenses. Other Federal agencies are not required to use FSS as their source of supply, Consequently, FSS cannot commit Federal dollars to contract for items that other agencies won't buy. This means that getting into the FSS supply system is not the end; recycled paint needs to be marketed to the purchasers and users.

To date, only one paint manufacturer, Major Paint Company in California, has had its recycled paint tested and listed. The paint did not meet the color and percent solids requirements of the existing standard for virgin paint but, on a pilot test basis, the paint was assigned an NSN number and is available in a limited area. It can now be ordered in California, Nevada, Utah, Washington, Oregon, and Idaho through the FSS.

Procurement Preferences and Specifications

Many people have thought that providing a government "preference" for recycled paint would be helpful. The GSA,however, has argued that this is not the best approach. Creating and implementing preference systems for recycled products is very time-consuming and cumbersome. The primary difficulty is being able to verify that a product is, in fact, made from recycled materials because it is not readily observable. At this point in time, recycled paint can be offered at prices that are lower than prices for virgin paint,

which is already a good incentive. In addition, many parts of the government are trying to find recycled products to use wherever possible, so the preference may not be necessary at all.

Recommendations to Help Promote Use of Recycled Paint

In general, one step towards increasing the use of recycled paint would be the development of standards. The Federal government is required to use non-government standards if they are available for the purpose. For common painting tasks that would lend themselves to the use of recycled paint, a recycled paint standard could be developed. It would have to be developed with input from manufacturers to ensure that their output would conform to the specifications. The American Society for Testing Materials (ASTM) is one group that develops specifications and could assist in this process. Once developed, the standards could be reviewed by the American National Standards Institute (ANSI). The ANSI serves to review standards to ensure that they can be met by enough manufacturers to provide competition. If so, they will certify the standard as a national standard. In addition, it would be smart to start to develop local markets within the government units that also pay for the disposal of HHW. Since they will benefit from diverting paint from the waste stream, they may be willing to provide uses for the paint.

We, at the WWC, have asked for a listing of the types of uses for paint used by the Department of Defense. From this, we will be seeking to develop some demonstration projects using recycled paint. Recycled paint demonstrations have been done in California and need to be expanded elsewhere. After the demonstration projects, we need publicity. This can come through the governments publications, Marketips, through professional journals, through the electronic system, Multi-Use File For Interagency News (MUFFIN) and through the general press and publications.

Options for Disposal of Latex Paint Wastes Collected at HHW Collections

Philip Farina, Environmental Purification Industries

The management of household hazardous waste is becoming more and more sophisticated as various counties begin to hold special waste drop off days or develop permanent hazardous waste drop off sites. The popularity of special waste drop off days is also growing with the public who have been searching for what to do with these household hazardous wastes. As this market grows, the waste stream managers are pushed even harder to find new technologies for recycling or reuse of the materials collected or to find safer and more efficient methods of disposal.

One stream which seems to be growing in volume throughout the county is unused household latex paint kept in thousand of garages and basements. This material comes in various forms, from unused virgin paint to "cottage cheese" material - the result of freezing and thawing of formulated paints. The scope of the problem continues to grow as more and more home owners look for environmentally safe methods of disposing of their paint waste.

In a recent survey of 15 counties on the East Coast who have set up permanent waste collection sites, it was determined that paint waste was the largest single stream collected at most of the sites. This is good since it shows the public's concern for the environment, but what are the options available to the waste stream managers for reuse, recycle or disposal of such collected volumes?

The first option readily available is the reuse of the paint as paint for low income housing, public service buildings (as primer) or just giving the material away to be used as a primer or other low tolerance use.

This can be effective for some quantity of directly reusable material but more often as not the collected material cannot be directly reused as it may be contaminated or has otherwise de-emulsified and is thus unusable.

One disposal option for such unusable material has been to landfill. This must be considered as a least desirable option as the waste was originally collected to keep it out of the landfill in the first place! This is however, the lowest cost option for the disposal of both can and contents, but should again be considered as less than desirable.

Another frequently used option is "Fuel Blending". In fuel blending we use the energy derived from the paint material as a fuel for a cement kiln which is used to manufacture Portland cement. This is a good use for the material since it does derive some benefit from the waste, however there are some limitations involved in fuel blending.

The most important limitation for fuel blending material is that the raw waste must possess a minimum of 5,000 BTU/lb. before

it can be blended into fuel. In most cases this can be met with high solvent borne paints but is not seen with latex paints which use water instead of solvent as a carrier. In most states, we are seeing a dramatic shift toward water born paints, so the fuel blend option may be limited in the future.

Another common option - but a very expensive one - is incineration. Here the material is simply thermally destroyed with the resulting ash going into a hazardous waste landfill. The cost for such service may exceed $8.00/gallon but for many counties this has been the only option.

A new technology - PYROLYSIS - has been developed to handle low BTU value latex paint waste, which takes paint sludge and related materials and processes them into a non-hazardous inert filler material which is then recycled.

This proven technology was developed by Haden Environmental Corporation and is known as the Haden DryPure Process. The first plant is operated by Environmental Purification Industries and is located in Toledo, Ohio. How does this technology work?

The EPI DryPure schematic (see figure 1) slows the process flow of material from a sludge into the dry powder - EPI-PURE.Material is received at the facility in drums, roll off boxes, vac truck or tank trucks. The material must be debris free as debris cannot be processed by the system. The material is tested at the facility and is off-loaded directly into the receiving hoppers (1). The material is pumped via V-Ram (for solids) or diaphragm (for liquids) into the dryer (2).

The thermal fluid dryer consists of two hollow, auger like screw conveyors that run horizontally and slowly convey the sludge from one end of the dryer to the other in a continuous process. (3) The screw conveyors, which contain an oil heated to 550°F, come into contact with the paint sludge in what can be described as a "frying reaction". As the sludge passes through the dryer and is heated, water vapor and other volatile liquids, such as volatile organic compounds (VOC's) that are contained in the paint sludge are driven off as the paint sludge is cured (4). These gasses are collected in a vapor dome and are transferred into a waste heat boiler. These materials are destroyed in the boiler which is fueled by natural gas and is heated to over 1600°F (5). The heat generated from burning the VOC's is also recycled by routing it to an air to oil heat exchanger (6), where the heated oil is then pumped into the holoflite screws of the dryer, making for an efficient closed loop system.

The solids material from the dryer is conveyed to a vibrating screen, (7) which separates the larger particles to be re-routed back into the dryer for further processing (8). The fully cured material - which has the consistency of find sand - is collected in forty cubic foot bags for shipment to an end user.

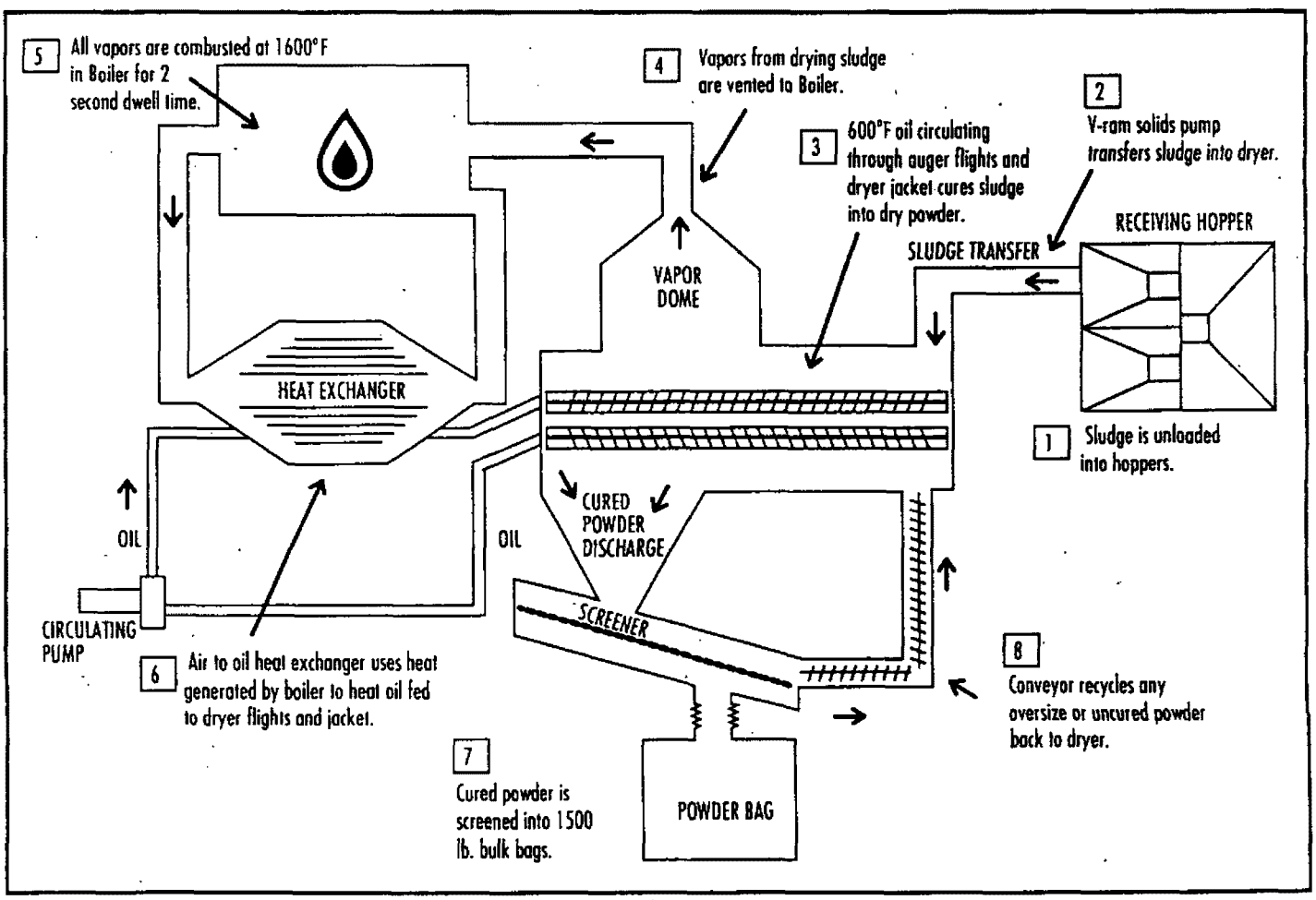
The resultant material - EPI-PURE™ is then sampled and subjected to a series of tests to verify that the material is fully cured. Uncured powder is reprocessed through the dryer ensuring all material recycled is both fully cured and safe.

The final cured material is an inert, non-hazardous, light weight material that is currently being used as a filler replacement for roof mastic and cement block markets. The material is also being tested for use in brick as a replacement for other filler materials.

This method of recycling paint waste does indeed end the paint waste liability cycle by creating a new reusable product from a waste stream.

In an environmentally conscious society we can offer a paint waste recycling program which is both environmentally sound and economically efficient.

EPI DRYPURE SCHEMATIC



INMETCO's Nickel-Cadmium Recycling System

John A. Patterson
Marketing and Sales Representitive
INMETCO
P.O. Box 720
245 Portersville Road
Ellwood City, PA 16117

INMETCO is the leading recycler of metal waste in North America. In 1992, approximately 57,500 tons of nickel, chromium and iron bearing wastes, including approximately 1,350 tons of nickel-cadmium and nickel-iron batteries.

INMETCO recycles all types of nickel cadmium batteries, including large industrial cells and AAA, AA, C and D cells. Landfill liability is eliminated, and valuable, non-renewable resources are preserved.

INMETCO is a TSD (EPA I.D. Number PAD-087561015) secondary metals reclamation facility which actively reclaims nickel, chromium and iron from hazardous and non hazardous wastes. As part of our technology, the process uses the only smelting furnace in North America dedicated to the recovery of nickel, chrome and iron, while producing a stainless steel remelt alloy used by virtually all of the U.S. Specialty Steel manufacturers plus customers in Canada, Europe and Japan.

INMETCO is a wholly owned subsidiary of Inco Ltd., one of the world's largest nickel companies. The Ellwood City, Pennsylvania facility operates a RCRA Part-B permitted hazardous waste storage facility. INMETCO received its Part-B Hazardous Waste Storage Permit #PAD087561015 from the Pennsylvania Department of Environmental Resources on November 6, 1992.

Being a true reclaimer and recycler who has been in operation since 1978, we meet all state and federal requirements for insurance, while providing an environmentally sound approach to the processing and reclaiming of valuable metals.

The process lends itself to the recovery of nickel, chrome and iron from a variety of waste types and forms, such as solutions, solids or dusts. With the present process we have the ability to use other materials, such as spent carbon and carbon bricks, magnesium swarf, metallic grindings, chrome-magnesium refractories, and spent nickel-cadmium and nickel-iron batteries to name a few.

RECYCLING METAL BEARING WASTES THROUGH PYROMETALLURGICAL TECHNOLOGY

R. H. Hanewald , M. E. Schweers, J. C. Onuska

INMETCO
245 Portersville Road
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ABSTRACT

The pyrometallurgical process is a solution to the problem of recycling nickel, chromium bearing refractories from the glass manufacturing industry. This process eliminates the need for stabilization and land disposal by reclaiming these metals for further use. In this paper, the steps of the pyrometallurgical process (1) feed preparation,
(2) reduction and (3) smelting and casting are examined in detail. The recovery of the metal and non-metal components of the wastes is explained.

INTRODUCTION

The pyrometallurgical process upon which this paper focuses was developed by INCO in its research facilities in the mid-1970's. This process, after pilot testing, led to the building of a facility in Ellwood City, Pennsylvania, which began commercially reclaiming stainless steel waste known as flue dust, mill scale and swarf beginning in 1978.

Since 1978, the process' waste feed specifications broadened to accept other waste streams such as nickel and chromium containing plating cakes, and nickel and chromium containing plating solutions. In 1991, approximately 50,000 metric tons of waste, including approximately 234 metric tons of chromium-bearing refractory brick were recycled resulting in the production of over 21,000 metric tons of metal.

PYROMETALLURGICAL PROCESS OVERVIEW

The pyrometallurgical process consists of three basic steps: 1) feed preparation, blending and pelletizing; 2) reduction; and 3) smelting and casting. (See Figure 1)

FIGURE 1: STEPS IN THE PYROMETALLURGICAL PROCESS

	Operation	Equipment Used
1.	Feed Preparation	Pelletizing Disc
2.	Reduction	Rotary Hearth Furnace
3.	Smelting	Electric Arc Furnace
4.	Casting	Pig Caster

The equipment used is relatively well known in the primary metal producing industry. The feed preparation equipment is specifically suited to the feed material from the specialty steel industry, utilizing a rod mill for mill scale and a table feeder and rotary breaker for the swarf. For blending, mass flow bins with electronic speed controls are employed to move the finely prepared material, via a screw feeder, to the covered conveyor and into screw conveyors. The screw conveyor discharge is carried by conveyor to a 4.3 m diameter pelletizing disc where water is added and the pellets formed (approximately 1.2 cm in diameter). The first reduction step is carried out in a 16.7 m diameter Rotary Hearth Furnace. Smelting and final reduction is accomplished in a 6.3 MVA, 6.4 m diameter Submerged Arc Electric Furnace. Casting is performed by pouring the hot metal from a 12 metric ton ladle into a twin strand pig caster. Pig weight is about 14 kg.

The first step in the process involves receiving the various wastes and pretreating them, where necessary, to insure a uniform size material. These pretreated wastes are stored in separate silos from which they are fed at a carefully controlled rate. The wastes are blended with coke or coal and water in a screw conveyor. The mixture proceeds to a disc pelletizer which produces green waste pellets strong enough to resist disintegration in the subsequent thermal operations. Since the pellets are not going to be tumbled in the reduction process, the strength requirement is minimal.

The second major step in the process is the partial reduction of the metal oxides in a Rotary Hearth Furnace. In this furnace, some of the carbon in the pellets react with oxygen in the waste to produce reduced metal. A portion of the Zinc, Lead and Halogens contained in the flue dust are exhausted into the off-gas treatment system. Hot, metallic, sintered pellets are transferred in sealed containers to the Electric Arc Smelting Furnace where the third major operation is performed. In this stage, the pellet is melted and chromium oxides are reduced by the residual carbon in the pellet. Lime, silica, alumina and magnesia separate to form a liquid slag which assists in cleansing the metal bath. Metal and slag are tapped periodically from the furnace. The metal is cast from a refractory lined ladle into pigs which are sold to the steel mills. The slag is treated in a special area in order to obtain a sized material that can be used locally as fill or ballast. The process water is treated and yields a filter cake that is recycled in a separate processing plant to recover the Zinc values.

Currently, one plant using the pyrometallurgical process is capable of treating 50,000 metric tons of raw material per year. At this feed rate, the plant can produce 21,000 metric tons of pig metal with a composition similar to that shown in Table 1.

TABLE 1: TYPICAL METAL ANALYSIS

Ni	-	8.5	Co	-	0.42
Cr	-	14.1	S	-	0.27
Fe	-	69.5	C	-	3.7
Mn	-	1.6	Si	-	0.1
Mo	-	0.99	P	-	0.05
Cu	-	0.76			

PLATING & SURFACE FINISHING INDUSTRY WASTE PROCESSING

The pyrometallurgical process has been modified to recover metals from plating and surface finishing wastes such as nickel and chromium containing solutions and nickel and chromium containing filter cakes. Table 2 and Table 3 list the typical values for nickel, chromium, iron, pH, copper and phosphorus for liquids that may be recycled via the pyrometallurgical process. Table 4 lists typical composition of nickel and chromium containing cakes that may be recycled pyrometallurgically.

TABLE 2: CHEMICAL ANALYSIS OF CHROMIC ACID

Client Mill #	pH	Fe (ppm)	Ni (ppm)	Cr (ppm)	Cu (ppm)	Co (ppm)	P (ppm)
1	1.00	4870	215	98400	162	65	50
2	1.00	8760	64	161000	224	12	14
3	1.00	14000	32	132600	1210	5	16

TABLE 3: CHEMICAL ANALYSIS OF NICKEL SOLUTIONS

Client Mill #	pH	Fe (ppm)	Ni (ppm)	Cr (ppm)	Cu (ppm)	Co (ppm)	P (ppm)
1	1.20	3160	33000	63	17	19	6
2	13.22	9	23200	32	4	460	40
3	1.38	65	57600	131	174	33	53

TABLE 4: CHEMICAL ANALYSIS OF CHROMIUM AND NICKEL CONTAINING CAKES

Client Mill #	%Cd	%Mo	%Pb	%Zn	%Cu	%MgO	%Ni	%Co
1	0.03	0.12	0.04	0.02	0.11	0.50	2.29	0.08
2	0.07	0.22	0.1	0.16	0.33	7.12	4.66	0.16
3	0.07	0.35	0.19	0.5	0.44	2.02	3.74	0.37

Client Mill #	%Fe	%Cr	%Mn	%CaO	%SiO2	%P	%Al2O3	LoI
1	20.04	4.22	0.16	24.61	1.6	0.026	0.5	63.3
2	34.59	11.28	1.04	0.8	0.96	0.023	0.21	56.8
3	34.08	8.42	0.92	13.04	3.37	0.036	0.68	0.2

In order to guarantee the quality of the product known as stainless steel remelt alloy "pigs", the concentration of elements such as phosphorus and copper in the wastes must be relatively low.

Nickel and chromium containing liquids such as waste nickel stripper solutions, waste chromic acids and rinse waters are used to produce pellets from dry, metal bearing waste. These liquids are pumped at a controlled rate to the pelletizing disk. (The deck of the disk is made of corrosion resistant 316 stainless steel.) Here they agglomerate or pelletize dry, metal bearing waste forming "green pellets". The green pellets are approximately 1 cm in diameter. They are transferred by conveyor to the Rotary Hearth Furnace. Wet filter cakes bypass the pelletizing disc. In order to feed filter cakes, a 3.3 m table feeder is used to feed several 8.5 m long and .62 m in diameter ribbon flight screw conveyors that mix carbon fines and filter cake prior to delivery to the Rotary Hearth Furnace.

In the Rotary Hearth Furnace, the carbon that has been added to the waste reacts with the nickel and iron hydroxides for purposes of reduction prior to transfer to the Electric Arc Furnace. The basic reaction is shown in Figure 2.

FIGURE 2: SIMPLIFIED REDUCTION REACTION

$$NiO \cdot H_2O + Fe_2O_3 \cdot H_2O + C + Heat \Rightarrow Ni + Fe + CO + CO_2 + H_2O$$

Note that about half the lead and zinc will fume off along with a portion of the halogens which are captured by a wet scrubber and removed in a waste water treatment plant.

In the Electric Submerged Arc Smelting Furnace, the waste materials are smelted to extract nickel, chromium and iron. Because it requires higher processing temperatures, chromium oxide is not reduced in the Rotary Hearth Furnace. However, this is easily accomplished in the Electric Furnace where the metal temperatures reach 1600° C. At this temperature, a slag bath and a nickel/chromium/iron bath are formed. As was explained earlier, metal and slag are tapped periodically from the furnace. Molten metal is cast into pigs weighing approximately 14 kg using a twin strand pig caster. The non-hazardous slag is poured into thin sheets, cooled, sized by crushing and screening, and then sold as fill and construction aggregate.

RECOVERIES

Through the reduction and reclaiming steps, the pyrometallurgical process is highly efficient in the recovery of metallics. Some actual recovery values are indicated in Table 5.

TABLE 5: TYPICAL METAL RECOVERIES

Ni	Mo	Co	Cr	Fe	Mn
98%	92%	97%	86%	96%	60%

While achieving the above metal recoveries, also removed are Zn, Pb and most of the Sulfur.

COMPOSITIONAL CONTROL

The customers, the specialty steel producers that provide the larger percentage of the raw material used at the plant, desire a quality remelt alloy that can be used to produce material similar to type 304 stainless steel (18% Cr - 8% Ni - balance Fe). When Molybdenum is present, the pig could be used for the manufacture of the higher valued type 316 stainless.

A quality control group has developed the necessary procedures to sample the various nickel-containing waste liquids and solids that are processed here. This insures complete and accurate chemistry control. This group specifies what material can be used in our process, as well as the processing circuit to be employed and the consumption rate.

The procedure is to analyze each lot or truckload as it arrives at the plant. The material is then assigned to a particular storage bunkered area based on its Nickel and Chromium content. The contents of the various bunkers are carefully blended to produce a mix with satisfactory processing characteristics and uniform alloy content. Any shortfall in Nickel content from the target level is made up by adding nickel alloy wastes. The Electric Arc Furnace contains a heel of about 120 metric tons of hot metal which helps smooth out product compositional fluctuations.

RESOURCE RECOVERY PLANT WASTES

A resource recovery plant is, of course, subject to the same environmental concerns as the industry it serves. The plant does not landfill any residues from its process. The non-hazardous slag co-product passes the EPA TCLP test, does not leach, and is sold the same as other slags have been since the turn of the century.

The gaseous effluent from the Rotary Hearth Furnace contains significant quantities of Zinc, Lead and Halogens. A wet gas scrubbing system was specified to treat this effluent. The scrubber water is treated to meet all the applicable quality standards. After treatment, it is discharged to the municipal sewage treatment system. The treatment system produces about 2,000 metric tons per year of an alkaline filter cake containing significant quantities of Zinc and Lead . The plant recycles this cake through a secondary zinc producer. The Electric Furnace is attached to a standard baghouse for collecting the remainder of the zinc and lead. (See Table 6 for compositional information.)

TABLE 6: BY-PRODUCT COMPOSITION

Constituent	Composition Weight %	
	Scrubber Filter Cake	EF Baghouse Dust
$SiO_2 + Al_2O_3$	7%	3%
CaO + MgO	13%	5%
F	3%	1%
Cl	0.5%	9%
Pb	6%	4%
Zn	22%	28%
Fe	9%	2%
Cr	3%	0.5%

The slag that is generated is poured from the ladle, while still molten, down a ramp into a thin layer. This is cooled and broken up with a front end loader. The broken slag is screened and sized. This sized material is chemically inert and is sold for roadway beds and construction material. Table 7 gives the analysis of this slag.

TABLE 7: 1990 CHEMICAL ANALYSIS OF SLAG CO-PRODUCT

SiO_2	25%	CaO	31%
MgO	18%	Al_2O_3	10%
Cr_2O_3	5%	Fe_2O_3	3%

FINAL COMMENTS ON THE PYROMETALLURGICAL PROCESS

This paper is presented to demonstrate how the process works with plating as well as other metal bearing materials. Over 1800 tons of nickel, 3000 tons of chromium and 16,000 tons of iron are annually recovered and recycled. These non-renewable resources are kept from landfills. The environment is improved by processing hazardous wastes into non-hazardous valuable, recyclable remelt alloy.

RECYCLING PROGRAMS FOR MANUFACTURERS, DISTRIBUTORS & USERS OF NICKEL-CADMIUM BATTERIES

INMETCO has developed several types of nickel-cadmium (Ni-Cd) battery recycling programs to serve the needs of manufacturers, distributors and users of Ni-Cd battery products. Examples of three such programs are listed below.

Mail Back Program

Ni-Cd batteries and battery packs are delivered to INMETCO directly from the Ni-Cd user via U.S. Postal Service, 4th class mail or UPS. The mailers are provided by the manufacturer/distributor of the Ni-Cd battery power product. It is our understanding that under the United States law, only conditionally exempt small quantity generators "CESQG's" (facilities generating less than 220 lbs. per month of hazardous waste) or households may ship used Ni-Cd's in this manner.

The manufacturer/distributor of Ni-Cd battery powered products is responsible for the cost of shipping.

A sample mailer is available upon request to the Sales/Marketing Department.

Reverse Distribution Program

In this program, the service centers of the Ni-Cd battery powered product manufacturer/distributor serve as the collection sites for used Ni-Cd's. It is our understanding that if the service centers qualify as CESQG's, they may ship these used batteries to INMETCO via 4th class mail or UPS, under U.S. law.

The Ni-Cd batteries are to be shipped in packages weighing approximately 20 to 70 lbs., meeting the specifications of the shipper. The manufacturer/distributor is responsible for the cost of the shipping.

Large Quanity Generator Program

This program id for manufacturer/distributors of Ni-Cd battery products that collect large quantities of Ni-Cd's at one central facility. The Ni-Cd batteries are packaged and transported according to INMETCO's "Nickel-Cadmium Battery Processing Conditions", available upon request. The manufacturer/distributor is responsible for freight to INMETCO's facilities.

The cost to recycle Ni-Cd batteries under this program is on a graduated scale.

For assistance with your Nickel-Cadmium battery disposal needs please contact our Sales/Marketing Staff, 412-758-5515.

U.S. HOUSEHOLD BATTERY RECYCLING: MERCURY REFINING

ALAN WILDS
Vice President Marketing and Sales
Mercury Refining Company, Inc., Latham, New York 12110

Is it too early to think in terms of a success story? In 1984 the amount of mercury being sold domestically as a component in batteries for all markets was more than 2 million pounds [1]. By 1991 this is reported to have been reduced to 156 thousand pounds. The consumer market represents about half these numbers; one million and 80 thousand pounds, respectively.

The reduction continues. All the major US manufacturers state that their batteries (both alkaline and zinc/carbon) either already do not or will not contain any added mercury by 1993. The same is true of the manufacturers in Europe and Japan. The only possible remaining sources of mercury into the domestic battery market may be from the so called cheap battery manufacturers (Singapore and Hong Kong, for example; and this may not be a fact) and the mercury button hearing aid batteries.

Thus a very small percentage of household batteries now contain added mercury of any concentration and the trend continues downwards.

In 1992, David Hurd [2] estimated the domestic market for Dry Cell Batteries to be:

zinc/carbon	19.7%
zinc/alkaline	63.5%
zinc/air	3.4%
nickel/cadmium	9.4%
silver cells	2.6%
lithium batteries	0.2%
zinc/mercury	1.2%
TOTAL	100.0%

Several others have reported on the battery market breakdown and the mix does not substantially change (certainly Mercury Refining Company [MERECO] internal information supports these data).

The single domestic consumer market for mercury batteries is the hearing aid battery. This is a very tiny battery and is being replaced by the zinc/air cell. Several States have programs in place which will affect the availability of mercury in the remaining market, for example:

CA [3] is suggesting a prohibition effective in 1996.
NJ [4] has an exemption for hearing aid batteries until 1996.
VT is already requiring the recycling of batteries.
MN has already established a program to collect consumer batteries.
NY [5] will publish the results of the Battery Task Force at the beginning of 1993.

Many of the other States either already have regulations in place, are enacting the necessary legislation or are watching the existing State programs, with a view to introducing their own.

Based upon these facts, it may not be unreasonable to assume that mercury from the consumer battery market will be virtually eliminated as a source entering the market during 1996. It will therefore decrease in the waste stream shortly thereafter with the potential to effectively become zero.

MERECO has the capability to reclaim and refine mercury from the consumer batteries and other mercury bearing waste streams. The company was established in 1955 to do just that. At the time, the market for mercury was supported by the US Government. The price was high enough to enable the waste mercury batteries to be purchased, packaged, shipped and the mercury reclaimed without cost to the generator. The declining value of mercury coupled with the increasing costs of regulation has meant that customers now have to pay for the recycling service.

The method employed is retorting. This process has been known for a long time and is essentially a distillation process. The mercury batteries are loaded into a chamber, heated and the mercury vaporized. The vapors are collected and condensed.

Mercury batteries are received into the facility, usually in drums or fiber boxes. Since these batteries are from the domestic waste stream (and predominantly from New York State), they are not now hazardous waste, in New York State. Consequently, they are not accompanied by a manifest.

The batteries are sorted, manually, by type. When about 1,000 pounds have been accumulated, the mercury batteries are prepared for retorting by placing them into retort pans. Each pan holds about 14 gallons or 250 pounds of mercury button cells. Four pans are loaded into the retort, the door closed and sealed (it is important that the door be effectively sealed to eliminate the possibility of mercury vapor entering the environment).

The re-circulating cooling fluid in the condenser is checked to ensure that the vapors produced in the process will be cooled. The retort chamber can now be heated.

Indirect heat, in this case by natural gas, is applied to heat tiles below the retort chamber. Heat is transferred to the chamber and the batteries are forced to open. The expansion due to heat actually causes them to explode.

Volatile materials are driven off in the heating process (for example water from the electrolyte and mercury). As the temperature inside the retort approaches the boiling point of mercury metal (356 deg C or 673 deg F) the mercury evaporates and is driven from the retort. It is collected by the condenser and returned to the liquid state. The mercury is collected at the outlet from the condenser.

The chamber continues to be heated towards its maximum of 750 deg C (1400 deg F), in order to continue the process of reclaiming all the mercury contained within a battery. For example, mercuric oxide (the major component of a mercury battery) decomposes at 500 deg C (932 deg F).

Once all the mercury has been expelled from the material, the heat is shut off and the chamber with its contents is flushed with cold air or nitrogen. This assures that any resident mercury vapor in the retort passes through the condenser. It also increases the rate of cooling. Once the retort has cooled it is opened and the pans removed.

The residual material, typically metal cases, glass seals and salts, is sampled and drummed. Samples are analyzed on a statistical basis to prove the complete removal of mercury. The drummed waste is sent to a secure land-fill for disposal.

The collected mercury metal is further treated prior to sale. The treatment consists of distillation and various chemical

washes, with and without agitation, to remove all contaminating species.

Mercury is sold as two grades: prime virgin quality and triple distilled. The prime virgin grade is at least 99.9% pure, and is the purity obtained directly from the retorting of cinnabar (an ore which is mainly mercury sulfide). MERECO warrants its mercury as being at least as pure as prime virgin.

Triple distilled mercury is a higher grade of mercury achieved through multiple distillation steps and chemical washing of the refined mercury from the retorting process. Its purity is at least 99.99% and may exceed 99.9999%.

The lower purity mercury has applications in the manufacture of mercury compounds and in the chlor/alkali process. The higher grade mercury is used in mercury vapor lamps, dental amalgams, mercury in glass devices and fluorescent tubes.

Thus, mercury has been used in batteries for many years. As a result of environmental contamination (and in some instances human health effects), there has been a major drive to eliminate mercury from the domestic (and world-wide) market. Since 1984, there has been a steady but dramatic decline in the quantity of mercury being used in domestic batteries. States are passing legislation banning mercury from the domestic market during 1996. The battery manufacturers have been cooperating with the effort to reduce the mercury content of their products while minimizing any impact on performance. Mercury Refining is working to reclaim as much mercury from the domestic consumer battery market to further lessen the impact of mercury in the environment.

Is it too early to claim a success for the control of mercury entering the environment from the domestic consumer battery? The end certainly seems to be in sight.

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A New U.S. Battery Recycling Facility
W.R. Meador, Recovery and Reclamation, Inc.

Recovery and Reclamation, Inc. (RRI) is primarily involved in the collection and distribution of recycled materials from the recycling of industrial and household batteries. Since 1990 RRI has received new, used and obsolete batteries containing hazardous and non-hazardous material and processed them through the facility, recycling all and/or portions of the batteries and reselling these materials to third party dealers who use the recycled materials as Feed-Stock to produce commercial products.

RRI manages the battery recycling facility in a manner in which no product or material becomes a waste and thereby needing off-site disposal. All by-products are sold as recycled material to commercial end-users as Feed-Stock material or is used within the facility as complimentary products for processing batteries and/or their subsequent by-products. Again, there is no off-site disposal of any waste material.

RRI has made application to the Texas Water Commission (TWC), the lead agency for the Environmental Protection Agency (EPA), for a Part "B" Storage Facility Permit, which is very near completion. The EPA has assigned the facility permit number to RRI's facility and TWC representatives assure RRI that the permit will be completed and in our possession by the first of February, 1993. The Permit Application covers the existing facility and the planned storage and containment facility. The facility units at RRI are:

1.) Zinc-Carbon - Industrial wet electrolyte type storage batteries
2.) Alkaline - 1 for Known Levels of Mercury being "0" (Household)
3.) Alkaline - 2 for Unknown Levels of Mercury (Household)
3.) Lithium - Household / commercial / military types
4.) Ni-Cad / Ni-Fe - Industrial
5.) Storage Warehouse (Part "B" Building).

The EPA does not presently regulate the actual process of "Recycling" (with the exception of certain uses constituting disposal), only the Storage, Transportation, and Generation that proceeds it. RRI was not forced or even asked to acquire a Part "B" permit, but applied voluntarily in order to meet possible future regulations and to satisfy current and potential client concerns.

LAND USE AT AND NEAR FACILITY:

The RRI facility is located in a light industrial area near Pecos, Texas. Environmental due diligence has shown that the potential for environmental risk is low due to any contamination from past uses and low potential due to present uses based on current practices and evaluations of operations at the facility. Surrounding land uses are excellent for the operations as all surrounding industrial lands are abandoned or undeveloped. Soil types, depth to potable water and lack of sensitive receptors in the area tend to limit the potential for environmental risk.

Additionally, the facility has in place processes and are addressing additional systems due to the application for the Part "B" permit that should limit any other potential environmental risks. These systems include the "SPCC" plan and "Pollution Prevention Plan" for the NPDES permit.

The facility is fenced on all sides by a six (6') tall security fence with two (2) strands of barbed wire. Access to the facility is controlled by gates that are locked when the facility is closed and monitored when open.

There are no storm or process sewers located in the RRI facility, and there is no waste water generated or discharged in the facility operations.

In the vicinity of the RRI facility, the topography is flat to gentle sloping to the south and west. The facility is not located in the 100 year floodplain. Also, from seismic studies, the closest fault is over eight (8) miles to the East of the facility.

EMPLOYEE TRAINING AND SUPERVISION:

Supervision of employees within the various plants located within the facility is handled primarily by individual plant foremen. The plant foremen train the employees in the various tasks necessary to operate the individual plant equipment and process the particular batteries for each individual plant. Safety and environmental concerns are addressed on a regular basis by specially trained environmental supervisors and outside consultants. Regular safety meetings are held on site for all employees as well as OSHA CFR 1910.120 Haz-Mat training is conducted for all employees, these being 24 Hr. certified training and 8 Hr. refresher course.

The RRI training program is designed to ensure that personnel are able to operate the plant safely and efficiently and to respond effectively to emergencies. Employees are educated in the nature of materials being handled, the regulatory requirements for normal facility operations, and proper procedures to follow in emergency situations. Personnel training provides instruction in all elements of preparedness and prevention, contingency plan and emergency procedures, inspection requirements, and standard operation and emergency equipment use.

In addition to introductory training, operators receive on the job refresher training that includes a review of the introductory material, instruction in changes in operational procedures, the use, repair, and inspection of new facility equipment, and additions to or changes in environmental regulations.

COLLECTION AND TRANSPORTATION:

Batteries that arrive at the RRI facility come to RRI from all over the United States, Canada and Overseas at this time. The bulk of these batteries arrive via trucks in either Totes, Gaylords or D.O.T. approved 55 gal. drums containing the batteries. In the past, leased trucks and drivers made the pick-up and delivery of batteries to the RRI facility. However, RRI's own drivers and trucks make the rounds to the various clients picking up batteries and delivering them to the Pecos, Texas facility. RRI's trucking company is called Recovery & Reclamation Trucking, Inc.(RRT). RRT has an EPA Haz-Waste Transportation Permit and an ICC Contract Waste Carriers permit (excl. Radioactive and Explosive). Batteries do still arrive at the facility by other contract carriers for clients and their agents.

The schedule for the various pick-up points varies on an as needed basis.

RECLAMATION PROCESS:

The majority of the processes used to reclaim the various battery types that arrive at the RRI facility are proprietary. Batteries that contain liquid electrolyte are drained and the electrolyte is used within the facility for additional battery type processes or is neutralized.

The various metals and plastic components are separated by mechanical or manual procedures. After separation, the components are recycled and/or used in preparation of different battery types or sold to various metal and plastic scrap dealers.

Each battery type that is handled in the facility is processed in its own plant. (ie. Lithium in the Lithium plant, Alkaline in the Alkaline plant.) There is no cross processing of battery types or components.

INSPECTIONS:

RRI maintains an open door facility regarding inspections. In fact, it is a prerequisite that a representative for a new client visit the facility prior to RRI's acceptance of that clients batteries.

RRI's facility has been inspected by many Federal and State authorities as well as Environmental Firms across the U.S.. Many of the major battery manufactures and their technical representatives have also been to Pecos, Texas to inspect our facility. You have an open invitation to visit anytime.

TYPES OF BATTERIES COLLECTED AND RECYCLED:

Currently, RRI collects, reclaims, and recycles Alkaline, Lithium, Nickel-Cadmium, Nickel-Iron, and Zinc-Carbon. RRI can transport and ship to third parties Lead-Acid, Mercuric Oxide and Silver Oxide batteries. A Lead-Acid facility is in the planning stages and will be constructed sometime in late 1993 or early 1994.

CONCERNING STATE AND FEDERAL PERMITS:

The current EPA I.D. number (Part "B" Permit) for Recovery and Reclamation, Inc. is TXD 988 077 640. The current State of Texas I.D. Number Recovery & Reclamation, Inc.s, Solid Waste facility is # 52085. Should you have any questions regarding Recovery and Reclamation, Inc., you can call the District office of the TWC in Odessa, Texas and speak to an Inspector. Their office number is 915-362-6997. In addition, the facility has received a EPA NPDES General Permit # TXR00B476.

The DOT and Hazardous Waste code numbers for batteries handled at Recovery and Reclamation, Inc. facility include:
D-002, D-003, D-004, D-005, D-006, D-007, D-008, D009, D-010, D-011.

"BATTERY-PAK SYSTEM":

Recently, Recovery and Reclamation, Inc. has started a new program called the "BATTERY-PAK SYSTEM". This is a program that is designed to offer companies with large or small amounts of household batteries a method of collection, storage, transportation and recycling through one source.

The "heart" of the program is a color coded, D.O.T. approved container that simplifies the over all process of battery management. By maintaining specific battery streams in specific colored shipping containers, Recovery and Reclamation, Inc. is able to quickly process the containers of batteries to the appropriate plant, in a safe and permitted facility.

And you no longer have to store truck loads of batteries to gain transportation cost savings. Because the storage container is the shipping container as well. Additionally, you are provided with all necessary labels, instructions and prepaid shipping container designed for the individual battery type at your plant or facility. Also, recycling costs are included the cost of each container sent.
Once the container is filled, all that needs to be done by your staff, is to call RRI and the container will be picked up by the shipper. Its that simple.

U.S. Fluorescent Light Recycling Activities

Dana Duxbury
Waste Watch Center

During the past year there has been a great deal of activity relating to fluorescent light recycling within the U.S. Environmental Protection Agency (EPA), certain states, manufacturers, and recyclers. Studies, passage of laws, proposed position papers, building of new recycling facilities, and proposed regulations all occurred.

National Level

At the national level, a variety of activities are under way at EPA - they tested fluorescent lights according to the newer Toxicity Characteristic Leaching Procedure (TCLP) and found that over 50 percent of the bulbs tested as a hazardous waste. Because of this, these bulbs would have to be managed as a hazardous waste. In order to prevent the Agency's Green Lights program (a program designed to reduce our energy usage by conserving energy through converting to energy efficient fluorescent lights) from meeting resistance because of the cost of managing these bulbs as a hazardous waste and the regulatory demands which would follow from this decision, EPA developed and sent to the Office of Management and Budget (OMB) a Universal Waste Rule which would allow fluorescent light bulbs to be transported and managed as a recyclable waste not a hazardous waste. At this time, this proposal is still in OMB. This recommendation is a similar type of scheme that has been developed to encourage reclying of car batteries, another waste which would test under TCLP as a hazardous waste.

The manufacturers trade association, the National Electrical Manufacturers Association, developed a position paper which advocated that these bulbs not be put into a solid waste incinerator, but that EPA undertake studies to determine if they can be put into a solid waste landfill.

State Level Activity

Minnesota has been most active in this issue producing a policy statement that forbid fluorescent light bulbs from being put into the solid waste steam stating that they could instead be stored, managed as a hazardous waste or recycled. They just completed a draft study on fluorescent lights, will finalize the study and possibly propose new legislation.

Two new recycling facilities opened during 1992 in Minnesota with a third one about to open. In Allentown, Pennsylvania another new recycling facility opened with at least four other new ones proposed to open in 1993. These join the three already open in California.

Each of the states is requiring different permitting procedures for these facilities. In Pennsylvania the state issued a recycling permit, in California they have issued hazardous waste R & D permits and in Minnesota there is no state permit requirement only a license from the County.

Recycler Survey

During the fall, the Waste Watch Center (WWC) developed a questionnaire to identify how the existing seven fluorescent light recyclers differed or were similar. Attached to this speech is a listing of the firms to whom the questionnaire was sent. Six of the seven firms which received the questionnaire replied and their answers will be summarized below. They were Advanced Environmental Recycling Corp (AERC), Lighting Resources (LC), Mercury Technologies Corp. (MTC), MTC of Minnesota MTCMN), Mercury Recovery Systems (MRS), and Recyclytes (R).

1) **Briefly describe your company.**

From 7,000 to 32,000 sq ft (AERC) were being utilized for the recycling of the bulbs with from 3-15 employees.

2) **When did you enter the business?**

Two of the California companies ((MTC) and (MRS) began operations in 1986 and the third California company (LR) opened in 1990. All the others opened in 1992.

3) **Are you an equipment manufacturer or both?**

AERC, LR, MTC, and R identified themselves as both.

4) **Briefly describe you recycling process.**

AERC crushes the lamps, separates the glass and metal, separates the mercury from the phosphor powder and then recovers the mercury through triple distillation.
LR sucks out the phosphor powders and the mercury before the lamps are crushed.
MTC and MTCMN use a similar process as AERC and they both send their mercury to AERC for triple distillation.
MRS uses a similar method as AERC and send their phosphor powders for distillation.
R crushes the lamps first as do all but one of the firms above and sends the mercury to a distiller.

5) **What local, state and federal permits did your facility require?**

AERC was required to get a Pennsylvania recycling permit issued under the authority of Title 25, Section 261.
LR, MTC and MRS all had to get a state of California R&D variance for treatment.

MTCMN and R were not required to get a state permit but were required to get a license from the county.

6) **What wastes in what volume can you handle annually and if currently in operation, how much are you processing?**

AERC has 2 machines with the capacity of processing 10-12,000 lamps per day.
LR can process several hundred thousand per month and when they have their four facilities open they project they will be able to process 63 million per year.
MTC is permitted to process 5 million per year with 12-15,000 per shift.
MTCMN has no permit limit, but must process them within 24 hours.
MRS can process 21,600,000 feet of lamps annually
R can process 1,000,000 lamps per month when they become operational at their full capacity and are processing 120,000 lamps per month now.

7) **What are the products and by-products?**

AERC stated they were recycling the endcaps (metal), glass triple distilled mercury and the phosphor powder with plant scrap as a by-product.
LR stated that they are recycling the glass, mercury, aluminum tungsten and cardboard.
MTC stated the same as AERC plus cardboard.
MTCMN the same as above.
MRS stated that they are recycling glass, metal tips, cardboard and mercury.
R stated it was recycling glass, metal, mercury and mercury free powder.

8) **Do you produce marketable recycled products from fluorescent tubes, what are the value and end markets of the end products?**

AERC stated that the powder has re-use applications.
LR stated that they are selling the glass for $45/ton, the aluminum for $.26/lb and the cardboard for $35/ton.
MTC and MTCMN stated that they were both looking at what to do with the phosphor powders.
MRS stated the are getting $50/ton for glass, $35/ton for cardboard and $.03/lb for mercury.
R stated that they are getting $.05-.10/lb for glass, $.10/lb for metal and $2/lb for mercury.

9) **Do any by-products require disposal and what are the costs and requirements?**

AERC stated that their plant scraps are incinerated at a permitted facility.
LR stated that their phosphor powders are manifested and sent to a Class 1 landfill at $100/drum because they contain cadmium.
MTC and MTCMN landfill plant scrap.

R said that their is a market for mercury and that the other things can be landfilled.

10) **Do you recover mercury? What percent? and how pure?**

All of the plants said they recover mercury. They all stated that over 99 per cent was recovered and that it was 98 percent or higher in purity.

11) **How much residual mercury remains in the glass? metal and powder?**

Answers ranged from non-detectable to ≤ .2 mg/l or ≤ 20 mg/kg in the glass. In the metal and powder, LR stated that there were no detectable levels, MTC MTCMN stated that the level was ≤20 mg/kg, R stated that there were 3.5 lb/640 lb of powder (≤1 per cent).

12) **Are there residual levels in other mercury bearing products that you are recycling?**

This question was not applicable since none of the firms are recycling other mercury bearing products at this time.

13) **Are there mercury bearing emissions from your process?**

All of the companies stated that there are emissions but they are "carbon filtered", below any regulated level of time weighted averages taken every two hours", "negligible below OSHA REd 0. 05 mg", "less that 0.01 per cent from the near-by power plant, and are at "non-detectable levels".

14) **Are there other emissions?**

All answered no.

15) **How well proven is your recycling system?**

AERC, MTC and MTCMN answered that their had been four years of development work.

LR said their system was highly tested and MRS stated that they are in their second year of testing.

16) **What is the total cost of your system?**

None of the firms provided this information.

17) **What storage procedures do you recommend?**

All recommended packing them in the cardboard boxes that the new ones come in.

FLUORESCENT LIGHT RECYCLERS IN OPERATION -1992-

Advanced Environmental Recycling Corp.
2591 Mitchell Avenue
Allentown, PA 18103
Robert M. Blanchfield
V.P. Corporate Development
800-554-2372 P
215-797-7696 F

Lighting Resources, Inc.
386 S. Gordon Street
Pomona, CA 91766
John M. Chilcott
President
800-572-9253 P
714-623-1338 F

Mercury Recovery Services
2021 S. Myrtle
Monrovia, CA 91016
Bob Roberts
President
818-303-2053
818-358-2703

Mercury Technologies Corporation
30677 Huntwood Avenue
Hayward, CA 94544-7021
Paul Abernathy
Executive Vice President
707-745-5173 P
707-745-2332 F

Mercury Technologies of MN, Inc.
Pine City Industrial Park P.O. Box 13
Pine City, MN 55063-0013
Raymond Hite
President
612-629-7888 P
612-629-7799 F

RecycleLights
2010 East Hennepin Avenue
Minneapolis, MN 55413-2799
Keith Thorndyke
612-378-9568 P
612-378-1179 F

Resource Recycling
7253 Washington Ave., South
Edina, MN 55358
Paul Mehl
Operations Manager
701-234-9102
701-280-1690

Fluorescent Lamps: Lamp Maker Initiatives
National Electrical Manufacturers Association

Beverly Grimm, GE Lighting

Net Environmental Impact Of Efficient Lamps Is Positive

- "Discharge" Lamps containing Mercury have Highest Energy Efficiency (Light Output/Watt)
- Fuels used to Produce Electricity Contain Mercury
  - Coal, Oil, Gas
- Various Authors' Estimates put NET Hg Releases from use of Incandescent Lamps at 3X - 4X the NET Releases from use of Fluorescent Lamps
  - Major Release due to Energy Use - not Manufacture/Disposal
- Other Pollutants are avoided by Saving Energy (Source: U.S. EPA)
  1 KWH = 726g Carbon Dioxide
  5.3g Sulfur Dioxide
  2.8g NOX

Source Reduction Programs

- Manufacturers Independently Committed to Reducing Mercury Content of Lamps

	Average Mercury/ 4 ft., 1 1/2" Diameter Lamp (U.S. Mfrs.)
1985	48.2 mg
1990	41.6 mg
1995 Projection	27.0 mg

Industry Goals For Lamp Management Policy

- Environmentally Responsible Management of Spent Lamps
- Reduce Mercury Content to Lowest Feasible Level
  - Phased Source Reduction Plan
- Infrastructure in Place before any Disposal Mandates Become Effective
- National System - Limited State Variations
- Lamps not Classified Hazardous Waste when Properly Managed

Mercury Use In Fluorescent And HID Lamps

- Mercury an Essential Component of Lamp Operation
  - "Mercury Free" Lamps not Technically Feasible at this time
  - Mercury Levels affect Lamp Life
- Mercury used in Lamps Represents a Small Part of Total Mercury Potentially entering Environment

- Global Releases from Natural Sources	7,000 T/YR
- Global Releases from Coal, Oil and Gas Combustion	3,000 T/YR
- Global Releases from other Manmade Sources	3,000 T/YR
- Use in U.S. Lamp Production	~ 30 T/YR

- Lamps account for at Most 0.2% of Total Mercury Releases

Industry Concerns: Lamp Reclamation Technology

- Full Recovery of Hg from Lamps being done to Limited Extent Today
  - Net Result is Volume Reduction, but most Hg still Disposed or Stock Piled; not Reused
  - Users should Carefully Evaluate Reclamation Technologies
- Occupational Exposure must be Controlled
- Recovered Glass and Metal still contain Hg
  - Safety of these Materials in Reuse Applications has not been Studied
- No Comprehensive Review of Comparative Environmental, Health, Safety Impact of Various Disposal Methods

Insufficient Data to Determine Which is the Environmentally Best Disposal Method

Disposal In MODERN, QUALITY Landfills Appears To Be A Responsible SHORT TERM Management Option

- Available Leachate/Gas Condensate Data suggest Hg not an Issue in Landfills (Source: BFI, Waste Management Inc.)
  - Hg Levels in Leachate Below Maximum Contaminant Level for Drinking Water
  - Gas Condensate Levels Below Detection Limit
- Quality Landfills with Liners and Leachate Collection/Monitoring are Available in Most Areas of the U.S.
  - Source Separation Could be Avoided in most Locations

Fluorescent Lamp Waste Management Proposed Legislation

- No Incineration
  - Incinerators Widely Cited as Source of Hg Pollution
  - Effective Control Technologies exist but not Widely Applied
- Source Reduction Standards
  - Phased Reductions
- Product Labeling
- EPA Study of Lamp Waste Management Alternatives
- Interim Requirements: Quality Landfill or Recycle
- Define State Authority

- Suggested Regulatory Actions Are Exactly Parallel
- Goal is For Federal Program to Coordinate State Actions

Progress On Policy Implementation

- Secured Sponsorship for RCRA Amendment - Working to Gain Support in U.S. Congress - will be Active in 1993 Session
- Presented Regulatory Proposal to EPA to Favorable Response...Following up with Futher Meetings
  - EPA continues to Affirm Conceptual Agreement
  - EPA has Agreed to Take Leadership Role in States
- Implementing State Strategies Consistent with Federal Legislative/Regulatory Approach
  - Supported CA Study Bill
  - Worked with Florida Legislators to Mirror Federal Proposal
  - Supporting Minnesota Study Team
  - Working with Minnesota PCA

Fluorescent Lamps: New Developments in Europe

Christer Sundberg — MRT System, AB

Classification concerning Fluorescent tubes in Europe

* Recommendations to legislate collection and treatment of fluorescent tubes was announced in Europe 1990.
* A number of countries within EC and EFTA had already stared collection or have up till now adopted to that recommendations.

Such countries are:
- The Nordic Countries (SE, DK, FI, NO)
- Germany
- The Netherlands
- Switzerland
- Austria

New directives are introduced in Belgium, Luxembourg and France.

A part from the above countries, some laws are valid in different regions or cities for collection of tubes.
E.g. Italy. The northern provinces have city laws that classifies fluorescent tubes as dangerous city waste and oblige the selective collection. for instance Milan region law 37 from 1988.

Furthermore, most of the fluorescent tube manufacturers are processing the scrap material from their production as such treatment in general is required by the authorities.

Future directives within the European Communities (EC)

* A proposal for a Council Directive on landfill of waste was submitted by the Commission on April 23th. 1991, code No. 91/C 190/01.
* The proposed Directives has been presented January 13th. 1992, to the European Parliament.
* Now each Country Parliament are making preparations for an approval.
* A second hearing will then take place in the European Parliament in the beginning of 1993 and thereafter a final approval to the Directives will take place.

The time frame for each country to adopt to the Council Directives is five years. It is estimated by the technical commissioners and the members of the European Parliament
that the directives will be implemented in most of the EC countries within two years.

The proposed Council Directives states the following criteria for landfilling

* The Hg limit for Municipal waste (Household waste to ordinary landfill) is 2 g / ton.
(Scrapped and crushed fluorescent tubes reaches approx. 150 - 200 g / ton).
* The Hg limit for Industrial waste (Special deponi) is 100 g / ton.
Secondly the leachate limit (acc. to German DIN 38414/S4 from Oct. 1984) is 0.02 mg / litre - 0.1 mg / litre.
Within this limit the waste is considered as Hazardous Waste and must go to Special landfill.
Above the 0.1 mg / litre limit, the waste must be treated.

This means that fluorescent tubes obviously must be treated as the above limits are exceeded.

As landfilling of Hg contaminated waste is limited to two (2) ppm for Municipal waste, the treated glass and metals from fluorescent tubes can be a subject of Special landfill if "less sophisticated and unqualified system and technologies" are used. This could involve high deposal costs, if such end products are not recyclable or exceed the limit. In this connection it is most likely so that higher demands also will occur in the future on the recyclable material. E.g. limits of foreign material in the glass fraction, etc.

Concerning the Mercurial fluorescent powder different legislations are valid

In general, untreated powder cannot be landfilled anywhere at any site.

Some countries allow temporary storage like e.g. the Netherlands where AVR in Rotterdam have an unlimited temporary storage permit.

Some bundesländer in Germany also allow temporary storage in Salt mines.

As such storage, without any doubt is risky and dangerous an independent European institute are at the moment evaluating different technologies, both concerning fluorescent tube recycling in general and how to deal with the mercurial powder.

Most likely, well proven distillation technology will be required.

Another qualified guess is that systems that creates a mercury sludge from their process must find a solution to this problem.

Present situation in some European countries

* Legislation or recommendation
* Percentage and number of treated tubes
* Technology available

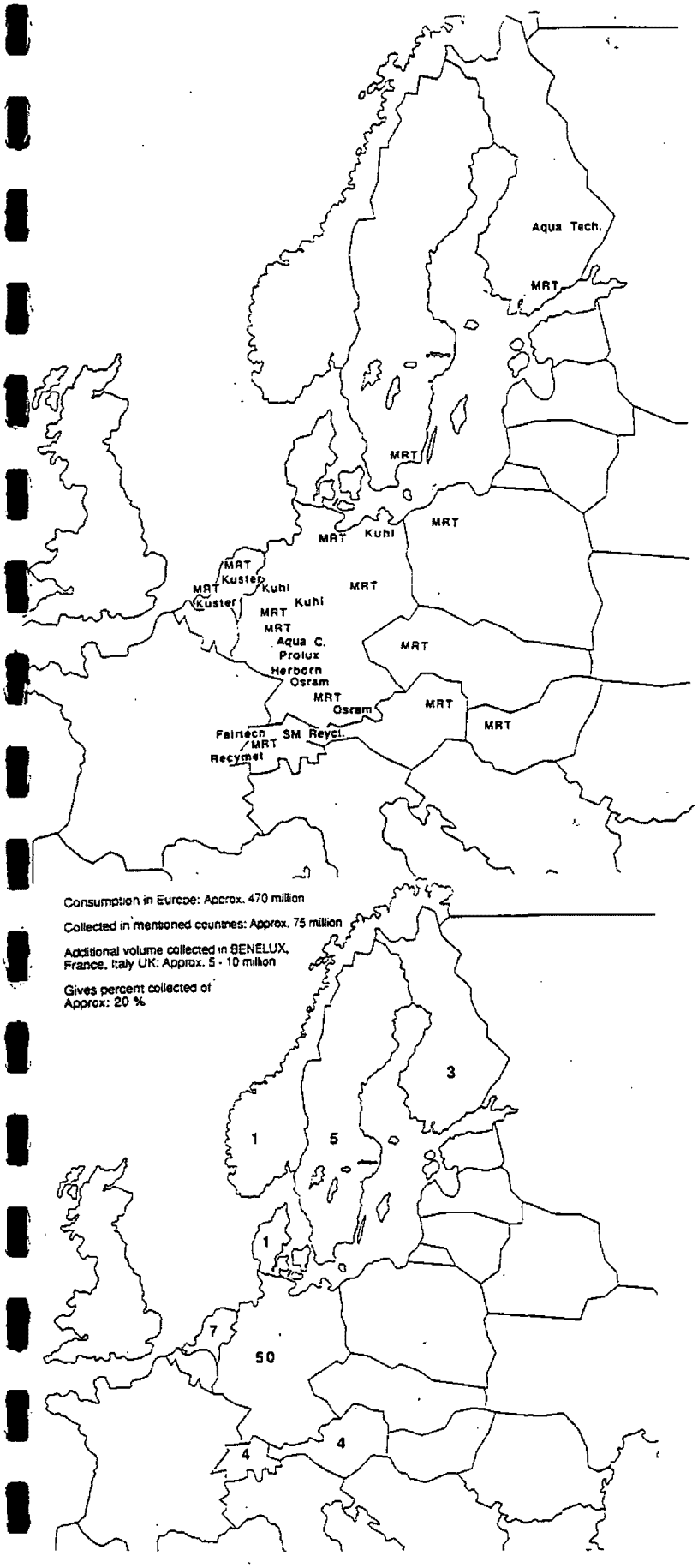
E.g.
- Nordic Countries (SE, DK, FI, NO)
- Germany
- Austria
- The Netherlands
- Belgium, Luxembourg, France
- Switzerland
- Eastern Europe

The Nordic Countries

Sweden: Collection and recycling recommended. Approx. 5 million tubes or 40 % are treated in a MRT Crush and Sieve Plant plus distillers.

Denmark: Collection and recycling legislated from Jan. 1st. 1993 Tubes from the Municipality of Copenhagen are pre-crushed and shipped to the MRT Plant in Sweden. Approx. 20 % of the consumed tubes are processed.

Finland: Collection legislated. 10 % of the consumed tubes are shipped to MRT, Sweden. Another 10 % are treated in a MRT installation in Finland. Aquatechnic processes another 10 %.



So approx. 30 % in total are processed of the Finnish tubes.

Norway: Collection recommended.
Approx 5 - 10 % of the consumed tubes are collected and shipped to MRT, Sweden.

Lamp manufacturers

Manufacturers in Sweden and Finland are using MRT technology for processing the scrap material from their production.

General market information about the Nordic Countries

Approx. 35 - 40 million tubes are consumed annually in the Nordic Countries. Of those, roughly 25 - 30 % are collected and treated. A big growth is expected volumewise during 1993 - 1994 and will probably reach 50 %. This is due to that a new marketing concept is introduced and legislations will be adopted.

Germany

Approx. 90 collectors acc. to ZVEI (Zentralverbank Electronicindustri) of which approx. 13 also have recycling facilities.

Legislation: Collection and storage in general.
Treatment and Recycling legislated in several bundesländer.

Technology used	No. of plants (estimate)	
MRT	5	End cut technology, crushers and distillers. Glass and metal recycling.
Kuhl	3	Crushing and metal recycling.
Prolux	1	End cut technology, glass recycling.
Herborn	1	Crushing. No recycling.
Aqua	1	Crushing and washing of mixed glass and metals from powder. Limited recycling possibilities.
Osram	2	End cut technology. Glass recycling.

Approx. 50 million consumed tubes are collected which is approx. 40 % of the total volume. A rough estimation is that 35 - 40 million of those tubes are treated at present.

Manufacturers are using recycling technology.

E.g. Osram use their own End cut technology in order to recycle glass.

Sylvania use MRT distillers for internal scrap material from production.

General market information about Germany

Biggest growth in Europe. Many contracts signed or under negotiation for installation during 1993 - 1994.

Germany environmental authorities, require waste owners or producers to take care of the waste generated from their products by using a green label.

Marketing concept introduced by one Lamp manufacturer to take back the old tube when selling a new lamp.

The Netherlands

40 - 50 % of all consumed fluorescent tubes are collected and treated (approx. 7 million our of 15 million).

Legislation: Fluorescent tubes classified as chemical/toxic waste. Collection required.

Technology used.

Kusters: The major volume is collected under the logistic control of LumenEx/PNEM. The company uses a Kuster crush and sieve installation which partly is designed and based upon the patented MRT sieving technology. Kusters is a licensee of the MRT technique for that installation.

MRT: Ecotechniek uses MRT end cut technology.

Lamp manufacturers

The manufacturer Philips uses both a Kuster installation and the MRT end cut and distiller technology for processing the scrap material from the production.

General market information about the Netherlands

Although, enough treatment capacity exists for processing and separation of glass, metal and powder from all consumed tubes, negotiations are to be continued with several companies for MRT installations. One reason is that LumenEx only accept 10 000 tubes as the minimum volume to be collected. Secondly, no distillers are installed yet for treatment of the fluorescent powder. This is yet stored in AVR in Rotterdam under a temporary permit.

Switzerland

Approx. 40 % of the annual consumed volume of fluorescent tubes are collected (4 million out of 10 million).

Legislation:
- TVA (Technische Verordnung uber Abfälle)
- VVS (Verordnung uber den Verkehr mit Sonderabfällen). VVS stipulated that fluorescent tubes are to be considered as hazardous waste when exceeding 12 pieces.

Hardest regulations in Europe:
Limit for Hg content in residue for landfilling: 0.01 mg / l (leachate).

Technology used:

- MRT (used by Sovag): End cut technology, crusher. Std distiller, Superior distiller. Recycling of all material glass, metals, phosphor and mercury.

- Fairtec AG: Crushing, washing. The glass and metal volume goes partly to end users and partly to Sondermulldeponi. Mercury sludge created which must be further treated.

- Recymet: Crushing and sieving. Glass and metal cleaned in dilute fluoroboric acid and shipped to end users or special landfill. Mercurial powder stored, but is said to be cleaned by chemical and electrochemical processes in the future. Mercury should then be removed from fluoroboric acid by reaction with zinc or aluminium pellets and thereafter distilled to remove mercury.

- SM Recycling: Crushing and thereafter heating of all material in a thermal process. Mercury trapped in silver impregnated carbon filters. Thereafter the material is separated into glass, metal and powder. Glass and metals to end users. Mercury filters and powder stored or exported due to the mercury content.

General market information about Switzerland

The total recycling capacity is several times bigger than the need for processing the annual consumed volume.

The four companies use the same end user of the glass (Isover) which use it for glass fibre insulation. Metals delivered to different scrap dealers.

All the companies, except Sovag using the MRT technology, have problems with the mercurial materials after the process. Recymet have partly been stopped this autumn for redesign work and modifications on the electrochemical process, etc. SM Recycling will probably make an agreement with Sovag to process the filters in MRT distillers.

Sovag have had an increase in volume of waste the last year due to that they have the complete technology for recovery of the mercury.

The volume increase concerning collection of tubes in Switzerland has not developed as expected due to that less than 12 pcs are not considered as hazardous. However, this limit is under review.

Austria

The major portion of the 8 million consumed tubes per annum are today collected.

Legislation: Classified as special waste and collection required. Similar waste laws as Switzerland. More strict emission limits.

Technology used:

- MRT: Crush and sieve system and distillers. Recycling of glass, metal and mercury.
- Others: Minor collection of tubes is done in western Austria and shipped to south Germany.

General market information about Austria

The major volume of tubes will in the future be treated by the MRT plant located in Vienna.

Belgium, Luxembourg and France

In those three countries collection has started, but still it is of course a minor volume of all consumed tubes.

Legislation and technology:

- In Belgium, fluorescent tubes are classified as toxic waste and at least one bigger system will be installed using a crush and sieve system and MRT distillers.
- In Luxembourg, fluorescent tubes are classified as chemical waste. As the collection volume is limited a smaller installation will take place next year.
- In France, two new directives will become valid soon concerning collection points and industrial waste. In the so called white book, is also stated that a percentage of waste generated must be recycled. Fluorescent tubes and other mercurial products are of great concern. Plants of different brands will be introduced and installed soon.

General market information

Those countries will soon, or have already, adopted to the EC-directives. However, collection and treatment facilities are not yet so established as e.g. in Germany, The Netherlands, Switzerland, etc.

Eastern Europe

MRT System AB has a strong market position in those countries and have sold systems to the main lamp manufacturers like:

- Philips in Poland
- Tungsram / GE in Hungary
- Tesla in Czechoslovakia

Different technologies are used like MRT crushers, crush and sieves, end cut technology and distillers.

Lamp manufacturers are required to process their scrap material from the production.

Soon, collection of consumed tubes will start in some of those countries and further equipment will be installed during 1993 - 1994. The legislation will most likely follow the EC directives.

Collection Case Studies - Programs in Florida

by Jan Kleman
Hazardous Waste Management Section
Florida Department of Environmental Regulation

Florida has taken on the challenge of household hazardous waste (HHW) and conditionally exempt small quantity generator (CESQG) waste management with great success. 42 of our 67 counties have either constructed or are planning construction of permanent HHW collection centers. Approximately 10 additional counties plan to hold mobile collections during the coming year. With all of these programs in place, it is anticipated that in 1993, 78% of Florida's counties will be providing free collections to households and cost effective collection opportunities for CESQGs.

I'll be showing you slides of our permanent facilities and describing the different methods of operation for Florida's local HHW collection centers, but first, I want to tell you how we got where we are today. There are three factors - need, legislation and funding, that have each played an important role in assuring the establishment of Florida's network of local HHW collection centers. First, we've had the need. Florida is an environmentally sensitive peninsula, extremely vulnerable to groundwater pollution. Mismanagement of hazardous waste, even from households, poses a real threat to our drinking water. Second, we've had legislation to establish programs for managing household, CESQG and SQG wastes. Our 1983 Water Quality Assurance Act gave Florida comprehensive groundwater protection programs. One program, Amnesty Days, provided a free mobile hazardous waste collection to each county, twice, and helped gain public acceptance for permanent local HHW collection centers. And third, our Water Quality Assurance Trust Fund provides the funding for Florida's groundwater protection programs including construction of permanent collection centers. This Fund is replenished by an excise tax on products determined to be potential groundwater pollutants (petroleum products, pesticides, ammonia, chlorine, solvents and car batteries).

1985 legislation established Florida's Hazardous Waste Collection Center Grant Program and our first permanent centers were completed in 1987. The grant provides up to $100,000 per county for costs associated with construction of one or more

safe, secure HHW collection centers. Any remaining money may be used for collection center operation. Participating counties are required to operate their centers for 2 years after construction, offering a minimum of 2 advertised collections per year that are free to households and available to CESQGs for a reduced fee. The counties must contract with licensed, insured, qualified hazardous waste management companies, responsible for assuring the proper and most appropriate management of the waste. And finally, the county is responsible for working with its contractor to establish expanded "milk-run" pick up services to SQGs.

Permanent collection centers in Florida are generally located at landfills and consist of pre-fab steel buildings that are specifically designed for hazardous waste storage. The buildings have 2 or 3 bays, each capable of holding 15 55-gallon drums, and can have optional shelving. They are complete turnkey structures with spill containment reservoirs and sump pumps along with necessary and optional safety features such as an emergency shower and eyewash.

Pre-fab sheds are used for storage of equipment and trailers are used for office space. Some type of roofing is encouraged. It may be a canopy, permanent tent or pole barn. There are designated areas for storing lead acid batteries and work areas for bulking different waste streams such as used motor oil, antifreeze, flammable sludges and pourable flammables. At some collection centers, freon and motor case oil are extracted from white goods, aerosols are managed by capturing the propellant and draining the contents of the cans, and certain wastes are rendered non-hazardous. For example, one project manager can neutralize pool chlorine at a treatment cost of 50 cents per bag. She also destroys certain organophosphate pesticides such as malathion, parathion and dog dips such as dermiton and paramite, by hydrolizing them with soda ash.

About 25% of our local programs are run by project managers with chemistry degrees and past work experience as field chemists with hazardous waste management companies. There is a trend among these experts to hold collection events without their contracted hazardous waste management companies on site. Instead, other county project managers and folks with chemical management backgrounds such as chemistry teachers, are hired to help out on the collection day, segregating wastes for temporary storage in the appropriate bays of the collection center storage building. The project manager then takes several days or weeks after a big collection event to sort and consolidate wastes, bulking certain waste streams for management by subcontractors. Project managers for 4 of our counties have been given special permission by their contractors to lab pack. Once a project manager has done all that he or she can, the main contractor is

called in to identify any unknowns, lab pack if necessary and transport remaining wastes to permitted storage areas to await further management.

Our local collection center plan of operation is varied, ranging from some sites being open daily to by-appointment-only collections. 20 of Florida's counties meet the Duxbury definition of a "permanent" collection center by being open 1 or more days per month. Some counties only accept household and CESQG waste during big advertised collection events held once or twice a year, either at the collection center or at a mobile site. During 1992, there have been 79 such events consisting of 115 collection days. I have handouts available on plans of operation for Florida's sites, a summary of collection activity in Florida for this year and a project manager's contact list.

Although some counties hold mobile events, most collections are held at the permanent centers. Therefore, we encourage 2-lane driveways leading to and from a collection center and adequate space for the contractor to bring in trucks and equipment. The traffic flow works best if it moves in one direction along a U-shaped or circular driveway. As a participant waits for off-loading in front of the collection center, he is greeted by county staff and asked to answer a few questions on a participation sheet. After the contractor has taken possession of the hazardous wastes that it will be managing, the participant continues along the driveway to other off-loading points. Latex paint, lead-acid batteries, used motor oil and recyclable wastes will be taken from the participant by county staff at different drop-off points.

Opportunities for continued education and networking for Florida's project managers and collection center staff are important. Therefore, an annual spring meeting is held where all participants are encouraged to exchange ideas and war stories. This past May's meeting included a 1-day site safety class and a day of presentations by project managers on their individual success stories and innovative specialty waste management programs such as curbside household battery collections, local bio-hazardous management, SQG educational programs, public awareness programs and cost-saving strategies. Copies of the agenda for that meeting are available. This spring's meeting will be held at the Jacksonville facility and the focus will be on hands-on management of HHW including identification, sorting and bulking compatible wastes.

The Grant Program was expanded 3 years ago to help our smaller counties who cannot afford to support and fund a full-time collection center. The Cooperative Collection Center Arrangement Grant is now available for the smaller county to hold a collection for which the State will pay for 75% of the cost.

The smaller county pairs off with a larger county experienced with HHW management. The larger county receives funding for assisting the smaller county in holding its collection. I have the legislation on both grant opportunities available to you.

In summary, Florida has a well-established HHW and CESQG collection and management infrastructure. By the end of 1993, it is anticipated that 78% of Florida's counties will be holding some type of collection opportunity for their residents. It is a pleasure to share Florida's success story with you.

Jan Kleman
Environmental Specialist
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ATTACHMENT

1992 Summary

HHW Collection Activity in Florida

COLLECTION ACTIVITY AT LOCALLY-SPONSORED PERMANENT HHW COLLECTION CENTERS FUNDED FROM THE HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER GRANT - 42 COUNTIES

Alachua County - Collection Center is open daily, by appointment only. In addition, an average of 2 major collection events per year.

Brevard County - Collection Center is open 1 day per week. In addition, an average of 2 highly advertised collection events per year.

Broward County - Average of 2 highly advertised collection events per year.

Charlotte County - Collection Center is open 6 days per week. In addition, an average of 12 major collection events per year.

Citrus County - Average of 2 major collection events per year.

Clay County - Average of 2 major collection events per year.

Collier County - Collection Center is open 1 day per week. In addition, an average of 2 major collection events per year.

Dade County - Average of 2 major collectin events per year.

DeSoto County - Average of 2 major collection events per year.

Duval County - Collection Center is open 2 days per month, by appointment only. In addition, 2 major collection events per year.

Escambia County - Ceased collection activity after contractual committments for funding were met.

Hamilton County - Average of 2 major collection events per year.

Hardee County - Average of 2 major collection events per year.

Hendry County - Average of 2 major collection events per year.

Hernando County - Average of 2 major collection events per year.

Highlands County - Average of 2 major collection events per year.

St. Johns County - An average of 2 major collection events per year.

St. Lucie County - Collection Center is open 6 days per week. In addition, an average of 2 major collection events per year.

Sarasota County - Both Collection Centers are open 1 day per week. In addition, an average of 4 major collection events per year.

Seminole County - Both Collection Centers are open daily. In addition, an average of 1 major collection event per year.

Suwannee County - Site construction is delayed until January, 1993, pending permitting of a new landfill site.

Volusia County - Collection Center is open daily. In addition, an average of 2 major collection events per year.

County Sposored Collection Events in Florida

79 HIGHLY ADVERTISED MOBILE EVENTS -- 115 COLLECTION DAYS

Date	Location (County)	No. Days
1/92	Charlotte	1
1/92	Hillsborough	1
2/92	Charlotte	1
2/92	Highlands	1
2/92	Hillsborough	1
2/92	Pasco	1
2/92	Sarasota	2
3/92	Charlotte	1
3/92	Hillsborough	1
4/92	Alachua	5
4/92	Brevard	3
4/92	Charlotte	1
4/92	Clay	1
4/92	Dade	2
4/92	Desoto	1
4/92	Duval	1
4/92	Hamilton	1
4/92	Hillsborough	1
4/92	Orange	2
4/92	Sarasota	1
4/92	Seminole	1
5/92	Broward	2
5/92	Charlotte	1
5/92	Hillsborough	1
5/92	Leon	2
5/92	Marion	1
5/92	Putnam	2
5/92	St. Lucie	1
5/92	Volusia	4
6/92	Charlotte	1
6/92	Citrus	1
6/92	Collier	2
6/92	Hillsborough	1
6/92	Lee	2
7/92	Charlotte	1
7/92	Hillsborough	1
8/92	Charlotte	1
8/92	Indian River	2
8/92	Hillsborough	1
9/92	Charlotte	1
9/92	Levy - Co-op	1
9/92	Polk	2
9/92	Orange	2
9/92	Hillsborough	1
9/92	Lee	2
9/92	Alachua	3
9/92	Lake	2
9/92	Monroe	2
9/92	Clay	1

Date	Location(County)	No. Days
10/92	Glades - Co-op	1
10/92	Brevard	3
10/92	Duval	1
10/92	Hillsborough	1
10/92	Okeechobee - Co-op	1
10/92	Volusia	4
10/92	Flagler - Co-op	1
10/92	Charlotte	1
10/92	Leon	1
10/92	Okaloosa	2
11/92	Sarasota	2
11/92	Charlotte	1
11/92	Dade	2
11/92	Hendry	2
11/92	Duval	1
11/92	DeSoto	1
11/92	Highlands	1
11/92	Putnam	1
11/92	Lee	1
11/92	Manatee	2
11/92	Hillsborough	1
11/92	Marion	1
11/92	Hamilton	1
11/92	Madison	1
12/92	St. Lucie	1
12/92	Citrus	1
12/92	St. Johns	1
12/92	Lee	2
12/92	Charlotte	1
12/92	Hillsborough	1

1991 Summary of Locally-Sponsored HHW Collection Events in Florida: 67 counties; 79 collection events; 115 collection days.

October 1992

FLORIDA RESIDENTS CALL YOUR COUNTY FOR HOUSEHOLD HAZARDOUS WASTE COLLECTION INFORMATION

The following counties are participating in the Florida Hazardous Waste Collection Center Grant Program which provided up to $100,000 funding per county for establishing and operating one or more local hazardous waste collection centers.

COUNTY	CONTACT	PHONE	SUNCOM
Alachua	Chris Bird	904/336-2442	SC 625-2442
Brevard	Rita DiStasio	407/633-2161	
Broward	Al Gomez	305/765-9202	Ext. 249
Charlotte	Jim Thomson	813/639-1802	SC 737-1255
Citrus	Cathy Winter	904/746-5000	
Clay	Greg Pitts	904/284-6374	SC 827-6374
Collier	Keeth Kipp	813/732-2507	SC 751-2507
Dade	Cindy Dwyer	305/594-1585	
DeSoto	Anne Alley	813/993-4826	
Duval	Steve Waterman	904/630-0973	
Escambia	Charles Miller	904/968-6628	
Flagler	John Schwabb	904/439-3778	
Glades	Ed Jablonwski	813/675-0124	
Hamilton	Jim Smith	904/792-1020	
Hardee	J. R. Prestridge	813/773-5089	
Hendry	Jim Kulczy	813/675-5253	SC 735-4252
Hernando	Frank Wentzel	904/754-4037	
Highlands	Christy Reed	813/655-1626	
Hillsborough	Steve Young	813/272-6674	SC 543-6655
Indian River	Stacy Strickland	407/569-0050	SC 224-1394
Lake	David Crowe	904/742-8427	SC 659-9619
Lee	Rick Clontz	813/335-2432	
Leon	Rosemary Bottcher	904/922-0400	
Levy	Billy Cobb	904/489-4311	
Madison	Jerome Thompson	904/973-2611	SC 527-5423
Manatee	Cari Walz	813/792-8811	
Marion	Norman Render	904/620-3430	SC 667-3430
Martin	Dana Hansen	407/288-5700	
Monroe	Ron Stack	305/292-4432	SC 472-4439
Okaloosa	Jim Reece	904/698-5774	SC 698-5774
Okeechobee	David Rivera	813/763-9312	
Orange	Dan Carrington	407/836-7400	SC 356-7400
Orange	Juan Martinez	407/249-6266	
Osceola	Chris Pappas	407/847-4481	
Palm Beach	Dave Gregory	407/687-1100	
Pasco	Farouk EL-Shamy	813/847-8041	SC 596-1145
Pinellas	Martha Gray	813/892-7720	
Polk	John Kolek	813/533-1205	SC 569-1205
Putnam	Joe Battillo	904/329-0396	SC 869-0395
St. Johns	Steve Marsh	904/923-9027	
St. Lucie	Freddie Cordero	407/468-1768	SC 259-1768
Sarasota	Dennis Laabs	813/364-4488	SC 522-4488
Seminole	John Hauserman	407/322-7605	SC 355-2000
Suwannee	Lester Baxter	904/362-3992	
Volusia	Susan Gaze	904/239-7766	

PROPER HAZARDOUS WASTE MANAGEMENT

For information on the Hazardous Waste Collection Center Grant Program or on establishing local hazardous waste management programs, call the Department of Environmental Regulation at 904/488-0300, extension 48.

To find out where you can recycle or dispose of used oil in your area, call the Department of Environmental Regulation toll free number, 1-800-741-4337.

Workshop 2-E - Collection Case Studies I
The EPA Region VIII Program
Brian Rimar, U.S. EPA Region VIII

* Why Household Hazardous Waste (HHW) Programs Are Promoted

- In the 1990 U.S. Environmental Protection Agency (EPA) Municipal Solid Waste (MSW) Conference Dana Duxbury gave a slide presentation on the status of HHW programs. When a slide showing the locations of programs in the U.S. was shown, EPA Region VIII (North Dakota, South Dakota, Montana, Wyoming, Utah, and Colorado) looked like the hole of a donut. Only Larimer and Jefferson Counties, Colorado, had regular programs.

- It was easy to convince management in the solid waste section that HHW programs would be beneficial and should be promoted. Source reduction was and is one of the section priorities.

* Project Funding And Promotion

- First the region needed a way for local MSW professionals to share knowledge, meet national experts, and obtain useful information on how to initiate a program. This was accomplished through a conference in March 1991, co-sponsored by EPA Region VIII and Boulder County, Colorado. Following the one day conference the Missouri Household Hazardous Waste Project offered two sessions of "From Awareness To Action : A Household Hazardous Waste Issues Training Course". All events were very well attended. We believed that with the conference and the training course that the basic knowledge had been offered on how to start a collection program and/or education program.

- Agenda for Action Grants provided another avenue of support. These are competitive grants available to tribal, state, and local governments and not-for-profit organizations. These grants can be used for a wide variety of MSW work, but cannot be used for capital purchases or normal operations and maintenance.

* Current Grants

- The Clean Water Fund of North Dakota has received funding for the "Pollution Prevention Begins At Home" education project. Similar to previous Clean Water Fund campaigns in New Jersey and Minnesota, this program will give public demonstrations in malls, to community groups, the media, and migrant farmworkers.

- Also in North Dakota EPA is funding a joint project between the state government and the Association for Retarded Citizens. One aspect of the program is a planned HHW exchange.

- The Colorado League of Women Voters is working with Agenda For Action grant funds on a statewide HHW public education program. The league is giving point-of-sale demos on low or non-toxic alternatives, airing HHW education videos on PBS, and providing used oil collection information where motor oil is sold.

- The newest HHW grant in Region VIII has been awarded to the Junior League of Sioux Falls, South Dakota. The planned program includes a statewide education campaign, a paint collection, and the production of a paint collection how-to videotape.

* Problems

- We have been successful in raising awareness of HHW issues. Unfortunately, this comes at a time when the regional Agenda For Action grants have been cut.

- Grantees should be prepared to use the grants when they are rewarded. A grant for assistance in siting a permanent collection facility was cancelled when the local government was politically unable to make the siting decision.

- There are limitations to the EPA grants. They cannot be used for capital costs, or normal operations and maintenance. Most regional offices are looking for a realistic workplan that produces a unique deliverable. Each region has a different system for choosing grantees, some use open competition, others use the funds to support organizations with proven records.

- As collection programs increased so did the regulatory questions. The EPA hazardous waste management staff, or RCRA C sections, were unfamiliar with some of the HHW issues. When asking for HHW management guidance from regulatory agencies be sure you are dealing with an individual who has experience.

* FUTURE

- The number of collection programs is growing throughout the region. Some are funded by increased landfill tipping fees, such as the program in the City and County of Salt Lake, Utah. Some programs have expanded into Conditionally Exempt Small Quantity Generator (CESQG) waste collection, such as El Paso County, Colorado.

- We will be encouraging more programs funded by supplemental environmental projects (SEP's). SEP's use fines from enforcement actions under a variety of environmental statutes, i.e. CERCLA, RCRA, CWA, SARA, etc., to fund pollution prevention projects. The City and County of Denver, Colorado, is currently working on a SEP to fund a HHW education project and start-up costs for a paint reprocessing facility.

CLEAN HOUSE
DSWA's Pilot HHS

Julie
Project
Delaware Solid
Dover

EXECUTIV

Between November 1, 1991, Solid Waste Authority sponsored and disposal of household hazar month pilot program, named Clea different methods of HHS collec drop-off center operated in Su collection van operated in Kent statewide $2.00 per ton surcharg

A total of 32,764 pounds were collected from 304 people pounds of HHS and 29,567 pound people through the door-to-doo participation rate was 0.4% of County.

Contractor costs, including were $191,519.46 in Kent County, Other costs, including publi $108,231.92 in Kent County and $ total cost of the program was $5

The Delaware Solid Waste Au (3) municipal solid waste landf Reclamation Plant, which processe ferrous metals, a refuse-derived Authority also owns two (2) tran Delaware, a state-wide voluntary

A household waste composit hazardous substances to be 0.58 About half of the 791,000 tons o estimated to be from household percentage of Delaware's solid w of 2,400 tons of HHS enterin significant.

Through state legislation in June of 1990, the Authority was directed by the General Assembly to develop "a program to source separate materials from the solid waste stream which are harmful to the environment for purposes of separate authorized disposal."

PLANNING

In response to the legislation, the Authority began developing the scope of an HHS management program. Among the many issues that were addressed in the planning process were the type of program, staffing, operating hours, contractor pricing structure, type and location of storage facilities, and funding.

Type of program

A variety of existing programs were reviewed throughout the United States and Europe, including one-day clean-up events, multiple events, fixed drop-off facilities, mobile drop-off facilities, and home chemical collection.

These programs were evaluated based on factors such as price and participation rates. It was found that European home chemical collections are successful in diverting a high amount of HHS from the regular solid waste stream. Because an operating home chemical collection program could not be identified in the United States, the Authority decided to evaluate door-to-door collection through direct experience, a six-month pilot program comparing door-to-door collection with operating a drop-off center.

Staffing and operating hours

Since the Authority generally contracts with private companies to operate its facilities and programs; the HHS pilot program was staffed by a hazardous waste contractor. A single company was contracted for staffing the collection program, as well as for transportation and disposal of the HHS.

Since safety considerations were a priority, operation of each program required a minimum of two (2) staff people for safety, and each was required to be trained in hazardous materials handling techniques, chemical compatibility, first aid, and spill response.

Full-time operating hours, including Saturday hours, were established to handle a potentially high participation rate and to make the program as convenient as possible for the public. Although considered, no evening hours were scheduled for both safety considerations and collection-van navigation.

Contractor pricing structure

Contract pricing was developed with a single unit price (per pound) for HHS transportation and disposal fees, and a fixed monthly fee for collection services, including program staffing, hotline service, equipment, and supplies.

Type and location of storage facilities

Temporary storage facilities were located at the landfills for a number of reasons, including of existing truck scales, security, and site availability. Uncomplicated temporary storage facilities with prefabricated storage building were selected for minimal construction time and future flexibility.

Funding

A critical aspect to a successful HHS management program is funding. The Authority does not rely on taxes to operate its facilities or programs; however, a funding mechanism was provided in the legislation creating the HHS management program. A $2.00 per ton surcharge was added to the solid waste disposal (tipping) fees at the Authority's facilities.

SELECTING A CONTRACTOR

The Authority issued a Request for Proposals for HHS collection and disposal services, resulting in the receipt of five (5) proposals. Clean Harbors of Kingston, Inc. was selected. Their proposal presented an excellent operations plan and demonstrated substantial experience in household hazardous substance collection programs.

TEMPORARY STORAGE FACILITIES

Facilities were constructed for temporary HHS storage at two of the Authority's landfills, the Southern Solid Waste Management Center (SSWMC) and the Central Solid Waste Management Center (CSWMC). These facilities each consisted of a hazardous materials storage building and oil storage tank located on a large concrete work area, surrounded by chain-link fencing. The contractor provided portable equipment-storage buildings at each site and a trailer to accommodate its personnel at the SSWMC.

The prefabricated hazardous materials storage buildings were supplied by the contractor. Each 22 ft. by 8 ft. building is separated into three (3) storage areas and is constructed with a separate secondary-containment sump to contain any spilled liquids. Other features included explosion-relief panels, mechanical ventilation, fire suppression systems, heating, air-conditioning and lighting. The area of the concrete pad at the CSWMC was 1,400 square feet. The concrete pad at the SSWMC was larger, 3,100 square feet, to accommodate the contractor's office trailer.

METHODS

The pilot program, named Clean House/Clean Earth, began operation in two (2) Delaware counties on November 1, 1991. Door-to-door collection by appointment served Kent County, and a staffed drop-off center served Sussex County. The following briefly describes the pilot program operation.

Collection and drop-off

Door-to-door collection service by appointment was provided to Kent County residents who called the toll-free hotline. Two (2) full-time hazardous waste professionals operated a small van/box truck to provide the door-to-door service. Materials were collected, packaged, documented on a bill of lading, and brought back to a temporary storage facility at the CSWMC. Household collections were scheduled from Tuesday through Saturday between the hours of 7:00 a.m. and 3:30 p.m.

A drop-off center was located at the SSWMC in Sussex County to accept HHS from Sussex County residents. Collection staff were on-hand during the hours of 7:00 a.m. to 3:30 p.m., Tuesday through Saturday. Two (2) staff members were provided during the first two (2) months of the program, but due to moderate participation levels, staffing at the SSWMC for the remainder of the program was reduced to one (1).

Materials accepted

Common materials collected included paints, solvents, automotive fluids, and pesticides. Provisions were also made for certain highly dangerous materials such as radioactive, shock sensitive, explosive, infectious, and dioxin-related (pentachlorophenol) wastes. While not a hazardous waste, oil was also collected by the contractor and disposed by a local oil recycler.

Latex paint was not collected because it is not generally considered hazardous. Asbestos was not collected because an existing disposal option is available at the Cherry Island Landfill in Wilmington, Delaware.

Hazardous substances were collected from households as well as agricultural-waste generators. Although limited exceptions were made, most commercial and institutional generators of hazardous materials were excluded from the collection program.

Temporary storage facility operation

Although no permits were required for the construction of the temporary storage facilities, a U. S. EPA identification number was obtained for each facility. Once the HHS was accepted at each facility, the Authority became the generator of the waste. The contractor maintained an inventory of the types and quantities of HHS stored and routinely performed facility inspections.

The contractor consolidated most paint, solvent, antifreeze, and oil into larger containers to reduce transportation and disposal costs. Empty containers were disposed as non-hazardous solid waste.

Contractor project coordination was provided by a full-time Project Manager. The Project Manager answered the toll-free telephone hotline, scheduled appointments, prepared hazardous waste

manifests, generated monthly reports, and provided supervision for other staff. His office was located at the SSWMC, and he provided assistance to the drop-off center staff when needed.

Advertising

Program publicity was coordinated by the Authority's public information officer. The program's slogan was "Don't pitch out, pitch in." Consultants were used to develop an attractive logo as well as the layouts for print advertisements.

Extensive advertising was used to inform the public about the HHS management program. Radio, newspapers, and television were utilized with both paid advertising and public service announcements. Press releases and articles were also distributed to the media, and posters were sent to local businesses. Radio and newspaper were emphasized, including weekly newspaper advertisements, and three (3) radio advertisements per day on each local radio station.

In addition, two unique publicity events were held in April. Three (3) Delaware radio stations held remote broadcasts at the SSWMC to encourage an "early spring cleaning" prior to the end of the pilot program. Landfill tours and T-shirts were also offered to participants during the radio remote broadcasts.

RESULTS

HHS quantities

A total of 77,742 pounds of hazardous materials and 41,394 pounds of motor oil were collected through the Clean House program. **Ninety-one percent (91%) of HHS collected were pesticides, paint, solvents, fuel, and oil.** Very small quantities of highly dangerous materials, such as shock sensitive, explosive, and infectious materials, were collected, while no radioactive waste was seen during the six-month program. 762 pounds of pentachlorophenol is currently in storage due to the lack of an Authority-approved disposal option. Table 1 presents the total quantity and types of HHS collected during the pilot program.

Similar types of HHS were collected in each county. Pesticides were the largest component of HHS collected. Paint and solvents were also commonly collected. Motor oil, which is not considered hazardous in Delaware, was collected in large quantities in both counties. Figure 1 presents each percentage of the major types of HHS collected during the pilot program.

A total of 32,764 pounds of HHS and 11,827 pounds of oil were collected from 304 people at the Drop-off center in Sussex County. 44,978 pounds of HHS and 29,567 pounds of oil were collected from 503 people through the door-to-door service in Kent County. Agricultural waste accounted for approximately twenty-three (23) percent of the hazardous substances in Sussex County and sixteen (16) percent in Kent County. Each agricultural participant

disposed of a much higher amount of HHS than the average household participant.

Oil and small household batteries are also collected through Recycle Delaware. 67,173 gallons of oil and 35,520 pounds of batteries were collected from all three counties in Delaware from unattended state recycling centers in FY 92.

Participation rate

The HHS pilot program results show a significantly higher participation rate in Kent County than in Sussex County. **The total participation represents a rate of 0.4% of the 74,253 households in Sussex County and 1.2% of the 42,106 households in Kent County.** It should be noted, however, that although the number of households in Kent County is less than in Sussex County, the actual population is similar.

Table 2 provides a monthly participation breakdown.The highest monthly participation occurred during April, the last month of the program. The highest daily participation also occurred in April. In Sussex County, one of the radio-remote broadcasts brought in 48 participants in one day. In Kent County, the highest was 16 participants served on any one day.

Disposal

All of the HHS collected in the program was packaged, shipped, and disposed in a manner similar to that of industrial hazardous waste. The contractor was required to transport all the HHS by hazardous waste haulers and dispose of it at Authority-approved treatment, storage, or disposal facilities.

The contractor was required to fully track and document all shipping and disposal activities. The contractor must provide shipping manifests, facility routing information, and evidence of destruction, such as "certificates of disposal," prior to payment for disposal services.

Cost

The contract cost to the Authority was $18,675 per month for HHS collection in Kent County, $16,175 per month for HHS collection services in Sussex County, and $1.77 per pound of HHS for disposal services. The Sussex County collection price was reduced by $200.00 per operating day when the contractor's staff was decreased in Sussex County.

Due to higher fixed costs and a higher participation rate, the collection and disposal cost was higher for Kent County than for Sussex County. The six-month collection and disposal cost was $191,519 for Kent County and $135,635 for Sussex County. The average collection and disposal cost per pound was $4.27 in Kent County, and $4.23 in Sussex County. In any single month, the average collection and disposal cost per pound was the lowest in

April at $3.05 per pound for Kent County and $3.39 per pound for Sussex County, because the participation rate increased and contractor efficiency improved. This information is shown in Table 3. Quantities identified in Table 3 include only materials disposed by the contractor, and do not include pentachlorophenol or oil.

Although contractor cost was the greatest expense of the pilot program, other significant costs included HHS storage facility construction and program publicity.

The total cost of construction for the drop-off center at the SSWMC was $63,864.25 and for the temporary storage facility at CSWMC was $61,639.61. Construction at SSWMC was higher because a larger concrete area was required to accommodate the contractor's trailer. The most costly expenditure for the facilities was the purchase of the storage buildings ($38,000 for each site).

The total publicity cost was $90,549.48. Paid radio advertising cost $40,614.98, and radio stations also provided public service announcements at no cost. Paid newspaper advertising cost $33,069.98, and free newspaper advertising was gained as a result of the preparation and distribution of news and information releases. Other publicity expenditures included a television commercial ($2,550), photographs ($1,685.97), printing and copying ($1,750), and consulting services and miscellaneous publicity expenses ($10,879.28.)

Miscellaneous program expenditures included oil recycling, electric utilities, and safety supplies. **The total cost of the pilot program was $546,220.19.** A cost summary can be found in Table 4.

Table 5 provides information on average cost and amounts collected per participant. The average participant disposed of 89.3 pounds of HHS and 58.8 pounds of motor oil in Kent County; and 105.5 pounds of HHS and 38.9 pounds of motor oil in Sussex County.

Although the door-to-door program had a higher total cost, it collected a higher quantity of HHS, resulting in a lower program cost per pound. The total program cost per pound of HHS and oil collected was $4.03 in Kent County and $5.61 per pound in Sussex County.

CONCLUSION

Based upon participation rate and cost per participant, the door-to-door collection program was more successful than the drop-off program. Door-to-door collection yielded a greater participation rate than the drop-off center. In addition, its collection and disposal cost per pound was similar to that of the drop-off center, and its overall program cost per pound was significantly less. However, higher participation generated more HHS requiring disposal, resulting in higher total program cost for the door-to-door collection program.

Figure 1. Pilot program summary

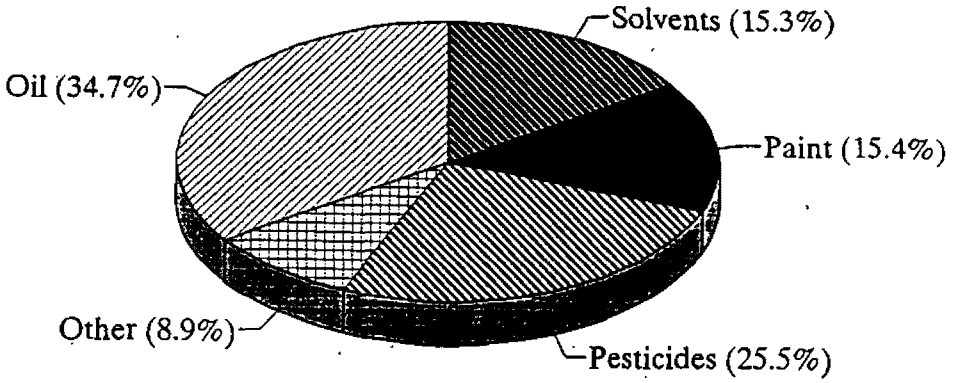

Figure 2. Monthly Participation

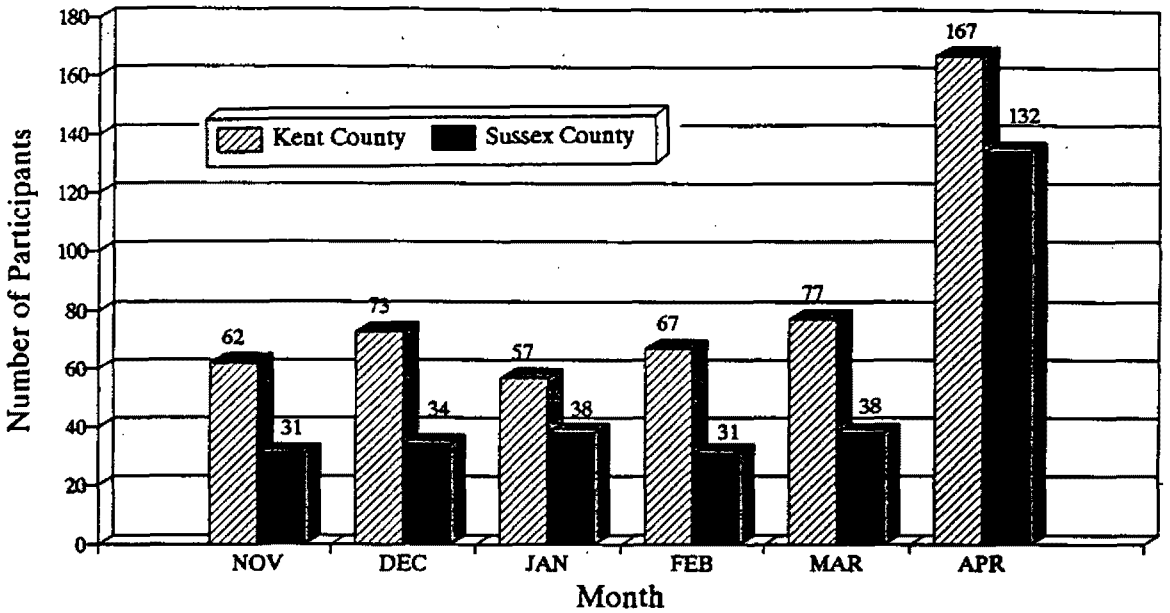

Table 1. HHS and Oil Quantity Summary

Clean House/Clean Earth

Six-month Pilot Program Summary

Quantities of material collected (pounds)

Type	Sussex Co..	Kent Co.	TOTAL
Solvents	6,426	11,844	18,270
Paints	8,389	10,010	18,399
Pesticides	14,770	15,653	30,423
Car batteries	959	2,472	3,431
Corrosive liquids	258	2,546	2,804
Oxidizers	87	57	144
Aerosols/Cylinders	213	503	716
Pentachlorophenol	682	80	762
Other	117	1,813	1,930
Oil with PCBs	863	0	863
Recyclable oil	11,827	29,567	41,394
TOTAL	44,591	74,545	119,136

Table 2. Monthly Participation

	Kent County			*Sussex County*		
		Quantities			Quantities	
Month	Participants	HHS (lbs)	Oil (lbs)	Participants	HHS (lbs)	Oil (lbs)
November	62	6,011	497	31	1,533	700
December	73	6,462	41	34	3,033	913
January	57	6,349	3,325	38	8,197	350
February	67	6,011	3,672	31	5,128	1,980
March	77	5,582	7,200	38	7,555	3,960
April	167	14,563	14,832	132	7,318	3,924
TOTAL	**503**	**44,978**	**29,567**	**304**	**32,764**	**11,827**

Table 3. HHS collection and disposal cost summary

	Kent County			*Sussex County*		
	Quantities	Contractor	Contractor	Quantities	Contractor	Contractor
Month	disposed (lbs)	cost	cost per pound	disposed (lbs)	cost	cost per pound
November	6,001	$29,297	$4.88	1,529	$18,881	$12.35
December	6,437	30,068	4.67	2,909	20,324	6.99
January	6,337	29,891	4.72	8,097	26,107	3.22
February	6,010	29,313	4.88	5,127	21,050	4.11
March	5,576	28,545	5.12	7,142	24,616	3.45
April	14,537	44,405	3.05	7,278	24,657	3.39
TOTAL	**44,898**	**$191,519**	**$4.27**	**32,082**	**$135,635**	**$4.23**

Table 4. Cost Summary

	Kent Co.	Sussex Co.	TOTAL
Contractor	$191,519.46	$135,635.14	$327,154.60
Facilities	61,639.61	63,864.25	125,503.86
Publicity	45,220.88	45,328.60	90,549.48
Oil Recycling	611.00	593.00	1,204.00
Utilities	324.35	661.16	985.51
Miscellaneous	436.08	386.66	822.74
TOTAL	$299,751.38	$246,468.81	$546,220.19

Table 5. Pilot Program Results Summary

	Kent Co.	Sussex Co.	Total
Number of Participants	503	304	807
Amounts Collected (pounds)			
HHS Disposed	44,898	32,082	76,980
Pentachlorophenol Stored	80	682	762
Oil	29,567	11,827	41,394
Total Program Cost	$299,751.38	$246,468.81	$546,220.19

	Kent Co.	Sussex Co.	Average
Data per Participant (pounds)			
HHS (Disposed)	89.3	105.5	95.4
Pentachlorophenol	0.2	2.2	0.9
Oil	58.8	38.9	51.3
Cost per participant	$595.93	$810.75	$676.85
Total Program Cost per Pound			
- of HHS Disposed	$6.68	$7.68	$7.10
- of HHS & Oil Disposed	$4.03	$5.61	$4.61

HOUSEHOLD HAZARDOUS WASTE CONFERENCE TALK

Ingrid Dierlam

AUSTIN, TEXAS: EVOLUTION OF A TEXAS HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM

Thank you for inviting me to speak at this conference.

Today, I'd like to describe the history of Austin's household hazardous waste collection program - from one-day a year collection events to the permanent collection facility which is presently opened one saturday every other month. I will also speak to the Texas Water Commission's role in household hazardous waste collection and other community hazardous waste management in Texas.

Some background on myself: I have worked for the City of Austin on its household hazardous waste collection program and helped develop and implement the permament collection facility. I am currently working with the Texas Water Commission in the Community Hazardous Waste Management Unit of Community Support on statewide HHWC efforts.

In April of 1986, after 12 long months of planning, the City of Austin held the first household hazardous waste collection in Texas. Funding for this collection came from the City's Water and Wastewater Department and the Solid Waste Department. Grassroots support came from League of Women Voters, Sierra Club, Audubon Society, Fire Department, local remodeling contractors and City and

State agencies, including the Texas Water Commission.

This first collection was held on a Saturday in April at 2 locations: one was in the parking lot of a local park, the other was in the parking lot of the Texas Department of Health. 450 households participated, 150 (55 gallon drums) or 33,000 pounds of household hazardous waste was diverted from the municipal waste stream, 500 gallons of latex paint was recycled, 50 automotive batteries and 600 gallons of waste oil were collected. (I have a few copies of all of these numbers here with me today.)

The next year, 1987, sites were changed to a parking lot of a local high school and a parking lot of a local middle school. The number of households participating went up to 650, while the amount of wastes decreased to 120 (55) gallon drums or 26,400 pounds. The amount of batteries quadrupeled to 216 and the amount of waste oil little more than doubled to 1300 gallons.

In 1988, the City again had two collection sites: the high school and a parking lot of a City swimming pool. Keep in mind that the pool was not yet opened for the season and all wastes were offsite by Monday morning. The amount of household participating increased to 1,070 and 167 (55) gallon drums of wastes were collected. 1500 gallons of latex paint was collected for use by housing rehabilitation groups and the amount of batteries collected went up to 600.

Because of the increase in participation, the city increased the number of collection points to 3 for the 1989. One was again held in the parking lot of a swimming pool, one in the parking lot of a baseball complex (this was the county site) and the third in the parking lot of a high school football stadium. This last location was by far the best one for the one-day collections due to the enormous size of the parking lot. A total of 1,260 households came out to these sites to participate dropping off 260 (55) gallon drums of hazardous waste. 3,400 gallons of waste oil were also collected.

For the 1990 collection, the city went back to the 2 location option: the swimming pool parking lot and the stadium parking lot. The county site did not have as much participation as the City thought it would have, so it was dropped. This collection turned out to be the city's largest one-day collection with 1,800 households participating. 380 (55 gallon) drums of hazardous waste was collected (going up from 260 drums collected in 1989), 2,002 gallons of latex paint went to local housing rehabilitation groups and 3,850 gallons of waste oil was collected. This was the City's last one-day collection event.

Since the first collection, the City had been taking information from the participants in the form of a survey. When the question "How often should this service be provided?" was asked, participants told the City that at the very least, collections should be made available twice a year. The City was also manning

an Environmental Hotline, which deals with questions from citizens on household hazardous waste disposal to environmental complaints. Persons running the hotline were overrun with questions on household hazardous waste disposal and the need for more collection times. Because of the citizens response to the survey and the response on the hotline, the City felt that it was time to expand the program and began planning for a more permanent collection facility.

On October 19, 1991, the City of Austin held its first collection at the permanent collection facility. This was the first facility of its kind in Texas and lots of trails were blazed through its opening.

The facility has 2 (1000 gallon) waste oil tanks, a 3 compartment hazardous materials storage building, 3 storage sheds, an office, a paint and battery staging area as well as an area for packaging of household hazardous wastes. This operation is done under a tent which is put up prior to each collection.

At the present time, the facility is opened one Saturday every other month from 9:00 to 3:00 and by appointment on the Friday preceeding the collection. For 1993, the City plans on adding 18 summer evening collection, to avoid the heat during the day. Eventually, the City hopes to expand the program to have collections either weekly or monthly on Thursday, Fridays and Saturdays. The City also plans on moving the site to another City facility where areas of the facility, like the packaging area, can

be done under permanent cover.

The Texas Water Commission's role in household hazardous waste collection in Texas is expanding. The Commission has regulatory authority over collections and reviews operational plans and approves or denies them. Any entity wishing to hold a collection must send this plan to us prior to the collection. The Commission has also been directed to administer grants for household hazardous waste collection. This year, we have awarded $1.6 million in grants to 7 entities. This money came from the municipal solid waste fund created by the tipping fees paid at municipal landfills. This money was directed back to municipalities through a bill from the Texas Senate. This bill mandated that this grant money could not be used for disposal of household hazardous wastes, only for the collection end of it. We hope to have additional money next year, so more grants can be awarded.

The City of Austin has been a model for household hazardous waste collection in Texas, starting the first one-day collections and now establishing the first permanent collection facility in Texas. We at the Commission expect to have many more cities in Texas follow Austin's lead.

In March of this year, the Texas Water Commission was delegated the responsibility for authorization of household hazardous waste collections. This responsibility was given to the Community Hazardous Waste Management Unit of the Community Support Program.

In addition to household hazardous waste collection program management, this unit also organizes and conducts 2 to 4 waste pesticide collections a year and will be conducting around 35 empty pesticide container recycling programs. Our current staff level is 4 persons for the entire state of Texas, so we've got our work cut out for us.

Environmental Protection Agency
Household Hazardous Waste Conference
Minneapolis, Minnesota - December 8-12, 1992

Speech Presented By:
LeeAnn Merashoff - Field Service Manager

DEVELOPING AN RFP

1. INTRODUCTION

Our Hazardous Waste Management firm has responded to literally hundreds of RFP's, or Request for Proposals There are basically two ways contractors can respond to RFPs - The "Technical Approach" where we write a technical, logical response to the RFP, or the "osmosis approach" - placing the paper on your head and hoping the vibrations tell you what is needed as a response to this RFP.

Basically an RFP conveys information that is organized in such a way that you get useful information in return. You want to give just the right amount of information - too much or too little and you might get the "osmosis approach" to the response.

2. There are several steps to developing a good RFP - lets start with the very first -

First make sure you know what your state, municipal or local legal requirements are for bidding. Don't assume anything about this issue until you've done your research, - it will pay off later if you know accurately what you have to do, to have you RFP legally acceptable.

For example: do you need to go out for competitive bids, or can you accept technical proposals for a special "service."

Find out if there is a certain kind of proposal or bid that you

have to do. We've seen programs cancelled because the wrong bid form was used. Prepare a checklist of legal requirements and review it often. The next most important thing to do is to ask in the RFP for a demonstration of the firms qualifications. This will include references - but don't just ask for references - ask for the contact's phone numbers and names and also for a description of the types of programs - this will be important when you're trying to evaluate the proposals.

Ask for background on the firm - this will vary depending much you know about your bidders. You really want to know what's behind the proposal, in terms of financial strength, contractual commitment and historical precedence.

Once These are out of the way, and these are two very important elements - you can move on to the more "common" elements of good RFPs. These include:

1. A Description of the program

This description could be a narrative; clearly, concisely written , that gives a brief background on the program development. State goals such as "providing an educational opportunity for participant." State if you are targeting certain waste streams, or a certain population group. Further, this description should include:

* When the collections will be held
* Where the collections will be held
* Who is in charge of it, with phone number
* Who is participating - number of households in the the population base
* When the proposal is due
* Special conditions for the program - "because of the

unique setting - it has been determined that no bulking can occur on site."

* Provide a checklist of documents that must be returned to you with the bid - avoid having people make assumptions. State "The following documents must be included with the proposal.....
* List the evaluation criteria.

Lets fact it - one of the reasons we send out an RFP is to be able to compare responses. The best way to get back comparable proposals is to list the evaluation criteria:

Very simply: "The proposals will be evaluated on":

(Example)
1. Completeness
2. Evidence of Compliance and Liability Protection
3. Prices

Also include: Time and date of Prebid Meeting, if any. List any Insurance Requirements you may have. Ask for evidence of documentation of the workers training and experience. Ask for a sample work plan for the type of program you are planning. Don't give them one. This will give you some idea of their ability in health, safety, site set up, etc... The exception here is for a permanent program where you may have certain documents already prepared. Ask for any wastes which will be excluded. Ask for a description of liability protection or what type of indemnification they will provide. Ask how the waste will be tracked and handled after it leaves you site. All of the above can be done in 3 pages for a one day program, and 15-20 pages for a permanent program.

Some Uncommon Elements:

Things people don't usually ask for but should:

If you have a contract that you are required to use, include: a copy for review and ask for any exceptions to be noted.

Include information about your budget, if possible.

Ask for details on the ultimate disposal of each waste type.

State how long you expect this bid to be good for "Prices must remain in effect for....."

Comparing Costs

The best way to get cost responses back so that they can be easily compared is to prepare a simple sheet on pricing in the form of a simple chart for disposal costs - This chart could be laid out as follows:

LIST COLLECTION

Description of Acceptable Waste	Packaging Method	Size of Container	Acutual Quantity of Waste	Disposal Method	Price Per Container
Example 1. Oil Based Paints	Consolidation	55gal	50 gal	fuels blending	$300.00
2. Acids/Based	Labpacked	55gal	20 gal or 300 lbs	Treatment	$350.00
3.					
4.					
5.					
6.					
7.					
8.					

For Labor, and Materials costs:

Again a simple Chart

Item	Unit	Cost
Description	per collection day of per hour	
Example Set-Up Labor/Materials	Per Day	$2,500.00 All inclusive

This leaves some flexibility for the potential vendors to show you some possibly better options.

Finally some tips or hints for a successful RFP...

1. proofread your RFP.
2. Keep it Simple.
3. Include a checklist of required forms.
4. Ask for feedback or an evaluation on the RFP from responders.
5. Allow approximately 2 weeks after a pre bid meeting for a one day - 3 to 4 weeks after the prebid meeting for a permanent program, for the response to be prepared.
6. Double check you mailing list to potential vendors. Follow up that they received it.

Thank you.

Site Selection

A. J. Novak
Project Development Manager
Chemical Waste Management, Inc.
Geneva, Illinois

I. How to select a site for a one day household hazardous waste collection. Below is a list of parameters, all of which should be reviewed and considered for the specific needs of your program.

1. Location

   - o Proximity to the population being served. (80% - 90% of participants will travel 8-10 miles)
   - o Recognizable to the population being served.

2. Natural Attributes

   - o Size - Ample work area
     - Ability to queue traffic
   - o Cover - Protection from the elements using pole barns or garages as the work area.
     - Ability to set up canopy tents to cover the work area.
   - o Surface - Asphalt or concrete base preferred.
     - Relatively level work area.
     - Sewers should be away from the work area, or diked.

3. Availability - If at all possible, no other activities should be scheduled at the site which can conflict with the collection.

4. Liability - Review and understand the insurance policies of the program sponsor, the land owner, and the contractor.

5. Safety

   - o Adequate ventilation in work area, especially if bulking.
   - o Spill protection and fire prevention equipment should be on site.
   - o Safety station should be on site with first aid supplies.
   - o A site contingency plan should be prepared prior to the collection identifying emergency contact phone numbers.

6. Permitting

   - o Check with local regulators to identify if any permits are required.
   - o Work with your contractor and local regulators to understand if federal and/or state hazardous waste identification numbers are required. (The process of applying for USEPA or state hazardous waste identification numbers typically takes four weeks.)
   - o Check with the site land owner to identify if the above information exists, and if it can be used for this program.

II. How to select a site for a continuous household hazardous waste collection.

1. All of the parameters considered for a one day collection apply to a continuous collection program.

2. Mobility or Portability - Will your program be moved to multiple sites throughout your community to provide more/better service.

3. Storage - Will your community have a centralized collection and storage area.

   o Types - Build a facility
     - Retro-fit an existing facility
     - Purchase a facility

   o Capacity- Evaluate the size of the community being serviced.
     - Evaluate the frequency of collections versus the frequency of waste removals.

   o Permitting - requirements for a HHW storage facility may be different from those of a one day collection. Check with your local regulators.

III. Examples of commonly used collection sites.

   o School Parking Lots

   o Community Event Centers

   o Municipal Properties

     - Public Works garages
     - Fire or Police Department parking lots
     - Local Airports
     - Fair Grounds or Parks

   o Local Business or Corporation Parking Lots

IV. Selecting a site for your Program.

1. Identify your needs and the program goals.

2. Compromise. You may not find a site with all of the attributes you desire. Based upon your needs, select a site which best satisfies your requirements.

3. Plan site logistics specifically. Walk the site, mark areas for delivered supplies, and clearly identify traffic and work areas.

4. Have Fun.

HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM PERMITTING AND PLAN APPROVAL

Sharon A. Rehder
New York State Department of Environmental Conservation

As of November, 1992, household hazardous waste (HHW) collection day programs have been held in every state, and permanent facilities have been sited in 24 states. The tremendous growth in the popularity of these programs over the past ten years has caused many state environmental regulatory agencies to develop HHW regulatory programs or policies.

The federal government regulates waste under the Resource Conservation and Recovery Act (RCRA). Hazardous waste is defined and regulated under Subtitle C of RCRA, while solid waste is regulated under Subtitle D. Subtitle C contains stringent permitting standards for hazardous waste treatment, storage, and disposal facilities, but specifically exempts waste from households from the definition of hazardous waste. All household waste is regulated under Subtitle D, which does not specifically address HHW. A few states classify collected HHW as a hazardous waste and subject these wastes to many of the requirements contained within Subtitle C.

The absence of federal requirements has left each individual state to establish its own regulatory program, and these vary widely. In many states, the regulatory programs are still evolving, as the states develop laws, policies, guidelines, or regulations in response to the activities of local collection program sponsors. Some states that have had a number of collection activities have firmly established regulations or policies.

Most states now require some level of state regulatory review. Permits are most often required for permanent facilities. In those few states where HHW has been designated as a hazardous waste, permanent facilities must meet stringent hazardous waste permitting requirements. In other states, HHW is a solid waste and solid waste permits are required. These solid waste permits often contain conditions similar to those imposed on hazardous waste storage facilities, but are often much easier to obtain.

Typical permit applications contain a detailed description of how the facility will be constructed, operated, and closed. The typical contents of a permit application are given in Figure 1. The standard application form, which may only be one page long, must be accompanied by site plans, maps, an operations manual, and emergency contingency plans as attachments. These materials are reviewed in detail. In New York, for example, it often takes six months before the state deems the application to be complete. During this time, the application will probably

undergo several rounds of changes. The final document will contain an operations manual which must be followed once the facility begins operation. When the application is complete, a public notice must be sent out and a 30 day public comment period is established. The state will then issue a construction permit and will likely inspect the facility before an operating permit is issued. States may subsequently conduct yearly inspections.

Plans are often required for single day collection programs, or for permanent facilities in states which do not require a permit. Plans contain many of the same categories of information that permit applications do, but are less formal and detailed, and do not require the services of a professional engineer. Plans are usually approved more quickly than permit applications.

If a state has permit-by-rule regulations, then a detailed application does not need to be submitted. These states have regulations which determine how the facility is to be constructed and operated. The collection program sponsors must notify the state that they are going to operate a facility, and that it will be in compliance with all applicable regulations. The program is then deemed to have a permit. Other states may issue variances from permitting if the state has not yet revised its regulations to accommodate HHW programs. Variances are often issued on a case-by-case basis.

Several states that do not have regulations which require a permit or plan to conduct a HHW collection program will require a detailed plan as part of a funding application. By accepting or rejecting the application for funding, the state has the opportunity to review the plan and ensure the safety of the programs. If the State environmental agency does not issue a permit or approval of any kind, other agencies, such as the local health department, may have HHW requirements. It is also important that any applicable fire, electrical, and building codes, OSHA regulations, and siting requirements be followed.

In the past, many states have been reluctant to allow HHW program sponsors to accept hazardous waste from conditionally exempt small quantity generators (CESQGs). It was not clear whether the regulations would allow HHW and CESQG waste to be mixed at a facility without triggering some Subtitle C requirements. A July 22, 1992 memorandum from the United States Environmental Protection Agency states that the two waste streams may be mixed without incurring additional regulatory requirements. Program sponsors should ask their state hazardous waste program representatives if CESQG wastes may be accepted at HHW programs. If these wastes are accepted, procedures need to be in place to verify that the businesses which bring waste to the facility are CESQGs.

The wide array of laws and regulations throughout the country can make the establishment of a HHW collection program very confusing. Many states are willing to meet with program sponsors early in the planning phase to discuss specific requirements. When planning a permanent facility, program sponsors should also meet with local building and fire inspectors to ensure that their plans are going to pass inspection and be allowed to open.

ITEMS COMMONLY ADDRESSED IN A HOUSEHOLD HAZARDOUS WASTE Figure 1 PERMANENT FACILITY PERMIT APPLICATION

1. Site plans and area maps, including engineering drawings of:

   - Site layout
   - Waste management areas
   - Property boundaries and adjacent land uses
   - Utilities

2. Scope of program

   - What will be collected
   - Who may participate
   - Days and hours of operation
   - Registration procedures
   - Anticipated participation and quantities

3. Facility Design

   - Layout of receiving, sorting, short term storage areas
   - Where on site will each waste type be collected, handled, and stored
   - Capacity of storage areas
   - Building materials, use of impermeable surfaces
   - Containment systems, including use of subfloorings or berms
   - Adequate aisle space for safe handling and emergency response

4. Waste Management

   - Sorting/segregation procedures
   - Packaging methods
   - Materials which will be consolidated
   - On-site log or tracking forms
   - Ultimate disposition of materials: reuse, recycling, treatment, or disposal
   - Any disposal facilities that will receive waste
   - Storage duration (many states limit to 90 days)
   - Transportation and manifesting procedures
   - USEPA ID number, if required
   - Procedures for unknowns

5. Health and Safety

   - Contingency plan
   - Location and listing of safety equipment
   - Fire suppression
   - Ventilation
   - Spill prevention and control

6. Personnel/Training

   - List of job titles and tasks
   - Training received by each job title (many states require 40 hours of OSHA training)
   - Documentation of training

7. Other

   - Inspection logs and schedule
   - Site security
   - Closure plans

NEGOTIATING THE CONTRACT

Elizabeth M. McCormick[1]

Virtually every type of household hazardous waste collection program requires the use of a contractor to perform some service. Typically, a one day program asks a contractor to unload cars, segregate and package waste, transport and dispose of collected wastes, and provide supplies and services such as protective clothing, spill control equipment, and contingency planning. A permanent program may only have the contractor transport and dispose of collected wastes, or may ask for training and supplies as well. Regardless of the type of program and extent of contractor participation, a program sponsor wants to obtain the best available services at the most reasonable price. This generally means using the competitive bidding process to evaluate possible contractors. The competitive bidding process includes three main elements: a Request for Proposal (RFP) prepared by the program sponsor, Proposals submitted by potential contractors, and the Contract negotiated between the program sponsor and successful bidder.

The RFP and proposal are being covered by other speakers today. This paper will concentrate on the key elements of contracts and provide a sample contract which could be modified for different programs.

Program sponsors are often told to begin planning at least 6-9 months before their collection program. This is also the time to begin working on the RFP and contractor selection process. It may take a month or more to prepare the RFP, then at least two weeks (preferably more, perhaps four to six weeks) for contractors to review the RFP and prepare proposals, two weeks or more for sponsors to review proposals, and another two weeks to finalize the contract negotiations. Pre-bid conferences and RFP addenda may extend these times. Some states such as California, Pennsylvania, and New York then review plans for the program, including the contractor. Allow time for revisions at each step of the process. Ideally the contractor selection should be complete and the contract signed several weeks before the collection program. This allows the sponsor to work closely with the contractor during the final, often hectic, days leading up to the collection.

Once the sponsor has an outline of their technical requirements, the local legal and purchasing departments must be contacted. Many local governments have specific requirements which must be included with all purchases. This may include equal employment opportunity programs, bid and performance bonds, anti-apartheid policies, insurance, public right-to-know, minority subcontracting, or other requirements. Legal and purchasing departments may also be willing to perform some of the work associated with the competitive bidding process, such as arranging pre-bid conferences or handling financial arrangements. Occasionally a draft contract may be included in the RFP, or the sponsor

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may request that potential contractors submit their own contracts. Frequently the contract is not addressed until a sponsor has reviewed proposals and made a preliminary contractor selection. Any contract should be reviewed by the sponsor's legal counsel. Although most programs go very smoothly, the contract forms the basis for conflict resolution if things don't go well. It is a critical element of any HHW program.

A. IDENTIFICATION OF PARTIES

The agreement should identify the full legal name of each party to the contract. Most contracts include two parties, the sponsor and the contractor. Some programs include multiple groups as sponsors, for example when two or more municipalities pool their resources to conduct a more extensive program than either could do alone. In such cases, the sponsors could all be parties to the agreement, or they could prepare two separate contracts - one an "intergovernmental agreement" between themselves outlining cost allocations, responsibilities, and designating a single lead agency, and one between the lead agency and the contractor. Both approaches have been used successfully.

B. RECITATIONS

These are the "whereas" statements which describe why the parties are entering into the agreement. They are usually brief and are sometimes omitted.

> "WHEREAS the Sponsor desires to conduct a Household Hazardous Waste Collection Program to provide a safe, convenient place where citizens of the community can dispose of stored household hazardous wastes, and
>
> WHEREAS the Sponsor desires to hire a professional contractor knowledgeable and experienced in conducting such a waste disposal program, and
>
> WHEREAS the Contractor has represented that it is staffed with personnel knowledgeable and experienced in conducting such a waste disposal program."

C. SCOPE OF WORK

This section describes the work to be performed and the responsibilities of each party in performing that work. To save space, the RFP and proposal are often incorporated by reference, with the acknowledgement that the contract governs any discrepancies between the RFP, proposal, and contract.

D. TIME OF PERFORMANCE AND CONTRACT PERIOD

How long will the contract be in force? For a single collection, for multiple collections, a year or more? Do you want the option of extending the contract by mutual consent of the parties? This could be an advantage, allowing the sponsor to work with a contractor for a period of time, then avoid the bidding process if performance is satisfactory. At the same time, the sponsor is not locked into a long term relationship with an unsatisfactory contractor.

E. TERMINATION

There may be reasons why either party wishes to terminate an agreement. For example, a government agency may not be allocated funds for the program. This section may either list specific causes for termination or provide a simple clause allowing termination with no specific reason given. Termination without a specified condition is called "for convenience" and the type which requires reasons is called "for cause." For convenience is more common, because it is impossible to predict in advance all the reasons which may cause a sponsor to wish to terminate the agreement.

F. EXCUSE OF PERFORMANCE

This is also called a "force majeure" clause. The agreement may be suspended or a scheduled date extended in the event of extenuating circumstances such as war, riot, storms, etc. The paragraph may list many possible reasons, but should also include a generic statement such as "...any other event beyond the reasonable control of such party; which event prevents the delivery, transportation, acceptance, treatment, incineration, or disposal of the waste."

G. PAYMENT

How will the sponsor pay for the program? When are invoices due, and will late fees be assessed? How will invoice conflicts be resolved? What about unusual fees or expenses which could not have been anticipated by either party prior to the program? Many program sponsors have a fixed budget and choose to include "not to exceed" language which requires the contractor to do periodic estimates of the costs incurred during the program and to stop accepting waste when the fixed limit is approached.

H. GENERATOR

Who will be the "generator" of the collected waste? Usually the sponsor acts as the generator of record, but some states such as Massachusetts and Pennsylvania require the contractor to assume this role. Sponsors in other states may also prefer to have the contractor's name on the manifests as generator. Program sponsors should recognize that naming the contractor as generator does not automatically relieve the

sponsor of potential Superfund liability. The sponsor should look to the indemnification, insurance, and overall financial strength and qualifications of the contractor for true liability protection.

I. LICENSES

Most one day or mobile programs require few if any licenses and permits other than a temporary generator ID and transporter permits. Permanent programs may have more elaborate requirements - building permits, special use permits, fire district approvals, etc. Who is responsible for these?

J. INSURANCE AND PERFORMANCE BOND

This section should describe the insurance agreed to by the sponsor and contractor, including workers' compensation, general and automobile liability, and proof of environmental impairment liability for the disposal sites. Programs typically request that workers' compensations be at that state's statutory limits, general liability for bodily injury and property damage limits of $1,000,000 - 5,000,000, and automobile liability for bodily injury and property damage limits of $1,000,000 - 5,000,000. The federal Department of Transportation requires motor carriers transporting hazardous materials to carry an "MCS-90" endorsement of up to $5,000,000. This endorsement includes environmental restoration coverage for accidents during transportation. Hazardous waste treatment, storage, and disposal facilities must carry environmental impairment liability insurance of $1,000,000 per occurrence, $2,000,000 annual aggregate for sudden accidental occurrences, and facilities with land contact such as landfills, lagoons, or waste piles must also carry $3,000,000 per occurrence, $6,000,000 annual aggregate for non-sudden events such as gradual groundwater contamination. Be realistic in this section - asking for unusual or excessive insurance coverages may limit the number of possible contractors who can bid on a program.

A performance bond guarantees the performance of the project in accordance with the contract, and provides a mechanism for the sponsor to recover funds if the contractor fails to perform. Many programs do not require performance bonds. If a bond is required, the amounts of bid and performance bonds may be determined by local purchasing department policies. In any case, the amount should reflect the amount of time, effort, and expense the sponsor may incur. The performance bond may be set at the estimated cost of the collection program, but should not be set much higher. Bond companies don't simply pay out the entire face value of the bond, they pay for the sponsor's actual loss up to the face value. They also charge a fee for the bond, based on a percentage of the face value. The percentage is usually a reflection of the contractor's reputation and loss history. Contractors with good performance records pay lower premiums than contractors with poor or average records. For these reasons, requesting a $250,000 performance bond for a $50,000 project simply wastes bond premium money while not providing the sponsor with any additional protection.

SAMPLE HOUSEHOLD HAZARDOUS WASTE COLLECTION AGREEMENT

This Agreement, dated this _____ day of _____, 1992 by and between _____ (the Sponsor) and Laidlaw Environmental Services (TS), Inc., a Delaware corporation, (LES), states as follows:

WHEREAS the Sponsor desires to conduct a Household Hazardous Waste Collection Program to provide a safe, convenient place where citizens of _____ can dispose of stored household hazardous wastes, and

WHEREAS the Sponsor desires to hire a professional contractor knowledgeable and experienced in conducting such a waste disposal program, and

WHEREAS LES has represented that it is staffed with personnel knowledgeable and experienced in conducting such a waste disposal program.

W I T N E S S E T H:

Now, therefore, in consideration of the mutual promises and benefits of this Agreement, the Sponsor and LES agree as follows:

1. Employment of LES. The Sponsor agrees to hire LES and LES agrees to act as the Sponsor's contractor to conduct the Household Hazardous Waste Collection Program on _____, 1992.

2. Scope of Services. LES shall perform in a good and professional manner the services identified in the Sponsor's Request for Proposal dated _____, 1992, as modified by LES's Proposal dated _____, 1992, copies of which are attached hereto and incorporated by reference, as well as the services listed in this Agreement. Any conflict between the terms of this Agreement and the terms of the Request for Proposal or the Proposal will be governed by the terms of this Agreement.

a. LES shall have present at the collection site employees or agents of LES as described in the Proposal trained in the identification of hazardous and acutely hazardous wastes (collectively "Wastes") as defined by federal or (state) laws or regulations, and such materials and equipment as are necessary to handle, containerize, label, load and transport such Wastes from the Sponsor's service area in a manner conforming to (state) and federal laws and regulations.

b. LES shall accept Wastes, for transportation and disposal from the Sponsor service area, only from such individuals as are designated by a Sponsor representative present at the site as being residents of the Sponsor service area, and only in such amounts as are approved by such representative.

c. Except as provided in Paragraphs d and e below, LES disclaims all responsibility for and assumes no liability for the following Wastes which it will neither handle at the site nor accept for disposal:

Compressed Gas Cylinders, Explosives or Shock Sensitive Materials and Ammunition, Unknown Materials, Radioactive Materials, Infectious or Biologically Active Materials, Dioxin, Tri, Tetra- and Pentachlorophenols and

K. TITLE TO WASTE

When, if ever, does title to collected waste pass from program participant to sponsor to contractor? Title basically describes who "owns" the waste and has the benefits (and risks) of ownership, such as responsibility for properly handling it, including responding to spills, etc.

L. WARRANTY

What warranties or guarantees are the parties providing? Typically the contractor warrants or guarantees that they will perform correctly, and the sponsor warrants that they are legally able to enter into the agreement.

M. INDEMNIFICATION

This is one of the most important elements of the contract, and often one of the most difficult to finalize. The indemnification language describes who will pay for what if things go wrong, particularly if one party comes to harm as a result of the other's actions. Program sponsors occasionally try to distance themselves from any responsibility for the program and ask that the contractor provide an indemnification for anything which happens, even if it is caused by the sponsor's personnel. This approach is seldom accepted by the contractor. More commonly, the parties agree to allocate costs based upon the extent to which they contributed to the problem. When the sponsor is a government agency, they must be sure to check applicable state statutes, which may limit or describe the terms under which a state or local government agency may indemnify the contractor. In these cases, the phrase "to the extent allowed by law" is inserted in the sponsor's portion of the indemnification.

N. MODIFICATION

The parties may wish to modify the agreement, for example to add additional sites or change the scope of work. The agreement should include a mechanism for doing so.

O. NOTICES Where should invoices, reports, or other notices be sent?

P. GOVERNING LAW

The parties should agree that the contract will be governed by the laws of a particular state, usually the state where the program occurs.

Q. MISCELLANEOUS

Contracts usually include clauses on whether or not the contractor may be considered the sponsor's "agent"; separation of clauses, so that if one or more paragraphs is ruled invalid the rest of the agreement will remain in effect; whether or not the parties may assign their interests to others; non-discrimination clauses; and of course, any specific local purchasing requirements such as anti-apartheid statements.

R. SIGNATURES

The agreement must be properly executed by authorized representatives of all parties. Some government agencies may have specific formats for contract execution which must be followed. Usually enough copies of the agreement are prepared that each party may have their own fully executed document with original signatures.

The enclosed sample agreement is for a one day household hazardous waste collection agreement. It could easily be modified for use by other types of HHW program by changing the scope of work, changing the time of performance to a contract period, and adding additional licenses or permits if necessary.

their Chlorophenoxy derivative Acids, Esters, Ethers, amine and other Salts (i.e., Sodium Pentachlorophenate, 2,4,5-T, Silvex and 2,4,5-TP).

d. Dioxin associated wastes from households only will be handled by LES through incineration and the Sponsor will compensate LES for packaging, transportation, and disposal in accordance with the fee schedule.

e. If a citizen brings any Waste chemical listed in Paragraph c other than those listed in Paragraph d to the collection station, and if the Sponsor decides to accept the Waste, LES will package the material for the Sponsor and the Sponsor will compensate LES for packaging services in accordance with the fee schedule in the Proposal. Further management and disposal of such material shall be the sole responsibility of the Sponsor.

3. Time of Performance. LES shall begin the services to be performed under this Agreement upon Notice to Proceed from the Sponsor, and shall undertake such services to assure readiness for and successful completion of the Household Hazardous Waste Collection Program.

4. Termination. Either party may terminate this Agreement upon sixty (60) days prior written notice to the other, provided that such termination shall be without prejudice to any other remedy the party may have. In the event of termination, any work in progress will continue to completion unless specified otherwise in the notice of termination. The Sponsor shall pay for any such work in progress that is completed by LES and accepted by the Sponsor.

5. Excuse of Performance. The Sponsor's obligation to deliver and LES's obligation to accept for servicing any waste pursuant to this Agreement may be suspended by either party in the event of: act of God, war, riot, fire, explosion, accident, flood, sabotage; lack of adequate fuel, power, raw material, labor, containers, or transportation facilities; compliance with governmental requests, laws, regulations, orders or actions; revocation or modification of governmental permits or other required licenses or approvals; breakage or failure of machinery or apparatus; national defense requirements or any other event beyond the reasonable control of such party; labor trouble, strike, lockout or injunction (provided that neither party shall be required to settle a labor dispute against its own best judgment); which event prevents the delivery, transportation, acceptance, treatment, incineration, or disposal of the waste.

6. Compensation and Payment. The Sponsor agrees to pay LES for its services in accordance with the price and terms of payment set forth in the attachments to this Agreement. Payment terms are net 30 days from invoice. Interest will be charged at the rate of 1.5% per month on all amounts outstanding more than 30 days. The interest will be calculated on the number of days in excess of 30 days past the invoice date to the date payment is received at LES. The Sponsor is responsible for notifying LES of any questions concerning an invoice. In addition, the Sponsor shall be responsible for collection agency or legal fees incurred in collecting payment of an invoice. The Sponsor shall reimburse LES for taxes, tariffs, fees, surcharges, or other charges imposed by legislation or regulations enacted or promulgated after the execution date of this Agreement and levied specifically

upon the transportation, treatment, storage, incineration or disposal of the waste upon thirty (30) days written notice of such change in legislation and upon submission by LES of evidence that such charges have been levied or paid.

7. Generator. The Sponsor shall be deemed to be the "Generator", for recordkeeping and paperwork purposes, of all Wastes accepted by LES during the Household Hazardous Waste Program from residents of the Sponsor's service area.

8. Licenses. LES certifies, that on the day of collection, it will have:

a. Valid Environmental Protection Agency ("EPA") identification numbers for transportation and storage of hazardous and acutely hazardous wastes; and

b. A valid (state) permit for transportation of hazardous wastes.

9. Insurance. LES shall procure and maintain, at its expense during the term of this Agreement, at least the following insurance covering the services to be performed under this Agreement: (a) Worker's Compensation - $1,000,000 or statutory; (b) Employer's Liability - $5,000,000 per occurrence; (c) General Liability (bodily injury and property damage) - $5,000,000 per occurrence, $10,000,000 annual aggregate combined single limit; (d) Automobile Liability - $5,000,00 per occurrence combined single limit; (e) Environmental Impairment Liability for sudden accidental occurrences, for LES Service's facility - $1,000,000 per occurrence, $2,000,000 annual aggregate; (f) MCS-90 Endorsement for hazardous materials transportation - $5,000,000. At least 10 days before the first collection day, LES shall provide the Sponsor with a Certificate of Insurance showing coverages a, b, c and d above, naming the Sponsor as certificate holder and noting the Sponsor's interest. LES shall also provide copies of documents demonstrating coverages e and f above.

10. Title to Waste. Title to all identified Waste accepted by LES at the site from residents of the Sponsor's service area for transport and disposal by LES shall pass directly from such residents to LES at the time of its acceptance.

11. Warranty. LES warrants that it understands the currently known hazards and suspected hazards which are presented to persons, property and the environment by the transportation, treatment and disposal of Wastes. LES further warrants that it will perform all services under this Agreement in a safe, efficient, and lawful manner using industry-accepted practices, and in full compliance with all applicable state and federal laws and regulations. Sponsor warrants that it is in compliance with all applicable state and federal laws governing its activities under this Agreement, and that it is under no legal restraint or order which would prohibit transfer of possession or title of collected wastes to LES or prohibit the servicing of such waste or LES's performance of services under this Agreement. Sponsor will cooperate and/or assist LES, as requested, with its defense, negotiation, adjustment and or settlement of a claim against Sponsor.

12. Indemnification.

a. LES shall indemnify, hold harmless and defend the Sponsor from and against any and all liabilities, claims, penalties, fines, forfeitures, suits and the costs and expenses incident thereto (including cost of defense, settlement, and reasonable attorney's fees) which may be alleged against the Sponsor or which the Sponsor may incur, become responsible for, or pay out as a result of death or bodily injury to any person, destruction or damage to any property, contamination of or adverse effects on the environment, or any violation or alleged violation of governmental laws, regulations or orders, to the extent that such damage was caused by LES's or LES's agents' negligent, willful or intentional act or omission, breach of contract or a failure of LES's warranties to be true, accurate or complete.

b. To the extent allowed by law, the Sponsor shall indemnify, hold harmless and defend LES from and against any and all liabilities, claims, penalties, fines, forfeitures, suits and the costs and expenses incident thereto (including cost of defense, settlement, and reasonable attorney's fees) which may be alleged against LES or which LES may incur, become responsible for, or pay out as a result of death or bodily injury to any person, destruction or damage to any property, contamination of or adverse effects on the environment, or any violation or alleged violation of governmental laws, regulations or orders, to the extent that such damage was caused by the Sponsor's or the Sponsor's agents' negligent, willful or intentional act or omission, breach of contract or a failure of the Sponsor's warranties to be true, accurate or complete.

13. Independent Contractor. LES is and shall perform this agreement as an independent contractor and, as such, shall have and maintain complete control over all of its employees and operations. Neither LES nor anyone employed by it shall be, represent, act, purport to act, or be deemed to be the agent, representative, employee or servant of the Sponsor.

14. Modification. No modification of this Agreement shall be binding on LES or the Sponsor unless set out in writing signed by both parties, except however that the Price List may be modified by LES providing thirty (30) days written notice to the Sponsor.

15. Headings. The titles of the paragraphs of this Agreement are inserted for convenience of reference only and shall be disregarded in construing or interpreting the provisions of this Agreement.

16. Completeness of Agreement. This Agreement and any documents incorporated by reference herein contain all the terms and conditions agreed to by the Sponsor and LES, and no other agreements, oral or otherwise, regarding the subject matter of this Agreement or any part thereof shall have any validity or bind any of the parties hereto.

17. When Rights and Remedies Not Waived. In no event shall the making by the Sponsor of any payment to LES constitute or be construed as a waiver by the Sponsor of any breach of covenant, or any default which may then exist, on the part of LES, and the making of any such payment by the Sponsor while any such breach or default exist shall in no way impair or prejudice any right or remedy available to the Sponsor with respect to such breach

or default. Any waiver by either party of any provision or condition of this Agreement shall not be construed or decreed to be a waiver of any other provision or condition of this Agreement, nor a waiver of a subsequent breach of the same provision or condition, unless such waiver be expressed in writing by the party to be bound.

18. Personnel. LES represents that it has, or will secure at its own expense, all personnel required in performing the services under this Agreement. LES is and shall perform this agreement as an independent contractor, and as such, shall have and maintain complete control over all its employees and operation.

19. Non-Discrimination Provision. During the performance of this Agreement, LES agrees as follows:

a. LES will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of LES. LES agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of the nondiscrimination clause.

b. LES, in all solicitations or advertisements for employees placed by or on behalf of LES, will state that LES is an equal opportunity employer.

c. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

20. Notices. Any notices, bills, invoices or reports required by this Agreement shall be sufficient if sent by the parties in the United States mail, postage paid, to the address noted below:

If to the Sponsor:

If to LES: Laidlaw Environmental Services Inc.

Sponsor shall give written notice to LES of a claim for indemnification under paragraph 12 of this Agreement within fifteen (15) days following Sponsor's first knowledge of the event or occurrence which gives rise to that claim. Upon receipt of notice, and determination by LES that Sponsor has a valid claim for indemnification, LES shall have the right to retain counsel to defend, negotiate, adjust, and/or settle a claim against Sponsor and LES will pay reasonable attorney's fees and other litigation expenses. LES has no obligation to indemnify Sponsor when Sponsor does not provide timely notice of a claim allowing LES the timely opportunity to defend, negotiate, adjust, and/or settle the claim.

21. Governing Law. The Sponsor and LES agree that the validity and construction of this Agreement shall be governed by the laws of (state), except where preempted by federal law.

22. Assignment. The Sponsor and LES bind themselves and any successors and assigns to this Agreement. LES shall not assign, sublet, or transfer its interest in this Agreement without written consent of the Sponsor. Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of the Sponsor, nor shall it be construed as giving any rights or benefits hereunder to anyone other than the Sponsor and LES.

23. Patent Infringement Disclaimer. LES disclaims any and all liability for past, present or future patent infringement relating to any apparatus, process, design, product, composition or structure which is made, constructed, used, sold, practiced or supplied by LES for the purpose of fulfilling the terms of this Agreement. LES does not represent and expressly does not warrant that any apparatus, process, design, product, composition, or structure which is made, constructed, used, sold, practiced or supplied by LES does not infringe any issued or future United States or foreign patent. Sponsor may not seek indemnification from LES for any damages, attorneys fees or costs as a result of a claim of patent infringement brought against it relating to any apparatus, process, design, product, composition or structure which was made, constructed, used, sold, practiced or supplied by LES.

IN WITNESS WHEREOF, _____; and LES have executed this Agreement as of the date first written above.

SPONSOR
BY:_____
TITLE:_____

LAIDLAW ENVIRONMENTAL SERVICES (TS), INC.
BY:_____
TITLE:_____

Corporate Seal:

1992 UPDATE FOR STATE AGRICULTURAL PESTICIDE COLLECTIONS

Charles P. Cubbage, Agriculture Environmental Coordinator
Michigan Department of Agriculture

October 16, 1992

ALABAMA

Dr. Bloch, Pesticide Division (205) 242-2656
Update/Fall 1992 As of this time, Alabama has not conducted any collections of unusable pesticides. They have asked for funding from legislature for a 1993-94 collection. Are also working with Soil Conservation Service which has federal funds that may become available for collection of farm pesticides. Has a very successful and active pesticide container collection program

ALASKA

Ms. Rose Lombardi, Department of Environmental Health (907) 745-3236
Update/Fall 1992 Pesticide collections are held in many of the larger communities, usually once a month. Collections will take household waste and farm pesticides. Pesticides are collected and stored at an approved facility. They are then transported to the lower states for disposal. Funded by the legislature.

ARIZONA

Sheila Burgan, Department of Environmental Services (602) 542-3579
Update/Fall 1992 In 1990, Arizona worked with Ciba-Geigy Corp. to set up pick up points for return of recalled pesticides back to the manufacturer. No other pesticide collections are anticipated at this time.

ARKANSAS

Charles Flowers, Department of Agriculture (501) 225-1898
Update/Fall 1992 The state of Arkansas will conduct their first farm pesticide collection in December 1992. Federal, state, and private industry are working together to make this collection successful. It will encompass one county that engages in many different types of farming. Funding of $150,000-185,000 has been set aside for the collection. Registrations forms have been sent out to potential participants. The collection is for one day, 7:00 AM to 5:00 PM, with no scheduling. Chemical Waste Management will be the waste hauler.

CALIFORNIA

Rich Loder, Department of Pesticide Regulation (916) 654-0606
Update/Fall 1992 The state of California does not have a program for collecting farm pesticides. Many of the counties and cities have annual and monthly collections for household waste and small amounts of farm pesticides. Some high agricultural counties have annual farm pesticide collections which have been very successful. Also, many agricultural counties are starting to get into recycling of pesticide containers. Programs are funded by county and city funds.

COLORADO

Agus Campbell, Department of Health/Hazardous Waste Division (303) 692-3320
Update/Fall 1992 Several counties have household hazardous waste collections. They do not accept farm pesticides, only household-type pesticides. No state pesticide collection programs are planned at this time.

CONNECTICUT

Brad Robinson, Department of Environmental Regulations (203) 566-5148
Update/Fall 1992 Due to budget restraints, funding not available. Last pesticide collection June 1990.

DELAWARE

Grier Stayton, Department of Agriculture (302) 739-4811

Update/Fall 1992 The state of Delaware conducted a household hazardous waste collection in two counties in 1992. This collection was open to farmers with no limitation on types or amounts of pesticides accepted. A total of 30,423 lbs. of pesticides were collected for disposal. Contractor signed the manifest for waste. Funding provided by landfill "tipping fees" collected at disposal sites. No fund is available for future collections at this time.

FLORIDA

Greg Lee, Department of Environmental Regulation (904) 488-0190

Update/Fall 1992 The state of Florida has 23 counties that have an on-going household hazardous waste collection, with only small amounts of farm pesticides eligible. The legislature has approved a grant for a pilot program for a farm pesticide collection in three counties in late fall of 1993. They hope to get permanent funding for future programs.

GEORGIA

Lora Schroeder, Department of Agriculture/Entomology and Pesticide Division
(404) 656-4958

Update/Fall 1992 The state of Georgia does not have a farm pesticide collection program. However, they are starting to recycle pesticide containers.

HAWAII

Robert Boesch, Department of Pesticide Regulation (808) 973-9401

Update/Fall 1992 The state of Hawaii has not had any farm pesticide collections since 1987. This year a collection of several hundred pounds of pesticides damaged during the hurricane were collected for disposal. They do have household hazardous waste collections, but will not take pesticides from commercial farms. At this time, they have no plans for future farm pesticide collections.

IDAHO

Bob Hayes, Department of Agriculture (208) 334-3243

Update/Fall 1992 As of October, the state of Idaho has issued a request for quotations from contractors and are planning an April 1, 1993 farm pesticide collection. State and local government and private industry are cooperating in the project. Funding level had not yet been established. The collection process will include a pre-registration requirement listing types and amounts of pesticides for disposal.

ILLINOIS

Dana Weatherby, Department of Agriculture/Division of Natural Resources
(217) 7858-2427 **Update/Fall 1992**

The state of Illinois had two collections in 1990-91 by the Department of Agriculture, Division of Natural Resources. No charge to participants. Most of the pesticides were banned or old and unusable. The state signed the manifest for all pesticides collected. Approximately 14,000 lbs. of pesticides were collected for disposal. There will be a meeting with Farmers Home Administration for possible grant funding for a collection in 1993.

INDIANA

Ann Piechota, (317) 494-9545, Purdue University, Agricultural Point Source Prevention Program and Dave Scott or Kevin Neal, Indiana State Chemists Office

Update/Fall 1992 The state of Indiana has participated in the Lake Michigan Clean Sweep program funded by EPA as part of the Lakes Management Plant (LaMP) program for Great Lakes protection. The $20,000 collection netted 4,300 lbs. (combined liquid and solid) from two counties with 35 participants.

Costs ran $5.00/lb. A number of factors kept the participation lower than expected; however, carryover of funds ($30,000) will allow a repeat collection in 1993. A fall survey is planned. Previously unreported, 1990 Allen and DeKalb County collections served 62 participants and netted 3,800 lbs. and 560 gallons, also taking in waste oil. The city of Indianapolis has a household hazardous waste collection which will accept small amounts of pesticides.

IOWA

Scott Cahall, Department of Natural Resources (515) 281-8263

Update/Fall 1992 In 1992, the state of Iowa conducted 20 household/farm pesticide collections throughout the state. Approximately 9,000 people participated, collecting 203,152 lbs. of toxic waste (over 100,000 lbs. in farm pesticides). One grower brought in 5,000 lbs. of DDT for disposal. Also, they were informed that one participant had buried 2-50 gallon drums of DDT, dug them up and brought them to a collection site for proper disposal. The waste hauler was the generator and there was no manifesting by growers.

KANSAS

Gary Bontz, Department of Agriculture (913) 296-2142

Update/Fall 1992 The state of Kansas has received an EPA grant for the collection of farm pesticide waste. The collection will be conducted in four counties in May of 1993. The state is working with local government to facilitate the collections. Participants must register to participate, listing types and amounts of pesticides for disposal. Collection will be held at designated local hazardous waste facilities in each county. Funding for future programs is being pursued through state government at this time.

KENTUCKY

Ron Egnew, Director, Pesticide Division (502) 564-7274

Update/Fall 1992 The state of Kentucky has passed a law providing for agricultural chemical collections, however, no funding is associated with the act. With assistance from TVA and EPA, a 1991 pilot project in two counties collected 42,395 gallons of unwanted farm pesticides from 80 farmers. A group of farmers and business people formed a corporation and signed as the generator. Post collection reaction is that the corporation formation is not the best way to approach generator status.

LOUISIANA

Larry LeJeune, Department of Agriculture and Forestry (504) 925-3789

Update/Fall 1992 In 1990, the state conducted a widespread pilot project collecting several tons of unusable pesticides, such as DDT, lead arsenate, dinoseb, chlordane and aldrin. The state served as the generator and signed the manifest. No manifesting was required by participants. Participants filled out a collection request form indicating amounts and types of products for disposal. Participants were assigned time of arrival for disposal at the site.

MAINE

Henry Jennings, Pesticide Control Division (207) 289-2731

Update/Fall 1992 The state of Maine funded a pick up for the removal of dinoseb and 2,45T. Products were collected by the state and transported to Tennessee and Texas. A total of 2,100 gallons of Dinoseb and 420 gallons of 2,45T was shipped to EPA storage facilities. They are working with private industry and federal government hoping for a farm pesticide collection in 1993.

MARYLAND

Dennis Howard, Department of Agriculture, Pesticide Registration (410) 841-5700

Update/Fall 1992 The state of Maryland has increased their chemical product registration fees. Hopefully, in the future some of the fee increase monies will be used for pesticide collections.

MASSACHUSETTS

Tara Zadeh, Department of Environmental Regulations (617) 727-3020

Update/Fall 1992 The state of Massachusetts has not planned any future collections. Ms. Zadeh stated there has been no indication that the need for a future collection is warranted. Also, a large part of the collection in 1990 was educating farmers on purchasing, use, and storage. All farmers that participated in the 1990 collection were required to attend a pesticide educational training seminar for which they also received pesticide certification credits.

MICHIGAN

Charles Cubbage, Department of Agriculture (517) 373-9744

Update/Fall 1992 The Department of Agriculture participated with EPA in the Lake Michigan "Clean Sweep" program as part of EPA's LaMP program for the Great Lakes. The $223,000 program at 8 collection sites served 23 counties and collected 37 tons of unusable pesticides from 330 participants. EPA funding helped to leverage cooperative but separately funded county and commodity group collections. Disposal costs ran $173,000. EPA/MDA funding of $140,000 was used in grants to county or regional cooperative extension service or health department offices. In-kind services amounted to $50,000 with cash match of $33,000 from county, commodity groups, and private cash donations. Pre-registration assured safe delivery and cost control. Paperwork was simplified by EPA's revised process for assigning collection site ID numbers and MDA assuming generator status.

MINNESOTA

Larry Palmer, Department of Agriculture (612) 297-7082

Update/Fall 1992 The state of Minnesota is conducting on-going farm pesticide collections. Funding has been made available through product registration fees. In 1991-92, they collected approximately 120,000 lbs. of unusable pesticides; over 50% was cancelled or banned products. All participants were required to fill out registration forms prior to collection day. Participants are allowed to bring in only products and amounts that have been agreed to on the pre-registration form. All participants must sign a disclosure form at the time of collection. Department of Agriculture signs the manifest.

MISSISSIPPI

Robert McCarty, Department of Agriculture (601) 325-3390

Update/Fall 1992 The state of Mississippi is working on a statewide collection program. They will be having a pilot program in 1993 which will encompass two counties. Survey forms have been sent out to farmers and retailers and will be returned to the cooperative extension service for processing. This is a joint effort of federal, state, and private agencies.

MISSOURI

June Sullens, Department of Natural Resources (314) 751-3176

Update/Fall 1992 The state of Missouri lost their funding for the 1991 farm pesticide collection project. They are still trying to get funds from the legislature for future collections. Some local communities have household collections and will take small amounts of farm pesticides.

MONTANA

Dale Rubrite, Dept. of Agriculture (406) 444-0510 George Algard, Dept. of Agriculture (406) 444-5423

Update/Fall 1992 In 1992, the state of Montana conducted a statewide survey of commercial and private farms to assess the amounts and types of products that would be offered for disposal. The response was very poor, less than 1%. Mr. Algard felt there were many farmers who did not want to identify themselves as having banned or cancelled products, feeling that enforcement action may be taken against them. The department has asked the legislature for funding and would like to conduct a collection in the near future. Mr. Algard feels there are products that need to be collected for properly disposal.

NEBRASKA

Rich Reiman, Department of Agriculture (402) 471-2394

Update/Fall 1992 In 1991 and 1992, the state of Nebraska conducted a recycling program for plastic pesticide containers from farms and aerial applicators. This program has been very successful. Concept of a pesticide collection of hazardous materials has been discussed but have not been able to obtain funding.

NEVADA

Chuck Moses, Department of Agriculture (702) 688-1180

Update/Fall 1992 Nevada has not conducted any farm pesticide collections. They have worked with some farmers, helping them find uses for registered pesticides they are no longer able to use. Clark County has two household collections each year and has been taking small amounts of farm pesticides. Mr. Moses stated they are trying to get an increase in product registration fees that will help fund a statewide farm pesticide collection. They are hoping for a collection in 1994.

NEW HAMPSHIRE

Kathy Schmitt, Department of Environmental Regulations (603) 271-3550

Update/Fall 1992 New Hampshire's Waste Management Department has set up several household hazardous waste collections. These sites will take small amounts of farm pesticides but are not set up for any large quantities. There is a need for a farm pesticide collection but funding is not available.

NEW JERSEY

Ralph Smith, Environmental Protection Division (609) 530-4134

Update/Fall 1992 All collections of hazardous waste (pesticides, etc.) are done by individual counties. Most counties have on-going collections, usually two per year. Collections are funded by county taxes. All people residing in the county can participate but there is a limitation on amounts per participant. Commercial businesses are excluded from participating. Mr. Smith feels the counties are doing a good job of removing hazardous waste from homeowners and farmers for proper disposal.

NEW MEXICO

Connie Matthews, Division of Pesticide Management (505) 646-2133

Update/Fall 1992 The state of New Mexico feels there is a need for a farm pesticide collection but funding has not been available.

NEW YORK

Frank Hegener, Pesticide Division (518) 457-2087

Update/Fall 1992 There is currently a Pesticide Association of New York made up of industry and pesticide users that is in the planning stages of setting up a farm hazardous waste collection possibly in 1994.

NORTH CAROLINA

William McClellan, Pesticide Division (919) 733-7366

Update/Fall 1992 North Carolina has been collecting unusable or banned pesticides for over ten years. Their program is unique from other states. Pesticides are picked up by state inspectors and transported to an approved storage facility. Approximately twice per year, contracts are made with waste haulers for pick up. State is the generator and signs the manifest.

NORTH DAKOTA

Ted Keller and Jack Peterson, Department of Agriculture (701) 224-4756

Update/Fall 1992 The state of North Dakota had three farm pesticide collections in 1992. Most of the products were banned, cancelled or unusable pesticides. 386 people participated and over 80,000 lbs. of pesticides were removed from the environment for proper disposal. Each participant filled out a transfer

form signing the pesticide over to the State of North Dakota. The state declared it to be a hazardous waste and became the generator, signing the manifest. There was no reluctance on the farmer's part to sign the transfer forms. The cost of the collections were $400,000. Average cost was approximately $5.00/lb. Funding for the project came from product registration fees. Mr. Peterson stated it was such a positive program he would expect it to be continued as long as needed.

OHIO

Larry Burger, Department of Agriculture (614) 866-6361

Update/Fall 1992 The state of Ohio will be conducting their first farm pesticide collection which will encompass two counties. Survey and registration forms have been sent out and returned for review. The total funding for the collection is $100,000 which was funded by pesticide fees (product registration, licenses, etc.). Farmers will be scheduled to bring their products to a designated site. The department will be the generator and sign the manifest. Chemical Waste Management will be the contractor and has proposed a bid $6.00/lb. for product disposed of by for incineration, and $2.30/lb. for products disposed of in landfills. Collection will be conducted in January 1993.

OKLAHOMA

Kevin Holly, Department of Agriculture (405) 521-3864

Update/Fall 1992 The state of Oklahoma held several meetings and agreed on the need for a collection, but no funding is available at this time.

OREGON

Rick Voilpo, Department of Environmental Quality (503) 229-6590

Update/Fall 1992 The state of Oregon had their first collection in 1992. They collected 20,000 lbs. of banned or unusable pesticides from 43 participants. Many of the products were very old, such as lead arsenate and DDT. Growers pre-registered with county extension offices, listed amounts and types of pesticides for disposal. No cost to participants and the state signed the manifest. Funding was provided from tipping fees collected at solid waste sites. First collection was very well received. Hoping to have another in 1993. Also, the state has an on-going plastic and metal pesticide container recycling project that has been very successful.

PENNSYLVANIA

Dave Bingaman, Department of Agriculture (717) 787-4843

Update/Fall 1992 The state of Pennsylvania will be conducting their first collection in late fall of 1992. They will be collecting farm pesticides from 6 counties in 1992 and 8 counties in 1993. They informed the farm community through news bulletins, flyers, and meetings. Their contract is set up so that pesticides will be picked up at the farms by the waste hauler. The hauler will be the generator and sign the manifest. State inspectors have visited all farms and identified all pesticide waste and total amounts. The cost of the 1992 pick up will be $125,000-$150,000. Cost is approximately $4.50-$5.00/lb. The pesticide collection is funded through product registration fees with no charge to participants.

RHODE ISLAND

Liz Duquay, Department of Environmental Regulations (401) 277-2781

Update/Fall 1992 Due to budget restraints, funding for pesticide collections have been cut.

SOUTH CAROLINA

Bob Bellenger, Department of Entomology (803) 656-5042

Update/Fall 1992 The state of South Carolina sent out surveys to several high agricultural counties to determine the amount, type of products, and condition of containers of pesticide waste that farmers are holding for disposal. They did not ask growers to identify themselves and the response was excellent --

75% returned. They realize the need for a collection and hope to have their first in 1993.

SOUTH DAKOTA

Department of Agriculture (605) 773-3724

Update/Fall 1992 The state of South Dakota has acquired funding through product registration fees for a collection in 1993. They have sent out surveys to determine types and quantities of pesticides in need of disposal. Hopefully, from the survey they will be able to determine what groups should be involved in the program -- should it be confined to farmers only or to include dealers and homeowners. They know there is a need for a collection and the survey should be very helpful in planning the collection.

TENNESSEE

Nox Writhe, Department of Agriculture (615) 360-0130

Update/Fall 1992 The state of Tennessee is in the planning stages for a farm pesticide collection for mid summer of 1993. Funding has been made available through product registration fees.

TEXAS

D. Wilcox, Water Commission (512) 463-8535

Leslie Smith, Department of Agriculture (512) 425-1620

Update/Fall 1992 The state of Texas has 4 collection encompassing 32 counties. Collection was for private applicators within the counties. Approximately 150 farms participated and approximately 97 tons of pesticides were collected. Sites were set up as a one-day collection from 8:00 to 3:00. No registration was required, first come/first served. (This method was used because farmers would not register as having banned pesticides for fear of having enforcement action taken against them.) Dow Chemical will do some of the disposal at no cost to the state. No charge to participants and the state signed the manifest for disposal. They are planning to have collection in 1993. Funding provided by state legislature.

UTAH

Mark Quilter, Department of Agriculture (801) 538-7123

Update/Fall 1992 Surveys have been sent out and the state of Utah is planning a farm pesticide collection in the spring of 1993.

VERMONT

Allen Karnatz, Department of Agriculture (802) 828-2431

Update/Fall 1992 The state of Vermont has finalized an agreement by committee to increase product registration fees to support and conduct a farm pesticide and household collection. Product registration fees will generate $90,000-$100,000 per year to support a four year program to educate and collect pesticides from users. Sites will be set up throughout the state. Applicants will be required to register to participate with no charge to the participants. Contractor will be the generator.

VIRGINIA

Dan Schwertzer, Department of Agriculture (804) 786-3798

Update/Fall 1992 In 1992, Virginia conducted their second farm pesticide collection encompassing 5 counties. A total of 191 farmers participated and 57,000 lbs. of pesticide waste was collected. Most of the products were cancelled or banned pesticides, such as DDT, chlordane, and dieldrin.

WASHINGTON

Joe Hoffman, Department of Agriculture, Pesticide Division (206) 902-2047

Update/Fall 1992 The state of Washington has been conducting farm pesticide collections since 1988. They have on-going collections each year. In 1992, they conducted five regional collections encompassing 12 counties. A total of 80,784 lbs. of pesticide waste was collected from 277 participants. All participants

must pre-register, listing types and amounts of pesticides for disposal. The chemicals are not declared a hazardous waste until the participants sign a release form at the site. At this time, the state takes possession of the chemicals and is the generator and signs the manifest. Since the state started collecting pesticides in 1988, they have had 17 regional collections covering approximately one-half of the state, collecting 150.8 tons of pesticide waste from 962 participants for disposal. Funding for next year will be approximately $450,000 generated from a sales tax (.7%) on wholesale dealers of hazardous waste chemicals. We should all be so lucky!

WEST VIRGINIA

Robert Frame, Department of Agriculture (304) 348-2209

Update/Fall 1992 The state of West Virginia has not conducted any farm pesticide collections due to budget cutbacks in the department. They are looking at EPA grants or increasing product registration fees to fund future farm pesticide collections.

WISCONSIN

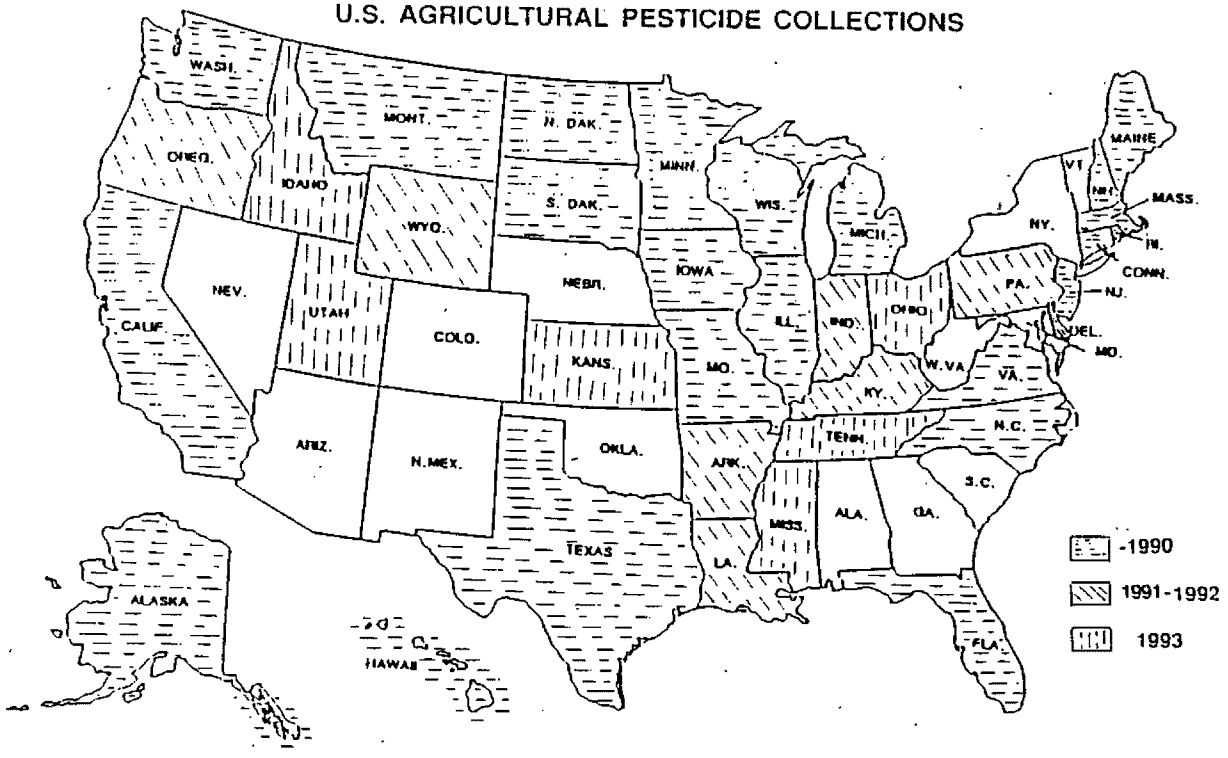
Dave Frederickson, Department of Agriculture (606) 267-4509

Update/Fall 1992 In the fall of 1990, the State of Wisconsin had collections in 3 counties, collecting 39,000 lbs. of unusable farm pesticides from 270 participants for proper disposal. In 1990, due to lack of funds, many farmers could not participate. Approximately 2,400 lbs. of waste could not be collected for disposal. This year, the state is participating with EPA in the Lake Michigan "Clean Sweep" program as part of EPA's LaMP program for the Great Lakes. Wisconsin's EPA share is $90,000. The legislature approved a new annual appropriation of $500,000 for a permanent program capable of serving 12-20 counties per year -- impressive! There will be 2 collections this fall with 13 planned for the spring and 8 more in the fall of 1993.

WYOMING

Tim Link, Department of Waste Management (307) 777-7752

Update/Fall 1992 Conducted a rural pesticide collection program in Wyoming County this year. Some counties have sponsored household hazardous waste collections and local ranchers have disposed of some banned pesticides at these locations. Farmers will be required to fill out survey forms and will be taken by appointment only. The state will take on the responsibility of generator and sign the manifests.



U.S. Agricultural Pesticide Collection Programs
1992 Status

STATE	STATUS	GENERATOR	NOTES
ALABAMA	None		
ALASKA	Ongoing	City	
ARIZONA	None		
ARKANSAS	92 Dec	State	
CALIFORNIA	Ongoing	County	
COLORADO	None		
CONNECTICUT	90		Need $
DELAWARE	92	Contractor	Need $
FLORIDA	Ongoing	County	Need $
GEORGIA	None		
HAWAII	87		
IDAHO	93 Planning		
ILLINOIS	90-91	State	
INDIANA	92	State	
IOWA	92	Contractor	
KANSAS	93		
KENTUCKY	91	Non Profit Corp	
LOUISIANA	91	State	
MAINE	88/90	State/Participant	
MARYLAND	None		
MASSACHUSETTS	90		
MICHIGAN	88/90-93	County/State	
MINNESOTA	91-93		
MISSISSIPPI	93		
MISSOURI	90/HHW		
MONTANA	86		
NEBRASKA	None		Need $
NEVADA	None		
NEW HAMPSHIRE	90/HHW		
NEW JERSEY	Ongoing		
NEW MEXICO	County		
NEW YORK	94 Planning		
NORTH CAROLINA	74-92	State	
NORTH DAKOTA	88-92	State	
OHIO	93	State	
OKLAHOMA	None		Want one
OREGON	92	State	
PENNSYLVANIA	92-93	Contractor	
RHODE ISLAND	90-91		Need $
SOUTH CAROLINA	93 Planning		
SOUTH DAKOTA	93 Planning		
TENNESSEE	93 Planning		
TEXAS	90/92		
UTAH	93 Planning		
VERMONT	91-93	Contractor	
VIRGINIA	92	State	
WASHINGTON	88-93	State	
WEST VIRGINIA	None		
WISCONSIN	90/92-93	State	
WYOMING	92	State	

U.S. EPA's NATIONAL HOME AND GARDEN PESTICIDE USE SURVEY

(Tracy Bone for) Ed Brandt
Office of Pesticide Programs

EPA's Office of Pesticide Programs identified a need for use and safety data on home and garden pesticides to support the reregistration of these products. The National Home and Garden Pesticide Use Survey is a one-time, cross-sectional survey of the use of pesticides in a and around homes in the United States. The study was designed as a national, probability-based sample of households with interviews conducted in person at the residence. Interviewers visited 2,078 residences from a total of 29 different states.

A few of the survey results are summarized below:

90 % of single family residences have at least one pesticide product in storage as do 70 % of multi-family residences;

22 % had more than five products in storage;

15 - 30 % of the pesticide products had last been used over a year ago;

75 % of households without children under the age of 5 had pesticides insecurely stored (not locked or within reach of children), and 47 % of households with children under the age of 5 stored pesticides insecurely;

10 % of households disposed of leftover pesticides and only 2 to 3 % of them used a HHWCP as the method of disposal;

6 % of all households had pesticides in storage that they did not know how to dispose of safely;

Many households have products in storage that have been cancelled by EPA (1 million households with chlordane; 150,000 with DDT; 70,000 with heptachlor and 85,000 with silvex).

For a copy of this report and/or executive summary call (703)308-8111 or call NTIS (800)553-6847.

THE MINNESOTA WASTE PESTICIDE COLLECTION PROGRAM
PROGRAM SUMMARY - DECEMBER 1, 1992

Larry Palmer and Joseph Spitzmueller
Minnesota Department of Agriculture - Agronomy Services Division
Waste Pesticide and Container Disposal Unit
90 West Plato Blvd. • St. Paul, Minnesota 55107-2094
Telephone (612) 297-7102

ISSUE. An estimated 3.5 million pounds of waste pesticides are currently stored in Minnesota. The occurance of unusable or waste pesticide is not peculiar to any county or region. Waste pesticides commonly accumulate on farms and at businesses using pesticides. Since the Waste Pesticide Collection Program began operating in 1990, thousands of pesticide end users have disposed of waste pesticide, are awaiting an opportunity to dispose of waste pesticides, or have contacted the Minnesota Department of Agriculture about disposal options. In a survey taken in 1988, 29% of Minnesota farmers indicated they store old and deteriorated pesticides.

WASTE PESTICIDES. Fungicides, insecticides, herbicides and other pesticides become waste in a variety of manners. The physical nature of a product may change in storage. Government or industry may cancel or ban a product's use. These actions render a pesticide unusable and generate waste pesticide.

INTRODUCTION. Minnesota Department of Agriculture's (MDA) Waste Pesticide Collection Program began operation in July 1990. Authorized by the Comprehensive Ground Water Act of 1989, its goal is to rid Minnesota of waste pesticides. Approximately one-half of the pesticides collected are banned and canceled pesticides, the remainder are unusable. The 115,000 pounds of waste pesticides collected to date have been destroyed at a hazardous waste incinerator at a disposal cost of $560,062. Funding is derived from pesticide registration fees collected by the MDA. The MDA program is designed for farmers and businesses using pesticides. More than 1,000 pesticide users from throughout Minnesota have voluntarily participated in this program.

OBJECTIVES. The objectives of the waste pesticide collection program are to:

- raise awareness of the amount of waste pesticides stored in the state;
- increase understanding of problems related to pesticide storage and disposal;
- provide a safe and affordable means for disposing of waste pesticides; and
- reduce or eliminate waste pesticide accumulation in the future.

LEGISLATION AND REGULATION. Although few pesticides have hazardous waste characteristics or are listed wastes, the inherent hazards associated with pesticides dictate hazardous waste disposal procedures. Hazardous waste disposal is complex. Hazardous waste generators must obtain an identification number and comply with hazardous waste transporter regulations. Hazardous waste disposal is also very expensive. The cost of disposal often far exceeds the original cost of the pesticide.

The complexities and high cost of hazardous waste disposal are barriers to proper disposal. Many pesticide users do not understand hazardous waste regulations, cannot afford proper disposal, and therefore do not comply. Alternatives for pesticide users with waste pesticides are storage or improper disposal.

COLLECTION PROCESS. State and local officials and other interested individuals work to plan collection events. A collection is designed to meet the needs of the area, county or individuals to be served.

The vast majority of waste pesticides collected are brought to "central-site" collections. Sites for central collections are chosen because of their convenience and accessibility for a county or region participating in the program. Central-site collections are estimated to remove 20 to 25% of the waste pesticide stored in the area. Participants are required to transport waste to the collection site. To promote safety, much effort is invested into safe handling and safe transport information preceding the collection.

A few collections have occurred directly at the site of pesticide storage. On-site collections are used when large quantities of waste exist or when the pesticide containers are in poor condition and cannot be safely transported from the site.

Collection participants must preregister prior to the collection. Preregistration of waste prior to the collection occurs up to a previously announced cut-off date. Information gathered through preregistration assists in planning the collection and management of the collection site, and also provides for a safer and more orderly collection. Preregistration is an excellent tool in providing for budgeting purposes.

PARTICIPATION. More than 70% percent of collection participants come from farms. Each participant transports an average of 115 pounds of waste pesticides to the collection site for disposal. The MDA secures all necessary federal and state hazardous waste identification numbers and becomes the generator for the waste collected.

Participants can dispose of up to 150 lbs. of waste pesticide at no cost to themselves. Participants disposing of larger amounts must share disposal cost with the MDA.

A "Disclosure for Waste Pesticide Disposal Management Plan" form is completed for and signed by each participant. With this information the MDA is able to identify all program participants and waste collected.

ELIGIBLE AND INELIGIBLE WASTE. Although, most waste pesticides can be collected for disposal through this program, some pesticides are not eligible for collection. The identity of unknown compounds can be determined, but at great expense. Only a few unknowns are analyzed and collected each year. Other wastes cannot be incinerated because they contain dioxins. Uncollected waste pesticides will remain in storage with the generator. Non-pesticide materials are not eligible

for disposal through the program. Materials such as pesticide contaminated substances (oil, wood, soil), clean or unclean empty pesticide containers, and pesticide contaminated rinsate are ineligible.

HAZARDOUS WASTE CONTRACTOR. A licensed hazardous waste service company assists the MDA in conducting waste pesticide collections. The contractor is present at all collections and acts in accordance with all applicable state and federal regulations. The hazardous waste service company responsibilities include handling, documenting, packaging, transporting, and disposing of all waste pesticides collected.

VOLUNTEERS. Volunteers for each collection event are recruited locally and help maintain a smooth traffic flow at the collection site. Each volunteer is required to attend a "Right-to-Know" training session conducted by the MDA before working at the collection.

PARTICIPATION. Collected pesticides are weighed in their container to arrive at the participant's total poundage. Nearly 90% of participants dispose of waste pesticides without cost to themselves. Disposal of 150 pounds or less is free to most participants. For quantities of 151 pounds up to 300 pounds participants pay $1.00 per pound. For quantities of 301 pounds up to 1,000 pounds participants pay $3.00 per pound. For quantities of 1,001 pounds up to 2,200 pounds participants pay $6.00 per pound. Waste will not be accepted from persons with quantities greater than 2,200 pounds. Government agencies and political subdivisions may participate in the collection program, however, these participants will pay $7.00 for the disposal of each pound.

PROGRAM SAFETY. A primary goal of the collection program is to operate in a safe and efficient manner. Exposure to physical and chemical hazards at the collection sites are minimized to reduce the risks of participants, volunteers and workers. No injuries or releases of waste pesticides have occurred as a result of program operation.

The hazardous waste service company personnel on-site are trained to handle most emergencies that may arise at a collection site.

If an extraordinary emergency arose at a collection, emergency responders in the area would be notified. The MDA routinely provides these responders with a detailed description of the activities and names of responsible parties at each collection site prior to the collection.

Air quality monitoring at collection sites has demonstrated that the risk of chemical exposure at the collection site is small. Collection sites will continue to be monitored to assure site worker's personal safety.

COLLECTION SUMMARY. Of the 115,000 pounds of pesticides collected, more herbicides have been collected than any other kind of pesticide. Insecticides containing DDT have been the most commonly collected pesticide equalling about 12% of total amount collected.

Herbicides with the active ingredient dinoseb and pesticide containing inorganic arsenicals are the next most commonly collected pesticides.

CONCLUSION. Large amounts of waste pesticide are stored in Minnesota, and waste pesticides continue to be generated. This large and growing pool of potential environmental contaminates is an important environmental safety and human health issue demanding attention. Assigning responsibility for the existing problem is difficult, however, because of the many factors involved in waste pesticide accumulation. Pesticide users are reluctant to undertake full responsibility and related expense. They continue to store waste pesticides as the least difficult option.

Storage, while an improvement over improper disposal, is not a long term solution. Often waste pesticides are old and the container is in bad shape, or the pesticide itself is corrosive and the container is deteriorating. Without proper and timely action, these containers are likely to spill or leak and necessitate clean-ups that will result in a costly remediation.

While site inspections and enforcement occur and may cause some end-users to properly dispose of waste pesticides, it is impossible to continuously inspect the estimated 90,000 farms in Minnesota and the businesses using pesticides. Pesticide end-users need sufficient motivation to take waste pesticides from their storage areas and dispose of them properly. The key to the success of the Minnesota Waste Pesticide Collection Program is providing a safe, effective and simple method for end-users to dispose of waste pesticides.

REFERENCE: Minnesota Pesticide Control, Chapter 18B

18B.065 [WASTE PESTICIDE COLLECTION PROGRAM.]

Subdivision 1. [COLLECTION AND DISPOSAL.] The commissioner of agriculture shall establish and operate a program to collect waste pesticides. The program shall be made available to pesticide end users whose waste generating activity occurs in this state.

Subd. 2 [IMPLEMENTATION.] (a) The commissioner may obtain a United States Environmental Protection Agency hazardous waste identification number to manage the waste pesticides collected.

(b) The commissioner may limit the type and quantity of waste pesticides accepted for collection and may assess pesticide end users for portions of the costs incurred.

Subd. 3. [INFORMATION AND EDUCATION.] The commissioner shall provide informational and educational materials regarding waste pesticides and the proper management of waste pesticides to the public.

Subd. 4. [CONSULTATION WITH POLLUTION CONTROL AGENCY.] The commissioner shall develop the program in this section in consultation and cooperation with the pollution control agency.

Subd. 5. [WASTE PESTICIDE COLLECTION ACCOUNT.] A waste pesticide account is established in the state treasury. Assessments collected under subdivision 2 shall be deposited in the state treasury and credited to the waste pesticide account. Money in the account is appropriated to the commissioner to pay for costs incurred to implement the waste pesticide collection program.

Subd. 6. [RULES] The commissioner may adopt rules to administer this section.

Subd. 7. [COOPERATIVE AGREEMENTS] The commissioner may enter into cooperative agreements with state agencies and local units of government for administration of the waste pesticide collection program.

18B.26, Subd. 3. [APPLICATION FEE.] (A)....Of the amount collected after calendar year 1990, $600,000 per year must be credited to the waste pesticide account under section 18B.065, subdivision 5,.....

WORKING WITH THE K-12 SYSTEM IN MINNESOTA

by Shirley M. Dougherty, Director,
Office of Environmental Education

Effective delivery of hazardous waste education to K-12 students requires some knowledge of the general requirements and practices for all education and special requirements for environmental education. I will describe and highlight areas of Minnesota's requirements, structure and avenues of access to the schools and teachers and for working within the established system.

Since 1969 Minnesota has been addressing environmental education (EE). In 1990, a "second generation" state program of EE was initiated with the passage of the 1990 Minnesota Environmental Education Act. The 1990 EE Act built on the lessons learned from the past and projected needs for the future.

The 1990 EE Act established seven goals for all EE programs, an Office of Environmental Education (OEE) and an Environmental Education Advisory Board. For the public (K-12) school system, the EE Act required all schools to have an environmental education program which is outcome-based, multidisciplinary, and integrated into all subject areas.

The Minnesota State Board of Education adopted learner goals for EE in 1990 and model environmental learner outcomes in 1991. Model K-12 currica, based on the requirements of the EE Act are being developed by the Minnesota Department of Education (MDE) (available July 1, 1993).

The Office of Environmental Education (OEE) is part of the Department of Education and oversees all EE programs, formal and informal. To provide access to the K-12 system, the OEE has established Environmental Education Teacher Contacts in each of the over 2100 schools in Minnesota. Access to EE contacts is available through OEE or the principal of each school who assigns the contacts.

In addition, OEE has established an EE Bulletin Board on Minnesota Quick Link, a computer hook-up between each school and the Department of Education. Information is added to the bulletin board by OEE and Quick Link users. To access the bulletin board, contact OEE.

OEE also is establishing a data bank of resources which will be available to teachers through Minnesota Quick Link system. The EE Resources Data Bank includes both people and material resources and is available to all persons. It is intended as a bridge between those who need resources and those who have them. Over 5,000 entries of persons, organizations, programs and materials are included to date. The bank includes both Minnesota and out of state entries and is continually updated. If you wish your resources to be included, a four-page self- categorization form will be sent to you.

Beyond the Department of Education, Minnesota has other state agency assistance for working with teachers. The Office of Waste Management (OWM) has a Clearinghouse for waste management

resources. The Minnesota Pollution Control Agency (MPCA), regulator of hazardous wastes, has an education component as part of its program.

The OWM Clearinghouse is heavily used by K-12 teachers and has the added benefit of being familiar to local solid waste county coordinators. This may be the first place contacted when a teacher searching for resources begins at the local level.

MPCA personnel with the hazardous waste program can provide invaluable assistance and insights for working with teachers and schools. They have had experience with obtaining access to the K-12 system and developing appropriate materials for use in the schools.

The state library system also provides access to teachers through computer data bases and special collections. In Minnesota, the PALS computer system (Public Automated Library System) is used and has links to many data systems. MDE is cataloguing curricula and other information housed in its library for access by teachers. ECOL, an environmental repository library housed in the Minneapolis public library is also an excellent access point to teachers. Additionally, the environmental agencies all have libraries where environmental resources are housed and made available.

Outside the state system, access to the Minnesota K-12 teacher is also provided by the Environmental Resource Directory. The Directory is published by the Earth Day Network, a consortion of private and public organizations dedicated to keeping earth day alive every day and every year through environmental education. This Directory is sent to schools every year and is highly regarded by teachers as a locator of resources.

Although each school district is autonomous, sooner or later each school in Minnesota will be developing environmental learner outcomes and an environmental education program which is multidisciplinary and integrated. Each teacher will be developing unit and lesson plans which align within the program. Materials and resources which are based on the goals of the 1990 Environmental Education Act and which are outcome-based will greatly assist the K-12 educators. Knowledge of the relationship between your resource, the EE goals and MDE model environmental learner outcomes will assist you when seeking to work within the K-12 system. Forethought and ideas on how your resource could be integrated into established subject areas (science, mathematics, English, etc.) would be beneficial to both parties.

Important points to consider when working with the K-12 system:

- Use the established avenues of contact with schools, both at the local (principal of school, EE Contact) and state level (OEE, Office of Waste Management, MPCA Hazardous Waste Program).
- Be familiar both with the general requirements, practices and methods for education and with environmental education requirements which schools and teachers are working to implement (legislated, State Board of Education, Department of Education)
- Develop resources which assist the schools with meeting the requirements (outcome-based, multi-disciplinary and integrated) and know how they relate
- List and/or provide resources to access points and delivery systems used by teachers (OEE, libraries, directories, data banks)

A SCATTERSHOT APPROACH TO YOUTH EDUCATION:
Integrating HHW into Environmental Curriculum

Sarah Dewey
Program Development Specialist
Household Hazardous Waste Project
1031 E. Battlefield, Suite 214, Springfield MO 65807
417/889-5000

Dana Duxbury asked us to identify the magic bullet of youth education. HHWP's approach to youth education did not find a magic bullet capable of infiltrating the stone walls of academia. Rather, we used a shotgun approach to scatter our message widely and found that at least some hit the target audience of youth and youth educators. We have provided information on household hazardous wastes to Missourians, including youth audiences, for the past 6 years. Our program is unique in that it is not linked to a waste management system. Our goal is to raise awareness of the environmental and health effects from the use, storage and disposal of household hazardous products.

WHY TARGET YOUTH

Youth are a very important audience to include in outreach efforts because they are future consumers and citizens, a focus for the community, and conduits of information to the home. Many youth have a sense of environmental stewardship that can be fostered for their home environment. Youth can have input into what types of products are used at home and how these products are used and disposed of. The study of household hazardous products provides more opportunities for realized actions on the part of youth than, for example, protecting the rainforest, which although worthy, is a very distant goal.

It is critically important to provide information on household hazardous products to youth because youth are much more susceptible to harm from these products than adults. Characteristics of youth that make them at higher risk include:

- higher metabolism, so they absorb more toxic substances;
- faster breathing rates, so they inhale more toxins relative to body size;
- lower body weights, so they have more toxins per pound of body; and
- developing immune systems, organ systems, and brain and nervous systems.

Youth are also at risk because of their frequent contact with their environment when playing in the dirt, in the water, and on floors and carpets. As a result, they have more opportunities to be exposed to toxins in the environment. In addition, children often have cuts and abrasions which makes skin absorption of toxins more likely. Finally, youth may not understand the risks from household hazardous products. It is estimated by the Center for Disease Control that 1 out of 10 children, age six or less, will be injured by a household hazardous product. Youth need to be able to recognize the hazards of these products and how to protect themselves.

STALKING YOUTH AUDIENCES

Youth audiences can be approached in both school and non-school settings. Teachers have a very tight schedule. In Missouri, teachers are constrained to present the information covered in the Missouri Mastery Aptitude Tests. These tests limit the amount of additional materials teachers are able to add to their syllabuses. Some of this material may be better suited for the more relaxed atmosphere of a youth group, such as 4-H, Scouts or environmental/science clubs. Involving both teachers and other youth educators strengthens your outreach efforts.

Opportunities to Address Youth and Youth Educators
Art Hazards and Techniques Workshops
Camps
Classrooms
Daycare Providers Training Workshops
District Teacher's Association Conferences

Earth Day Celebrations
Educational Clearinghouses
Environmental Issues Conferences
4-H, Scouts, and other Youth Group Meetings
Health and other speciality Teachers Conferences
National Education Association Conferences
Newsletters, Newspapers and Magazines
Radio and Television Programs
Science and Math Teachers Conferences
Waste Management Conferences
Water Quality Conferences

Presentations. Presentations are often requested for classrooms, youth workshops and youth groups at every age level. Household hazardous waste issues can be linked to the following subjects: art, biology, chemistry, communications, consumer studies, geology, health, science, shop, solid waste, and water quality.

HHWP was invited to talk with the 7-9 grade gifted students in Springfield. Their class was addressing the water quality of a urban creek as part of their community problem-solving exercise. After the presentation, the students identified excess nutrient run-off from yard care products as being responsible for biological oxygen depletion in the creek. The resulting media coverage of their work did much to educate the community and city planners. For another project, some of the students created safer alternative hair spray from citrus and marketed it to their classmates!

The Park Board of a neighboring town included household hazardous waste issues in its summer day camp programs on water quality and stream clean-ups.

Train others to make presentations. If you and your office have limited resources available for presentations, spread your resources farther by training volunteers to provide this information.

We have trained 275 people about household hazardous waste issues in Missouri. Many of them provide presentations, demonstrations and workshops to their local schools and youth groups. We give them line masters for making overheads, handouts they can copy, and instruction on how to provide information on household hazardous wastes in a 30 minute presentation.

4-H offers a summer camp called "Earthlink." The issue of household hazardous waste was presented to junior and senior high school aged campers. They, in turn, use the information in their communities by presenting programs to other 4-H members. There are a number of programs for youth on environmental issues that can be linked to household hazardous wastes.

Train youth educators. There are a variety of youth educator audiences interested in your information. Get your program on the circuit as a willing presenter to youth educator audiences. With educational materials and training, youth educators are more comfortable in presenting new issues. From the workshop, they can modify the information to suit their audience.

- Pollution Solutions is an annual conference designed to provide youth educators with current environmental information, curricula and learning activities. The conference in 1992 was attended by 122 youth educators from southern Missouri. There were three workshop tracks available for the teachers to attend: waste (where household hazardous waste was placed), water, and energy. HHWP presented a talk introducing the topic, discussing the role youth educators could play in their local waste district's ability to meet recent state laws on solid waste management, and describing available household hazardous waste curricula and activities. The conference was held on a teachers meeting day, so that the teachers could attend without missing class. Participants received educational materials as part of the $20.00 registration fee. The conference was co-sponsored by Junior League of Springfield, Ozarks Recycling

Association, Southwest Missouri District Science Teachers Association, and Springfield Public Schools. Many state and local organizations also donated printing costs and educational materials. After the conference, volunteers from the Junior League of Springfield and the League of Women Voters provided presentations on the 4-Rs (Reduce, Reuse, Recycle, and Refuse) to area classrooms. Last year, over 1500 youth received this presentation.

Another conference HHWP presented at is Interface, an annual conference for all Missouri mathematics and science teachers for K-12. Last year, 1700 teachers attended. It is sponsored by the Department of Education. There are a variety of offerings the teachers can select, including information on environmental issues to the use of technology in the classroom.

Educational materials. There are a number of excellent educational materials that address household hazardous waste. In other words, there is no need to reinvent the wheel. Last year, the California Department of Toxic Substances Control and HHWP updated the annotated bibliography, *Tools for the Environmental Teacher*. This describes over 50 curriculum and learning activities for grades K-12 from North America. Using the bibliography, appropriate curricula can be identified for modification. For example, agencies in Missouri, Vermont and California have excerpted and modified activities from other programs to be included in their materials. Once educational materials have been developed or selected, they must be distributed to youth educators. The best way to have the materials used is to provide them in conjunction with some training, such as at presentations or workshops. But there are other routes to materials distribution.

In order to reach youth educators who could not attend our workshops, we distributed our educational and informational materials to educational clearinghouses and to each public library in Missouri. A list of toxic art supplies developed by California was distributed to every school in Missouri. "Hidden Holiday Hazards," a description of common poisonous materials special to the holidays, was distributed to all state daycare operators by the Department of Health. We also submitted articles to state teachers' journals and other periodicals.

Another way for your information to reach youth audiences is directly through materials marketed to youth. There are media outlets, such as newsletters and radio shows, that are directed towards youth. Try to get your materials, information and availability reported by these outlets. As a result of our coverage in youth publications, we have received a great number of requests from youth on how to make the world a better place and how they can play a role in the future of their planet's health. It is exciting and encouraging to hear their interest and concern.

Educational Programs. One way to attract interest in household hazardous waste issues is to provide an intact program that the youth educator only needs to plug into. Teachers, in particular, have a variety of demands and may welcome a break from the routine, if the program is provided by someone else or if the teacher is provided with sufficient materials that require very little preparation time.

HHWP and the Missouri Energy Resources Program (MERP), an educational clearinghouse in St. Louis, developed a Safer Alternatives/HHW Kit available to Missouri youth educators for the cost of replacing the materials. Youth work at stations and clean dirty or corroded household products using alternative products they make from recipe cards. The recipes are given to the youth and many of the products they make can be taken home. The kit also contains background materials, educational activities, and a video.

HHWP is developing the Missouri Storm Drain Stenciling Project. It will provide youth and environmental groups with stencils bearing the message "Dump No Waste, Drains to Streams" and an illustration of a bass. Also in the kits are educational and informational materials. Activities will include mapping the fate of materials dumped into storm drains, determining the jurisdiction of the storm drains and obtaining permission to stencil, and investigating the types of wastes found around storm drains. In order to receive the free stencils and educational materials, the sponsor must agree to return an evaluation and provide a written plan for the continued use of the stenciling materials. This statewide program, in cooperation with University Extension 4-H and the Missouri Department of Natural Resources, has recently been funded and will begin in March 1993.

HOW TO HIT YOUR MARK

I believe that every time you make personal contact with youth, you have been successful. Every time you connect and help an interested youth educator, you have been successful. Work from where you are. If your program or interest is local, focus at the local level. If you work regionally, focus on both local and regional levels.

Youth often have deep feelings for the environmental consequences of our actions. This is from a letter I received from Erin, who was 16 when she wrote to me: "I would like any information that would help me understand what is happening to our environment. If you have any ideas that I could do to make a difference, I would appreciate it. I feel that it is important to help make this planet the best it could possibly be." Foster and encourage this environmental concern in our youth and include them in the resolution of our problems. If you cannot find the magic bullet, use an educational shot-gun approach. Set your sights on the future generation and aim far and wide.

The Household Hazardous Waste Project is a program of the University of Missouri Extension System, in cooperation with the Environmental Improvement and Energy Resources Authority.

CONTACTS

California Department of Toxic Substances Control, Education and Information Unit, PO Box 806, Sacramento, CA 95812-0806. Contact: Melinda Fox, 916/322-0476.

Missouri Energy Resource Project, 7838 Big Bend Blvd, Webster Groves, MO 63119, 314/962-7752.

Pollution Solutions Conference, 1616 E Olive, Springfield, MO 65802. Contact: Sondra Goodman, Coordinator, 417/869-9922.

University Extension 4-H Earthlink Camp, 210 Whitten, Columbia, MO 65211. Contact: Barry Link, 314/882-4012.

* This speech was not available at press time.

EPA

Environmental Fact Sheet

Comments Requested on New Options for Listing and Managing Used Oil

This notice discusses options regarding listing used oil as a waste, management standards for used oil handlers, and possible future incentives for encouraging used oil recycling. Through this notice, the Agency is trying to determine the most practical methods for regulating and managing used oil to protect human health and the environment while encouraging and promoting recycling of this valuable resource.

Background

In November 1985, the Environmental Protection Agency (EPA) proposed to list all used oils as hazardous waste. At that time, the Agency also proposed management standards to control the collection, transportation, and recycling of all used oils. Due to the potential stigma that might be attached to a hazardous waste, in 1986 EPA issued a decision not to list as hazardous used oil that is being recycled. The Agency thought that listing could discourage recycling, resulting in increased incidences of improper disposal of used oil. This decision was legally challenged in 1988, and the court ruled that EPA must make a listing determination for used oil based on the statutory criteria for listing, which relate to whether a material is toxic.

Since the 1988 decision, EPA has been collecting and analyzing new data on the composition of various types of used oils, the management of used oils, and the potential impact of used oils on human health and the environment when mismanaged. EPA believes it is important to consider the effects of other regulations issued since 1988, as well. The Toxicity Characteristic (TC) rule, issued in 1990, subjects many more wastes to federal hazardous regulations, including certain categories of used oil being disposed. Subsequent to 1988, EPA also has issued regulations on hazardous waste storage tanks and underground storage tanks. The Oil Pollution Act was passed in 1990, and the more specific Spill Prevention Control Countermeasure requirements are being developed. These laws and regulations all affect used oil management and disposal.

Action

This notice expands on the Agency's 1985 proposal, considers options regarding listing used oil, and reviews possible alternate management standards for all used oils. The notice does not address used oil generated by do-it-yourself oil changers. However, some incentives that are conducive to the collection and recycling of this oil are discussed.

Listing Options

Option One: This option, which was originally proposed in 1985, would list all used oil as hazardous. This option would include used oils that are contaminated after use and oil that may not be hazardous at the point of generation or contaminated after use.

Option Two: This second option would list only those categories of used oil that are typically and frequently hazardous based on their toxicity at the point of generation, rather than after collection and likely contamination. Oils that may be listed under this option are those from gasoline-powered engines. These include used oils from automotive crankcases, marine engines, and piston-engine airplanes.

Option Three: This option would be to not list any used oils as hazardous and rely on management standards to address the types of mismanagement that have historically occurred with used oil, such as contamination with hazardous waste due to mixing, road oiling, releases, and spills associated with storage and transportation.

If this approach is adopted, used oil handlers would still be required to test oil destined for disposal for hazardous characteristics. Characteristic hazardous waste must be disposed according to hazardous waste management regulations; characteristic hazardous used oil that is recycled is subject to the proposed management standards.

If used oil is listed as hazardous, certain exemptions and exclusions may apply to: nonhazardous wastewaters mixed with small amounts of used oil; industrial wipers (such as shop towels and rags); sorptive minerals (such as absorbent clay used to clean up spills) mixed with used oil; used oil filters and parts that are recycled;

used shock absorbers (including the used oil) that are recycled; and distillation bottoms recycled for the manufacture of asphalt.

A number of other materials may be mixed with used oil in small quantities. To determine whether or not these mixtures are hazardous, the Agency is proposing a qualitative test. If one drop of listed used oil can flow from the mixture, the waste would be considered hazardous. If adopted, this "one-drop philosophy" will allow used oil handlers to drain all free-flowing used oil from mixtures, and dispose of the waste in municipal solid waste facilities.

Options for Management Standards

EPA believes that used oils pose hazards to human health and the environment, and therefore need to be managed safely. The mismanagement of used oil can contaminate air, water, and soil. Contamination primarily occurs from improper storage in containers and tanks, disposal in unlined impoundments or landfills, burning of used oil mixed with hazardous waste, improper storage practices at used oil handling sites and associated facilities, and road oiling for dust suppression. The Agency proposed a comprehensive set of management standards in 1985 for generators, transporters, and recycling facilities that handle hazardous used oil. This notice discusses other management options for used oil.

Under the phased-in approach, the Agency is presenting options for comment on the level of controls needed for used oil. The options are to:

- Provide management standards for **all** used oils to some extent.
- Provide one set of management requirements for all used oil handlers.
- Provide basic management standards immediately that balance the interests of protective regulation and the need to promote recycling. (At a later date, the Agency may provide additional standards, if necessary.)

To reduce the risks posed by mismanagement of used oil and to impose the least burdensome requirements on the used oil recycling industry, EPA is considering implementing the proposed management standards in two phases. Phase I requirements would be fairly simple, "good housekeeping" practices that address the improper storage and disposal of used oil by generators, transporters, recyclers, and disposal facilities. "Good housekeeping" includes such practices as inspecting for leaks, releases, or spills; maintaining storage tanks and containers; and tracking recycled used oil from generators to recyclers. Phase I also proposes to ban road oiling and establishes guidelines that presume all

used oil being disposed is destined for recycling. In Phase II, the Agency may consider additional management standards and controls for used oil, if needed.

EPA proposes that the management standards include a recycling presumption. Under this presumption, all used oil handers would be subject to the same management standards unless their used oil is not recyclable. By eliminating the distinction between small and large quantity generators all used oils would be collected and recycled.

When they comply with the used oil management standards, certain generators—including service station dealers—would be exempt from Comprehensive, Environmental Response, and Liability Act (CERCLA) requirements for off-site releases of used oil.

The Agency recognizes that certain nonhazardous used oils cannot be recycled and will require disposal. To ensure that disposal occurs in an environmentally safe manner, EPA is considering four approaches to control the disposal of nonrecyclable, nonhazardous used oil:

— Allow hazardous, nonrecyclable used oil disposal in hazardous waste landfills.
— Allow disposal of nonhazardous used oil in municipal solid waste facilities after a demonstration that the used oil is not hazardous **and** not recyclable.
— Allow limited disposal of nonhazardous used oil if the disposal facility is in compliance with certain design and operating criteria that will be developed by EPA at a later date.
— Ban land disposal of nonhazardous used oil.

In addition to used oil management standards, this notice discusses possible future approaches for promoting the collection and recycling of used oil generated by people who change their own oil.

Contact

For additional information or to order a copy of the *Federal Register* notice, contact the RCRA Hotline, Monday-Friday, 8:30 a.m. to 7:30 p.m. EST. The national, toll-free number is (800) 424-9346; TDD (800) 553-7672 (hearing impaired); in Washington, D.C., the number is (703) 920-9810, TDD (703) 486-3323.

Copies of documents applicable to this rulemaking may be obtained by writing: RCRA Information Center (RIC), U.S. Environmental Protection Agency, Office of Solid Waste (OS-305), 401 M Street SW, Washington, D.C. 20460.

USED OIL AND FILTERS:
WASHINGTON STATE'S PROGRAMS

By

William P. Green
Washington State Department of Ecology

As in many areas of the country, Washington has seen the shrinkage in its used oil collection system over the past decade. This system, based on voluntary participation of businesses, usually gas stations, was deemed to be inadequate to meet the needs of the state, due to the withdrawal of many service providers. Businesses withdrew because of fears of liability for spills, contaminated loads, and long-term CERCLA liability. This was articulated in Washington's 1990 Problem Waste Study, Volume 3, Used Oil.

To address this reduction of service, the legislature enacted the Used Oil Recycling Act of 1991, now coded as chapter 70.95I of the Revised Code of Washington (RCW). This act forms the basis for the current activities in used oil going on within the state. Two of the goals of the act are:

> the provision of convenient collection service for all citizens of the state, and
>
> lure a re-refiner of used oil to establish a site within the state through the maintenance of a stable, yet substantial used oil supply.

The methodology selected to bolster the number and convenience of sites was through the state's moderate risk waste system implemented by local governments. Moderate risk waste is the combination of household hazardous waste and conditionally exempt small business waste. It is important to note that in placing used oil under the moderate risk waste stream, this is not to be construed that Washington has declared used oil a hazardous waste. The use of the moderate risk waste stream is for administrative purposes only. Not all MRW streams are hazardous.

Local governments are required to amend their moderate risk waste (MRW) plans to provide for convenient collection of used oil. Each planning area will set collection and re-refining goals for 1992 through 1996. The goal for 1996 will be 80%. Ecology was required to prepare guidelines on the amendments and the various requirements of the law.

In addition to establishing or augmenting the current collection system, local governments are responsible to provide education to general public on the advantages and the availabilities for used oil recycling. Local governments are required to pass and enforce an ordinance requiring retailers of used oil to post sign encouraging recycling and providing the location of the nearest recycling facility.

To describe the actual development of the guidelines and the subsequent

amendments, let me introduce you to Cascade County, Washington. Cascade County is a hypothetical jurisdiction, which sits astride the Cascade Mountains. It was designed by Ecology staff for illustrative purposes in the development of the used oil amendments. Throughout the remainder of my presentation, you will see different sections of the used oil amendment for Cascade County.

In the development of the guidelines, we encountered two major issues:

> How do we include currents efforts in meeting the requirements of the new law?
>
> What is convenient?

Required for all submissions of amendments is a checklist of the requirements ("Appendix C") prepared by Ecology. Ecology amended the checklist to provide for references to two documents, the current plan and the amendment. If a current effort met a requirement, the county only needed to reference on the checklist to be in compliance.

To provide guidance on convenience, Ecology gave the counties a choice to use two options, one planning based, the other based on standards.

In the first, the "Service Area Designation" approach, counties basically look at where the people are located, and where they go to complete routine tasks, such as shopping, school, or other public services. Oil collection facilities should be cited in such a way that all citizens will have at least one available at one of the routine places they go.

In the second, the "Benchmark" approach several specific options were made available, depending on whether the county is urban or rural in nature. For urban counties, three benchmarks are acceptable:

> Curbside used oil recycling (three of our counties have already implemented this),
>
> 90% of the population is within two miles of an oil collection facility, or
>
> there is an oil collection facility for every 10,000 residents.

For rural counties, two benchmarks are available:

> there is an oil facility at each solid waste handling facility, and one in each town of 2000 or greater that is more than five miles from an alternate oil facility, or
>
> there is an oil facility in each town of 1000 or more that is more than five miles away from am alternate oil collection facility.
>
> Out of these options, it is estimated the between 200 and 500 new oil collection facilities will be sited and/or constructed in the state by 1996.

As part of the moderate risk waste system, these efforts are eligible for Ecology's MRW assistance program, both technical and financial. Special funds (about $3 million) were set aside in the summer of 1992, for developing each county's used oil amendment.

Finally, training was provided to Ecology staff and local government staff. In this half-day training, the flexibility granted to local government in solving their used oil problem was emphasized. Local government staff were provided with three documents:

> Ecology's "Used Oil Recycling Amendment Guidelines for Local Hazardous Waste Plans; Publication No. 92-38",
>
> "(Model) Used Oil Recycling Amendment to the Local Hazardous Waste Plan for Cascade County, Washington, July 1992", and
>
> "A Guidebook for Implementing Curbside and Drop-Off Used Motor Oil Collection Programs" by the Washington Citizens for Recycling in behalf of the American Petroleum Institute.

In addition, Ecology has been working with the Western States Petroleum Association in behalf of the counties. Goals of this contact include greater private participation in oil collection, and more convenient re-refining opportunities for the counties. Meetings directly between association members and local governments are being considered for early next year. Already two auto parts store, Schuck's and Al's as well as Texaco service stations are operating sites jointly with local jurisdictions.

In support of local efforts, the legislature assigned Ecology to develop and implement a state-wide education program. Ecology is also to develop management standards for used oil collection facilities (which may be classified as limited moderate risk waste facilities, and thus require no permit). Ecology is also to promulgate rules governing transporters and processors of used oil. These rules will be incorporated in the state's dangerous waste regulations.

Several prohibitions regarding the disposal of used oil were included in the act, the violation of which is a misdemeanor (punishable by 90 days in the county jail, $1000 fine or both). These prohibitions include:

> the use of oil for dust suppression or weed abatement, effective January 1, 1992;
>
> the use of absorbent-based oil-changing kits, effective July 1, 1992; and
>
> the disposal of oil in a municipal solid waste landfill or any other facility not managed in conformance with the Act.

The Act focussed on used oil from households. Although not required, counties are encouraged to address other issues related to used oil. Such issues may include used oil filter, antifreeze, and used oil from

small businesses, as appropriate to the jurisdiction. If included in an approved used oil amendment, projects related to these issues are eligible for Ecology support.

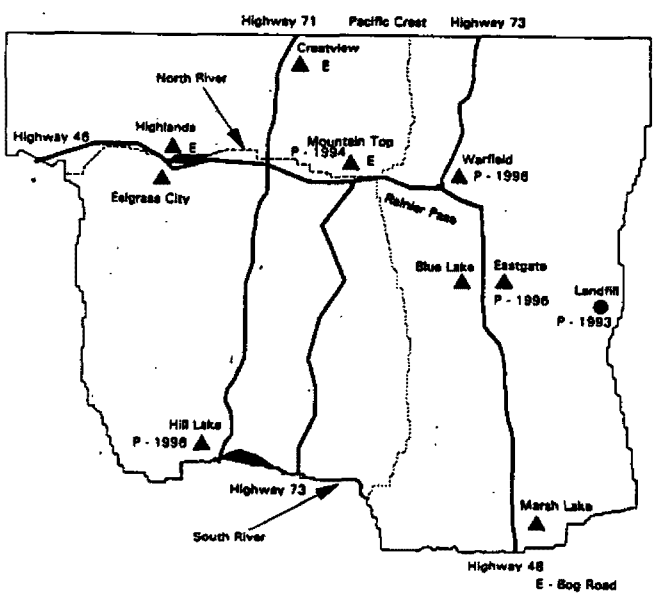
So, what do we get from all this paperwork? First of all, we get the used oil collection and re-refining goals. Of what use are these? We can take these numbers to the petroleum industry as a stable feedstock for the new re-refinery to be established in the state. Right now, our estimates are that we will be ready to re-refine some seven to ten million gallons by 1996. That's a lot of oil.

We have a planned and centrally (at the local level) implemented used oil system. This provides stability in used oil collection. If one vendor drops out, then another will be found to take his/her place. This provides consistent service to the public, avoiding the fallout of the 1980's, as well as (again) stable feedstock for the re-refiner. It also provides information for budgeting of resources to maintain the system, in case of market fluctuations.

Finally, it provides a thorough and hands-on analysis of the used oil system in the state. Counties are requested to present in their amendments any impediments to the proper management of used oil. The state has committed resources to the reduction or elimination of these impediments. Through an identical process in the moderate risk waste plans, many impediments were identified and about 50% have been eliminated by state and local policy development, information sharing, and, as necessary, legislation.

In the end, our efforts in used oil in Washington mimic our efforts with household hazardous waste. Enough planning to establish a local-state partnership to move this waste stream out of our lakes and streams and other water bodies: especially the Columbia River and Puget Sound. There is a radio ad that Metro of Seattle ran which said: "There was an oil spill in Puget Sound today...and its source was you and me." We hope to change that.

CASCADE COUNTY



APPENDIX A USED OIL RECYCLING AMENDMENT ELEMENTS CHECKLIST

#	Element	Ref. in plan	Ref. in amendment	OK*
A-1	Household Used Oil Generation and Management	4-5	A-1	
A-2	Existing and already-planned Collection Services	5-1, 7-5	A-1	
A-3	Needs for upgrading the Used Oil Collection Services		A-2	
A-4	Opportunities to expand or upgrade household used oil collection services		A-2	
A-5	Used Oil Education resources	7-1	A-3	
A-6	Used oil hauling and markets		A-3	
A-7	Financing of used oil efforts		A-3	
A-8	Other needs related to used oil		A-3	
B-1	Collection and reduction, reuse, and re-refining goals for 1993 - 1996 (two goals)		Coll: A-5 also A-8 Ref: A-8	
B-2	Number of used oil collection sites needed for adequate service		A-5	
C-1	Improvements to used oil collection services		A-5	
C-2	Marketing strategy for household oil		A-6	
C-3	Program for used oil education	7-1		
C-4	Enforcement strategy for signage ordinances, including ordinance development	7-7		
C-5	Implementation Schedule and annual budgets for all used oil activities		App C Guideline	
C-6	Roles and Responsibilites matrix for all jurisdictions involved in used oil management		A-6	

APPENDIX B SAMPLES OF SERVICE LEVEL DETERMINATIONS

RURAL SCENARIO--CASCADE COUNTY (pop. 75,000)

Cascade county is a rural Washington county, a map of which is shown at right. Cascade county has one major city, Mountaintop, with 35,000 people. The rest of the population resides in smaller towns or in unicorporated (agricultural) areas. The population of Cascade county is divided as follows:

Mountaintop	35,000
Eastgate	5,000
Crestview	4,500
Warfield	1,900
Blue Lake	1,500
Hill Lake	1,200
Marsh Lake	900
Highlands	800
Eelgrass City	600
Unincorporated	23,600

All of the above cities have commercial districts. In addition, there is a separate regional mall in Mountaintop. The landfill is located near Eastgate, and the self-haul rate is 30% (about equal to the unincorporated population). Eastgate and Blue Lake are contiguous, as are Highlands and Eelgrass City.

Year	Recycling Goal	Service % (as % of pop.)	Population Served
1993	25%	na	na
1994	40%(x1.25)	50%	38,000
1995	60%	75%	63,000
1996	80%	100%	75,000

Option One

Year	Proposed Sites	Pop. Served
1994	Two sites Mountaintop (Downtown and mall)	35,000
	Crestview	4,500
	Total	39,500
1995	Eastgate Landfill (self-haul)	23,600
	Total	63,100
1996	Eastgate-Blue Lake	6,500
	Warfield	1,900
	Hill Lake	1,200
	Marsh Lake	900
	Highlands-Eelgrass City	1,400
	Total	75,000

TOTAL SITES = 9

Option Two

Proposed sites

Solid Waste Stations	1
Cities over 2000	
Mountaintop	35,000
Eastgate	5,000
Crestview	4,500
Towns 1000 - 2000	
Warfield	1,900
Blue Lake*	1,500
Hill Lake	1,200

*Contiguous to Eastgate

Solid Waste + Cities over 2000 = 4 sites

Cities and towns over 1000 = 5 sites

PART C

RECOMMENDED PROGRAMS AND ACTIONS

1. Improvements to used oil collection services

The county has set the following collection goals (based on total household used oil generated = 160,000 gallons/year):

Year	Goal	Gallons
1993	25%	40,000
1994	40%	56,000
1995	60%	96,000
1996	80%.	128,000

In order to reach these goals, the county has set the secondary goal to service the following populations:

Year	%Pop	Population
1993	33%	25,000
1994	50%	37,500
1995	75%	63,000
1996	100%	75,000.

The following facilities are proposed:

		Population Served	Total Population Served
1992	Current facilities at 10%	7,500	
	Marsh Lake	900	(900)
	Execute interlocal		
1993	Eastgate Landfill MRW facility	23,600	(24,500)
	for Unincorporated County		
1994	Mountaintop	35,000	(59,500)
	Upgrade Joe's Auto Supply		
	New facility at Transfer Station		
1995	Crestview	4,500	
	Upgrade Bob's Snowmobile		
	Highlands-Eelgrass City	1,400	(65,400)
	Upgrade PUD, move to Rotary		

1996	Hill Lake	1,200	
	New PUD facility		
	Eastgate-Blue Lake	6,500	
	Mike's Gas-n-Go		
	Warfield	1,900	(75,000)
	Construct facilty at Rodeo Club		

Total Number of Sites = 8

An upgrade will be the installation of a 250 above-ground storage tank, including secondary containment and barriers. Tanks at the Eastgate Landfill and the Mountaintop Transfer Station will be 1000 gallons. Minimum maintenance of a station includes intermittent monitoring (full-time staff will be provided at the landfill and transfer station), keeping the area clean, and notifying the county when a pick-up is needed.

2. Marketing of Used Oil

The High School shall receive first preference for the used oil. This will absorb 75% of the collected oil in the first year. A determined effort by the county will lead to a re-refining rate of only 55% by 1996 (see note below). There are several impediments which prevent Cascade County from achieving the 80% re-refining goal as required by in the guidelines:

Used oil is being diverted to the High School. The school's used oil burner is the only source of heat for the building. Conversion to a more conventional system would take many years to finance. Emission tests have shown no adverse effects of the used oil.

There is an 85 cent per gallon price differential to re-refine used oil. Re-refining used oil will cost the county between $125,000 - $150,000 over the life of the plan.

The hauler for re-refining only has a capacity of 100,000 gallons per year. In 1996, he will be running at 88% of capacity, which is difficult in such a remote area as Cascade County, where roads may be closed for extended periods during the winter.

[NOTE: In this example, Cascade County could not reach the 80% goal by 1996. This was the example selected by Ecology in order to illustrate the content and format of an impediments section. It is expected that all counties will make determined efforts to meet or exceed the 80% goal by 1996.]

Appendix C Sample Implementation Schedule: Cascade County

SITES	1993	1994	1995	1996
Eastgate Landfill	10/1			
Mountaintop		3/1		
Mountain Mall		6/1		
Crestview (etc.) . . .			6/1	
Education	3/1 ---->	---------->	---------->	---------->
Ordinance	Develop -->	Implement -->	---------->	--

The numbers below are only to illustrate the format of the table.

Budget	1993	1994	1995	1996
Education	included	in current	MRW efforts	------
Ordinance	$10,000	$5000	$5000	$5000
Site Development	2000	3000	2000	6000
Collection	3400	16,000	51,000	88,000
Reserve	9000	12,500	21,000	28,000
Total	24,400	36,500	79,000	127,000

RECYCLING GOALS

1993	1994	1995	1996
25% (rate)	40%	60%	80%
40,000 GAL	56,000 GAL	96,000 GAL	128,000 GAL

Total in region = 160,000 gal

Projected gallonage of used oil collected including end use

Year	Collected		High School		Energy Rec.		Re-refining	
1992*	16,000	10%	12,000	7.5%	4,000	2.5%	0	0
1993	40,000	25%	30,000	18%	6,000	4%	4,000	3%
1994	56,000	40%	30,000	18%	10,000	7%	16,000	10%
1995	96,000	60%	30,000	18%	16,000	10%	50,000	32%
1996	128,000	80%	30,000	18%	10,000	7%	88,000	55%

Volumes are in gallons. *From estimates in moderate risk waste plan.

API's Used Oil Program

Craig Campbell

Thank you ...

It is a pleasure to be with you to discuss the petroleum industry's perspectives on used oil.

During our time together, I plan to cover several areas:

1. Discuss the industry's role in solving the problem.
2. Give you some background information to help define the scope of the problem
3. Communicate our position on the key used oil issues.
4. Highlight the components of the petroleum industry used oil program.

Let's start with the petroleum industry's role. While some of you may be familiar with the used oil problem, my guess is that few have had the opportunity to hear our thoughts on how best to solve it. So right up front, I want to emphasize that this is a very important issue for us and I want to clearly establish two fundamental reasons for the member companies of API making used oil a top priority.

First and foremost, we want to demonstrate that we are serious about protecting the environment. The key word is demonstrate and we are anxious to do that.

Secondly, we recognize that no one group working alone can significantly impact this problem. In fact, successfully managing used oil will require a great deal of cooperation. Oil companies, regulators, legislators, local governments, retailers, educators, recyclers, re-refiners, generators and I think most importantly, the Do It Yourselfer (DIY) -- all must work in harmony to make a used oil management system work. Accordingly, we want to be proactive, involved, and use our resources in the development of initiatives that result in the collection and recycling of used oil. In other words, we want to be part of the solution.

Having established the industry's role, I would like to present some background regarding the scope of the used oil problem.

Any discussion of this subject should include all generators of used oil but for our purpose today, we can divide them into 3 broad categories: industrial users, commercial vehicles, and personal vehicles.

For the most part, we believe that in the industrial and most commercial sectors used oil generated is being managed properly and recycled.

Our focus therefore is on oil identified for use in personal vehicles. This product is essentially purchased one of two ways: installed (service stations, car dealers, Quick Lubes) or over the counter (discount store, grocery store, auto parts store). The over the counter sales include oil sold to those individuals who prefer to change their own oil -- the DIYer. I might add that the DIY oil is not limited to automobiles. Oil changed in lawn mowers, boats and snowmobiles for example, are included in the scope of the problem.

Typically automotive oil that is changed at a service facility is placed into a storage tank. Periodically, the proprietor calls a collector and the product is picked up and recycled.

The DIYer, on the other hand, faces a more difficult problem when deciding what to do with his used oil. If proper disposal is neither convenient nor important to him, that oil may end up in landfills, backyards, or sewers, polluting both the soil and water.

Each year, it is estimated that DIY oil changers generate about 200 million gallons of used automotive oil. While some state and local governments have collection programs, our concern is that only a small percentage, perhaps as little as 10% of the DIYers used oil is being collected and recycled.

However, to be fair, there are several impediments to proper collection and recycling of DIYer

used oil including the lack of convenient used oil collection centers, the absence of coordinated information and education programs which motivate the DIYer and concerns about liability issues.

The petroleum industry has developed a policy statement which defines our position and recommended actions for collection and management of used oil. Three basic points summarize our thoughts:

1. We encourage and support state initiatives to promote public and private sector collection and education.
2. We support legislative and regulatory initiatives that set environmentally protective and cost effective management standards for recycling used oil.
3. We recommend that used oil not be declared a hazardous waste.

Now I'd like to take a couple of minutes and expand on these points.

You'll note that we've identified the states as the principal focus for these initiatives. We chose this path because state programs have several advantages.

1. They can be tailored to meet unique circumstances and demographics.
2. They can take advantage of local resources.
3. They are not subject to changes in the marketplace and therefore form a permanent core of collection facilities.

And as you will see later in my remarks, this approach is gaining acceptance.

The other points that I would like to expand on involve our views regarding the classification of used oil and management standards. The API and its member companies oppose listing used oil as a hazardous waste for several reasons:

1. Used oil destined for recycling is a resource, not a waste. It has value in the marketplace and as a source of energy.
2. Listing would increase the liability associated with handling used oil and thereby
   - reduce the value of the commodity
   - create a stigma which could discourage participation in collection and recycling.
   - and unnecessarily increase the cost of collection and management.

Put simply, listing appears only to make the collection and recycling of used oil more difficult and expensive - certainly counter-productive to the program we are trying to initiate. Alternatively, environmentally protective and cost effective management standards will ensure responsible management of used oil while not discouraging its collection and recycling.

Today while neither the U.S. Environmental Protection Agency nor Congress has decided how used oil should be regulated and managed, both groups are seriously considering the issue. It is our hope that our government leaders see the wisdom of not listing used oil.

During the balance of my time today, I am going to review the API Used Oil Program which was developed to promote the Industry positions just discussed. This program, which consists of communication, legislation development, implementation, outreach and company programs is endorsed and managed by a 19 member Used Oil Working Group.

The first component is program communication. This involves industry presentations to public policy groups, legislators and other interested organizations to promote the need for used oil collection and recycling. Focusing efforts in this area enables the API to communicate industry's position on used oil recycling to the public and to involve the petroleum industry in promoting model legislation and program development. To support this effort, API has developed and disseminated the Policy Statement mentioned earlier; a general information brochure; and a Q & A Program Sheet.

The second element of our program consists of legislation development. By working with state

legislators in conjunction with our State Petroleum Councils, we are assisting the states in developing effective legislation to increase the collection of used oil on a permanent basis. The API Used Oil Working Group has developed state model statutory language for used oil which emphasizes collection, education, management standards, and funding.

Because adoption of these objectives is such an important part of our program, I am going to discuss them in more detail.

First Collection. From an environmental perspective, we view this as the most critical and perhaps the most difficult component of a used oil program. The focus here should be the DIY and therefore, convenience becomes the key factor.

Accordingly, the model bill encourages the establishment of permanent used oil collection facilities at public sites as the primary collection effort. To complement this core of sites, the private sector is also encouraged to accept used oil from the public. The incentive for participation comes in two forms. First, used oil collectors are indemnified from expenses associated with the disposal of used oil that has been contaminated and therefore, non-recyclable. Second, grants are made available for the establishment and maintenance of public used oil collection facilities and for programs that support other types of used oil collection and recycling. An example would be curbside collection; which provides the ultimate convenience to the DIYer and which we feel holds a great deal of promise as being the most effective way to secure high residential participation.

The second objective of the model bill involves education. For used oil recycling to work, people must not only know where it can be dropped off, they must first want to dispose of it properly. At a minimum, public awareness programs should include a toll-free telephone number for used oil recycling information, appropriate signage indicating the location of used oil collection sites and some material for the classroom to ensure good habits are learned early by future DIYers.

Enforceable management standards which address collection, handling, transportation storage and recycling of used oil, comprise the next important component of our Model Bill. This ensures only responsible individuals are involved in handling used oil. While we encourage penalties for improper disposal of used oil, we feel legislation should exempt used oil collection facilities from liability for spills and releases as long as the collection facility does not knowingly violate the applicable used oil management standards.

The final objective of our Model Bill which I will discuss is funding. Obviously implementing and administering this program requires financial backing. Since improper disposal is a societal problem, ideally used oil programs would be supported by state general funds. However, since these resources are typically strained, the petroleum industry supports an environmental fee assessed on automotive oil sold in the state in bulk and packaged form. However, we feel strongly that the fee not confer a competitive advantage to a particular oil industry segment and should only be collected on sales for consumption in the affected state.

To complete my discussion of legislation development, I would like to make a couple final points. First, we have a consensus from the 19 members of the Used Oil Working Group to promote the Model Bill I just described as an industry position. This can be significant when working with legislators and regulators.

Second, the model bill is currently being reviewed by the Council of State Government's Suggested State Legislation Committee for inclusion in the publication, Suggested State Legislation. If approved, this endorsement will give our program added profile and exposure. (Discuss EPA Award, NACO, SSEB if appropriate).

And finally, in 1991, South Carolina, Texas, California, and Louisiana passed legislation very

similar to our model bill and other states are currently studying its components.

The third element of our used oil program involves working with municipal managers, regulators, and in some cases, tax administrators to implement their programs. Specifically, to assist with implementation, we will use three publications: The first will explain how to set up curbside and drop-off collection programs including how to select the type of program best suited for your particular area. The document is based on national surveys of existing programs and will include examples of budgets, procedures, equipment and model programs that are currently working.

The second publication will address the question of end-use for used oil by examining the various alternatives in terms of environmental impact, energy balance, geographic practicality, and economics. This should prove useful to the recycling coordinator faced with deciding on options for end-use.

Finally, the third publication will consist of a public relations kit containing a model public relations campaign and camera-ready materials which can be personalized for the respective municipality. This will provide local governments with a graphically consistent way to promote their programs at minimal cost and to inform the public how and where to properly dispose of used motor oil.

The fourth component, outreach, involves an effort to establish a leadership position and serve as a focal point by developing educational/reference materials on all phases of the issue and cultivating coalitions with other interested groups. Individual companies provide speakers to communicate our program to interested parties with different perspectives. By doing so, API is able to reach a broad audience and work with other groups interested in being part of the solution. (e.g. Association of Petroleum Re-refiners, National Oil Recyclers Association, and the Household Hazardous Waste Conference.)

To further our outreach efforts, we are developing a Digest of State Used Oil Statutes and Regulations which is a synopsis of used oil recycling legislation and regulation in all 50 states. In addition, we have assembled a Used Oil Bibliography which lists publications, magazines, government documents and state contacts that deal with used oil.

Finally, and most importantly, our member companies are promoting the collection of used DIYer oil and in some cases, are investigating recycling options for the proper end use of used oil. Ten member companies have, in the past year, formally announced voluntary used oil collection programs in 39 states and the District of Columbia with over 5,500 locations accepting used oil from the public. This is up from approximately 800 locations in early 1991. Other API member companies are studying the issue and we expect expansion and new program announcements in the near future.

In Houston, Texas, five companies have donated the resources necessary to initiate a used oil curbside collection demonstration in Houston, Texas. This pilot project will serve approximately 30,000 homes and become operational in April, 1992.

In addition to actually collecting DIY used oil, our member companies actively support state and local government efforts to collect and recycle used oil, reinforcing the notion that public and private entities working cooperatively can have a great impact on bringing improperly disposed used oil into a management system.

Looking ahead there is obviously a lot to do to bring a program of this size to maturity. For our part, the agenda is simple, we want used oil managed, not polluting the environment and we are anxious to work with all interested parties to achieve that end.

WASTE TYPES AND QUANTITIES

George Kinney, Environmental Supervisor, Dakota County, Minnesota

During this talk I'd like to focus on the HHW that could be expected in a new program. I'll also talk on factors that affect turnout.

If you're setting up a collection for the first time in an area, review the demographics of the community. Older communities will have more HHW, and more expensive HHW. Rural communities will have a different mix of wastes than an urban area, and the suburbs will bring in lawn chemicals and five gallon pails of water-based driveway sealer in great numbers! Just as important is the wealth of the community. We see more wastes, and less action at the exchange areas, in the more affluent communities than in the more modest communities. In our area, some of the more modest are also rural, and they may have more uses for many of the chemicals on the exchange tables.

How extensive is the collection program?

Several types of collection programs are in existence across the country. Some collect only paint at certain events, others collect all chemicals except paint. There are good reasons to follow either model.

In Dakota County, MN, we have had many event collections that included tires, and in a few instances, white goods, neither of which could be considered HHW. Presently, our collection site at Gopher Smelting and Refining in Eagan, open twice a week, takes, in addition to "mainstream" HHW, tires, used oil, and auto batteries. Both Gopher Smelting and Aptus, our other permanent site, also take household batteries. Recently we began taking fluorescent tubes. Our belief is that, as the County, we must be responsive to the needs of the public, and if that includes a tire drop-off for a reasonable fee, we should make an effort to include that service. By being extensive, we believe we will attract residents to the program who would otherwise not feel they had enough wastes to take the time to come. Back in 1985 and 1986 we worked with a contractor that would not take aerosol cans. We notified the public to not bring in aerosols. We received a good number of aerosol cans, some inserted into half-full cans of paint, many others hidden in plastic bags in the bottom of boxes.

Another reason for Dakota County's emphasis on offering to act as a disposal site for tires, oil and batteries, which could be dropped at service stations (for a higher fee), is that it gives us a chance to disseminate additional materials to those using the site. Our experience is that three to four per cent of our households have brought HHW to event collections or permanent sites annually since 1989. In 1990, 15% of the users surveyed indicated they were repeat users of HHW sites. That number is now between 20 and 25%. The number of new users, perhaps 3,000 household this year, will have greater awareness of HHW, and how to avoid creating additional HHW, as a result of using our sites.

How frequently does truly dangerous waste arrive?

This is a frequent question asked of those of us doing HHW work. The simple answer is "infrequently". In the metro area of the Twin Cities, we probably have one or two incidents of picric acid, high explosives, etc., annually. More frequent items, such as potentially peroxidized ethers or blasting agents, homemade black powder, or old shells and cartridges, occur with enough regularity to keep staff aware of possible danger.

What comes in?

Paint and used oil are our two largest waste streams. The "average" vehicle delivers the

following to one of our sites:

HHW	Approx Quantity	HHW	Approx Quantity
Used oil	3 gallons	Latex paint	2.5-3 gallons
Oil-based paints	1.5-2 gallons	Flamm. liquid	0.5-1 gallons
Aerosols	2 cans	Chlorinated pests, etc.	1-2 quarts
Acids	< 1 pint	Corrosive solids	6 ounces
Poisons	1 ounce	H.W.Solids	1 ounce

These numbers have changed somewhat over time. Initially, every early HHW collection had several very large , complex loads of HHW delivered, frequently from relatives cleaning out a deceased family member's basement or old shed. Our County, together with Ramsey and Washington Counties, is home to many retired employees of 3M and other companies that encouraged R&D in home laboratories. We also have had old farm families, no longer farming, who have brought in pick-ups of old pest sprays and ag chemicals in unlabelled glass jugs, and trash bags containing disintegrating bags of Depression-era insecticides. With time, this has decreased from commonplace to rarity.

Household Hazardous Waste

(Amount per Vehicle)

Waste Type	1/17/88	4/25/92	5/30/92
Oil Base Paint (Gallons)	330 (2.02)	605 (1.48)	459 (2.05)
Latex Paint (Gallons)	330 (2.02)	1100 (1.48)	880 (3.65)
Fuels (Gallons)	55 (.34)	220 (.54)	220 (.91)
Pest. Chlor. (Gallons)	138 (.85)	120 (.29)	117 (.48)
Acids (Gallons)	32 (.20)	10 (.02)	20 (.083)
Corrosive Solids 888 (Pounds)	45 (.28)	163 (.34)	112 (.46)
Poisons (Pounds)	50 (.31)	21 (.40)	27 (.11)
HW Solids	50 (.31)	9 (.022)	25 (.10)
Aerosols (Gallons)	55 (.34)	275 (.67)	165 (.68)
Vehicles	163	409	241

Data from collection events held several years ago show some differences with collections held today in our County. Fewer older chemicals of all types are seen, with more material of recent vintage, and especially paints and flammables are delivered. This may indicate a certain "market penetration", and maturation of the program.

As everyone who participates in HHW collections knows, the average citizen has some misconceptions about what is hazardous. Every collection event will have stories of homeowners waiting in line with empty bottles of rug shampoo or floor wax. As awareness is spread throughout the community, the homeowners will understand what can be flushed to the sewer or septic system and what must be saved for the collection event.

Regional differences

In much of our County, which is the fastest growing county in Minnesota, latex paint is discarded at a 3:2 ratio over oil-based paint. In the oldest sections of the County, however, the two are discarded evenly, and in sections of St. Paul, oil-based was received at collections in greater amounts than latex. The age of the community will also determine the quantities and types of hazardous chemicals received, such as old, banned pesticides and solvent cleaners.

The new suburbs also yield other types of waste not seen frequently in established communities, such as construction adhesives, tile mastics, frozen latex driveway sealers, and caulks. The age of paint is younger than in the established areas. Rural areas may bring in older HHW, from families cleaning out old storage buildings, etc.

In Minnesota, latex products freeze if left in unheated areas. This translates into a lot of ruined latex paint and other products that might otherwise not be candidates for HHW. This is certainly not the case in warmer sections of the country.

Fear Not the Waste Exchange

Brian J. Johnson
Environmental Programs Coordinator
City of Santa Monica

Introduction

Whether by enlightened decision making or regulatory mandate, local governments now find themselves implementing programs to segregate and manage household hazardous waste. Early on, program managers are confronted with the staggering budget impacts of program implementation. The per unit cost for disposal of containers of household hazardous waste often times meets or exceeds the original cost of the product. Indeed, the greater success a program experiences, the greater the cost (at least until such time that public education in this issue surpasses public chemical consumption). This conundrum places us in the unenviable position of striving to deliver the greatest service while knowing that the better we do, the deeper we sink into the swamp of fiscal despair.

Today, I intend to describe and sell to you a program activity which contributes to greater program success and potentially substantial cost savings. The activity is the materials exchange (also known as the waste exchange). Simply giving away, under controlled conditions, the usable products in their original containers that come to your program rather than paying to recycle or dispose of them off-site.

Liability

Before presenting the rather compelling results of Santa Monica's materials exchange program, lets discuss the "L" word, liability. To do this, we shall momentarily expand our perspective to construct a path of reason down which we may lead skeptical risk managers and nay-saying government attorneys to a clearer understanding of our purpose.

Liability in our industry, like energy, once created cannot be destroyed, it can only be transferred. We now know that, due to the public health and environmental hazards created by the existence of household hazardous waste in the solid waste stream, liability is created. If we choose to ignore this waste stream; as has been done until recently, the liability follows the generator (the city or county) to the solid waste landfill (which is not designed to contain hazardous waste). When the landfill leaks its contents and requires remedial attention, generator liability becomes fully realized. We endeavor to reduce this looming liability by establishing mechanisms to divert the household

hazardous waste component from solid waste landfills via collection programs and load checking.

Liability is then transferred to the collection program, because you come to possess the harmful waste. As the waste is subsequently transported from your program (often long distance) and disposed, your liability is comingled with that of other generators and becomes inextricably tied to the fate of the disposal facility, til death do you part. We hope to believe that this is a more defensible management of the liability created by the wastes.

Alternatively, by undertaking a waste exchange, there is a transfer of liability exposure from disposal to the individual using the product, as the possibility exists that someone may become harmed by a misused or mislabelled material. We acknowledge that the waste exchange is not without liability; therefore, participants are asked to sign a liability waiver as shown in Attachment 5.

One is, therefore, confronted with a choice between the superfund liability of disposal, where your fate is forever in the hands of the waste management company and its practices, or, the short term liability that virtually dissipates with the individual's use of the material. That which should tip the decision scale in favor of the waste exchange is not only the environmental and economic benefits, which will be detailed below, but also the reduction in liability exposure which evaporates (or volatilizes) with the use of the product.

I believe that we, in this industry, have largely failed to inform and explain to risk managers and councils the totality of environmental liability of hazardous waste management and to identify mechanisms to minimize long term exposure.

Waste Exchange Implementation

Successful waste exchange programs are not created overnight. Risk managers must be won over and consistent markets found. A strategy which has proven successful in our program was the planning for a small beginning to develop a history of need and safety and later expansion once these conditions are established.

We began by offering only paint products to City employees, which, over time, enjoyed moderate success. We found that our participants then wanted additional products. In response, we slowly expanded to non-paint items such as automotive products, cleaners and selected pesticides. Upon establishing a history of safety, we then opened our doors to other participants, including residents, Boy Scout troops, artists, contractors (particularly those who specialize in low income contracting), performing arts cooperatives (such as equity waiver theatre), a private high

school, neighborhood associations, and an abused women's home. Please see Attachment 1 for a copy of user groups and materials.

Program safety is of paramount concern in our facility. Protocols have been developed to determine which materials may be exchanged. Every container is opened to verify contents and ensure the integrity of the material, unless the container is brand new and sealed. The container must be in good condition and have an original and readable label. Unknowns and any suspicious material is excluded from the exchange, as are paints which appear older than 10 years. Banned materials such as pesticides (DDT), wood preservatives (containing pentachlorophenol) and asbestos containing materials (roofing tars, topping compounds) are excluded as well. We include few pesticides and oxidizers in the exchange due to philosophical or safety concerns. We provide special orders for individuals who request certain products and who have time to wait for a material (although most orders are filled within two weeks).

Currently, we are able to divert the following percentage of incoming materials into the exchange program:

paint and paint products	-	60%
corrosives	-	10%
pesticides	-	20%
automotive products	-	100%
home products (cleaners)	-	50%
oxidizers	-	0%
construction products	-	5%

Fiscal Impact

The City of Santa Monica currently budgets $248,000/year for the operation of the Household Hazardous Waste Collection Facility. Of this amount, approximately $56,000 is spent on transportation recycling/disposal of the waste and $54,800 is spent for materials and supplies. Based upon the current diversion rates, it is extrapolated that the materials exchange allows the avoidance of approximately $44,000 dollars in disposal costs, and perhaps another $15,000 in materials per year. This savings is greater than 20% of the program's entire budget. Please see Attachments 2, 3, and 4 for graphic representations of these statistics.

Summary

To date, our closest brush with liability was two contractors scuffling over a five gallon bucket of paint. We are saving over $50,000 per year in avoided disposal fees. These avoided costs have allowed the funding of our growing public education program (including production of a one hour documentary on household hazardous waste issues).

We are re-introducing carefully selected and screened household hazardous materials into the market for originally intended use by individuals who otherwise may not be able to purchase them. Over 76,000 pounds of household hazardous materials are exchanged rather than purchased each year, thereby slowing down the hazardous materials production continuum.

We have, thus far, minimized the City's long term liability by significantly reducing the volume of hazardous waste being managed off-site by disposal facilities. If any of these sound like positive steps for your program, I recommend implementation of a measured and controlled materials exchange.

ATTACHMENT 1

CITY OF SANTA MONICA
ENVIRONMENTAL PROGRAMS DIVISION
HOUSEHOLD MATERIALS EXCHANGE PROGRAM

Below, please find a list of individuals and groups which regularly receive household hazardous materials from the City's household hazardous materials collection program. Included is a list of the types of materials each group commonly receives.

Boy Scouts: white gas, small propane cylinders (camp stove size), paint, thinner, kerosene, pet care products.

Artists: paint, thinner, acid, roofing tar, stains, adhesives, spray paints.

Contractor/Handyman (specializing in repairs in low income areas): paint, thinner, stain, varnish, construction adhesive, roofing tar, pesticides.

Performing Arts Cooperative: paint, stain, thinner.

Private High School (Gang member rehabilitation program): paint, thinner.

Abused Women's Home: personal care products (hair spray, nail polish), paint.

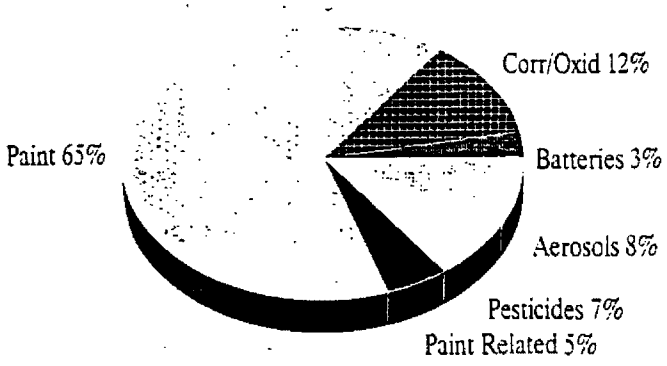
Neighborhood Association: paint, thinner.

Private and Public Graffiti Removal Programs: paint, thinner.

Private citizens and City employees: paint, thinner, stain, varnish, pesticides, pool chemicals.

CITY OF SANTA MONICA
HHW COLLECTION PROGRAM

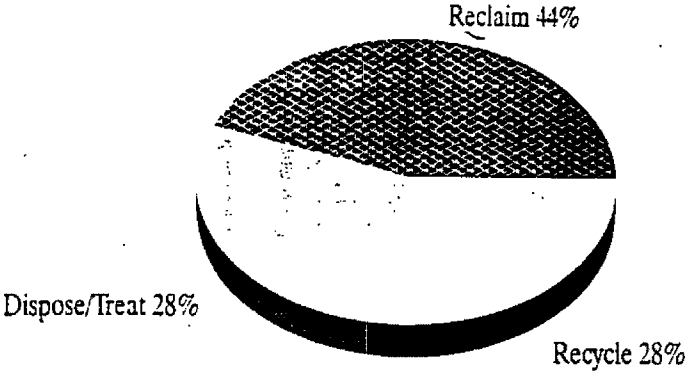
Volume of Materials Dropped-Off Annually



174,000 Pounds Annually
3,000 Participants

CITY OF SANTA MONICA
HHW COLLECTION PROGRAM

Materials Reclamation Performance



174,000 Pounds Annually

CITY OF SANTA MONICA
HHW COLLECTION PROGRAM

Materials Reclamation Costs Savings

Total Program Costs $248,767

Cost of Disposal/Treatment/Recycling $56,172

Cost Savings from Reclamation Efforts $44,000

Based on FY 1991-92 Actual Costs

THANK YOU FOR ANSWERING THESE IMPORTANT QUESTIONS
AND
PLAYING AN ACTIVE ROLE IN CLEANING UP YOUR ENVIRONMENT!

HOUSEHOLD HAZARDOUS WASTE QUESTIONNAIRE

NAME _____ PHONE (213) _____

DRIVERS LICENSE # _____ DATE ___ / ___ / ___

1. ARE YOU A ____ RESIDENT STREET ADDRESS _____
   ____ BUSINESS ZIP CODE _____
   ____ NON-RESIDENT WHAT CITY _____

2. HOW MANY HOUSEHOLDS ARE REPRESENTED BY THIS DELIVERY? ____

3. DO YOU LIVE IN A ____ HOUSE
   ____ APARTMENT

4. HOW DID YOU HEAR OF THIS PROGRAM?
   ____ BOOKLET IN MAIL ____ NEWSPAPER AD ____ WATER BILL
   ____ TELEVISION ____ NEWSPAPER ARTICLE ____ POSTER
   ____ OTHER, SPECIFY _____

5. WHAT TYPES OF MATERIALS DID YOU BRING FOR DISPOSAL? (check all that apply)
   ____ PAINT ____ PAINT THINNER ____ ACIDS
   ____ PESTICIDES ____ CLEANERS ____ STARTER FLUID
   ____ OTHER, SPECIFY _____

6. HOW MANY CONTRAINERS DID YOU DROP OFF TODAY? ____

7. WHAT IS THE APPROXIMATE VOLUME OF WASTE THAT YOU BROUGHT IN? ____ GALLONS
   ____ POUNDS

8. DO YOU HAVE A CONTINUING NEED FOR THIS SERVICE? ____ YES ____ NO

9. HAVE YOU HEARD OF THE MATERIALS EXCHANGE? (recycling program for household materials in S M) ____ YES ____ NO

I, the undersigned participant, intending to be legally bound, waive and release and forever discharge any and all rights and/or claims, and further agree to indemnify and hold harmless the City of Santa Monica, its contractors, sub-contractors, volunteers, Council members, and additional sponsors and contributors for any and all injuries and damages suffered by me that occurred during or as a result of the Household Hazardous Waste Project.

_____
Signature

Identifying Household Hazardous Waste

Deanna Seaman
Environmental Compliance Specialist
Norcal Waste Systems, Inc.

Whether you manage your Household Hazardous Waste (HHW) through a series of one day collection events, a small hazardous waste storage bin in a small rural community or through a large permanent program open multiple days per week in an urban setting, it is important to characterize your waste streams. I would like to convince you to identify most of the constituents of your waste streams so that your program can enjoy cost savings from fully knowing exactly what comes into your program and what goes out either through a reuse program or on a manifest. I will also discuss methods for handling unknown HHW as well as some commercially available methods for analyzing unknowns in your own lab.

If the waste streams are not properly characterized, incompatible materials could be shipped in the same drum creating a large potential for a shipping incident. If two incompatible containers open and mix during shipment, a chemical reaction can take place. Depending on the size of the reaction, this could create a dangerous and expensive incident. Putting incompatible containers in the same drum also limits the disposal options available to the Treatment, Storage, and Disposal Facility (TSDF), assuming the material makes the trip with out incident. If an aerosol is in the same drum with some paint and some flammable solid and if the TSDF chooses not to repack the drum, the only disposal option available, is destructive incineration because of the aerosol. Another option available to the TSDF is to reject such a drum and bill the program for the return and later re-shipping. This means the program which sent the drum incurs the cost of shipment three times plus the cost of repacking the drum properly and increased scrutiny from the TSDF. The best way to prevent problems with drum/waste stream constituents is to look carefully at the drum inventory sheets and pull any incompatible or questionable items for further identification.

Another reason to fully characterize the program waste streams is to maximize the reuse program. If you know exactly what comes into your program on a regular basis, then you can target groups or organizations which would benefit from some of the products your program routinely receives. For example, if your largest waste stream is organic poison, perhaps you should look at what types of poisons you get in, the condition of the containers and labels, and see how full the average container is. Once you have gathered this information, then the list can be distributed to ornamental horticulture programs or agricultural schools. I mention these two options because they are fairly safe users; they know how to apply which pesticide for which type of pest. In our programs, we do not put out Extremely Hazardous or controlled pesticides to minimize liability.

Other groups which could benefit from products in your waste streams include janitorial and cleaning services which do not use alternative products and pool cleaning services. I mention pool cleaning services because they can use the calcium hypochlorite which is typically very expensive to ship and treat or incinerate. By circulating your list of waste stream products to these groups, you make them aware that your program exists, cut down on your disposal costs, and cut down on the groups' product costs. Thus the time spent accumulating such data is well spent and can quickly be recouped from the savings realized through the reuse program.

A word about liability would be appropriate. Liability always exists in these programs simply because we collect the waste. There are ways to minimize the liability especially in the reuse programs: first is a product liability waiver; second is handing out instructions for use of a product, for example the

Roundup™ booklet; and third is to hand out the MSDS with the product when it is available, some programs have even made up generic MSDSs for product categories which serves to minimize liability.

The final reason I will mention to identify your HHW is to properly categorize the containers of "GOK" (God Only Knows) that we all get into our programs. These containers of GOK typically make up 1% of the container volume; so for every one hundred containers, there will be one container of GOK. There are a variety of ways to handle unknown containers and if your program accepts them, they must be properly identified to prevent incidents during shipment and to ensure that the selected TSDF can properly manage the container.

One method to deal with containers of GOK is to send them back with the participant. This option saves the cost of identifying the container but incurs many risks. Once the participant has been sent back on the road with the container of GOK, there is a high probability that the participant will be less than pleased and might dispose of it illegally. If your program also manages highway spills, the container has become your problem once again, but in a manner that puts the public and environment at greater risk for exposure than if you had accepted it when the participant first brought it in. Or maybe the participant takes the container home and leaves it in the basement for the next generation to deal with. In either scenario, the program has lost some good will from these participants. So, while little cost is incurred in dollars, the cost to the environment and community good will is great.

Once a program has accepted unknown waste, the program can ask its transportation, disposal, or operator contractor to analyze the waste. This management option costs anywhere from $35-$45 dollars per unknown. The advantages to this option include proper shipment classification and subsequent management of the container. The disadvantages include the high cost and the analysis may not be done to the level established by the program.

If the above management options seem costly, the program can consider analyzing the unknowns in house. This is my preferred option because the program, which has all the liability for the waste streams, can analyze the unknown to the level which will minimize liability and ensure that the unknown ends up in the appropriate hazard class and drum.

Unknown identification doesn't have to be a complicated process. In many cases a program worker can quiz the participant about the container. Asking such questions as "What is it, what was it used for, how long has the container been in the garage?" can yield valuable clues about the container's contents. Many times the resident will know what the container holds and save the program and the chemist a lot of work. Any information the staff may glean from the participant should be clearly marked on the container with either a magic marker or a grease pencil. This will decrease the time the program chemist needs to identify the waste and place it in a compatible waste stream.

The time of waste receipt is also a good time to screen participants for businesses, since most variance or permit conditions require that no business waste be accepted during hours the program is open to residents of the area. A person coming in with paint speckled coveralls, a similarly speckled tarp folding back to reveal 70 gallons of paint, and Joe's Painting on the side of the truck, is probably bringing in waste from the business. Not all business waste, especially waste from Conditionally Exempt Small Quantity Generator (CESQG) sources, is as obvious. Large quantities of any one particular waste can be a clue that the waste might be from a business, containers marked "Industrial" or "Professional Use Only" are typically business waste, and large containers over the five gallon size are typically of business origin. Once such a waste has been identified, every effort should be made to provide the generator with disposal options because the generator has shown some effort to dispose of the waste properly. It is extremely

important not to make the process seem insurmountable because we want this waste managed properly.

Some container types give fairly accurate clues about their contents. Photochemicals typically come in brown plastic jugs and a simple pH test will reveal whether it is developer (pH = 9-11) or a fixer (pH=2-5). This knowledge will decrease the time the chemist spends on these unknowns. A spray bottle usually contains a dilute pesticide or a cleaning solution, rectangular metal containers often contain solvents and sometimes contain concentrated cleaners. A clear container can also reveal information about its contents. A clear soapy fluid is probably nothing more exotic than soap. Occasionally, a visual check of the contents will clue the staff that the contents are not what is advertised on the bottle. In this case, the program really is dealing with an unknown because by that time, the participant is usually long gone. Bleach bottles are also easy to identify but they usually do not contain bleach when they arrive at a program site; typically they contain oil. I suggest to our program personnel that they open all bleach containers to make sure they contain bleach.

There are other instances in which containers should always be opened and checked. When the container label is torn or missing the container needs identification. If the container is leaking, the contents must be checked to ensure the waste is not put into an incompatible container; for instance, a hydrocarbon solvent will eat through most plastic containers. Some times a bottle of HHW must be opened because the label lists neither the ingredients nor its intended use and thus gives no clue as to the appropriate hazard class. A good example is Drano. Depending on the formulation the container might be an inorganic base (product contains lye or sodium hydroxide), an oxidizer (product contains calcium hypochlorite), or an inorganic acid (product contains hydrochloric acid). In this case a simple pH and oxidizer test would be enough to pack the container in the appropriate drum.

Another container type which should always be opened is food containers. The chances that a participant is actually bringing in soda in the soda bottle are slim to zero. Food containers are used for such a wide variety of products it is difficult to generalize what they might contain when they come through the program. One caveat is necessary however; participants have been known to bring in the corn relish that grandmother jarred in the thirties under the assumption that anything which has sat around that long must be hazardous. It is not necessary to dispose of corn relish as hazardous waste. Many types of products do not need to be treated as hazardous waste and in the interest of keeping costs down, check with the local Solid Waste Authority and Publicly Owned Treatment Works to see what products can safely be disposed in the local landfill or sewer system.

Once you have determined you have an unknown which must be handled as hazardous waste, and you have decided to handle it in house, there are several methods to analyze unknown wastes. One well known system is Hazcat™ which is a system designed to analyze spills on the highways. It works best with pure compounds although with a thorough understanding of the system, can be used for mixtures. The system uses three charts, one for solids, one for liquids, and yet another for gases. While this system does work fairly well for pure compounds, for those compounds which are mixtures of many chemicals, the system tends not to work as well or as rapidly and requires a much more thorough understanding of the system and the chemistry behind it.

Firecat™ is a spin off of Hazcat™ and I have been unable at this point to find any more information about it except to say that it was designed for use by fire fighters trained in hazardous materials response and is a quicker version of Hazcat™ with many of the redundancies removed.

Most TDSFs also have some analysis scheme on site for analysis of unknowns. Most of these companies only analyze the waste to the point they need to adequately characterize the waste for final disposal. These analysis methods usually include at a minimum; pH test for corrosivity, oxidizer/peroxide tests for

reactivity, water solubility for flammability (those compounds which are not water soluble are typically flammable) or alternatively, a char test, and a metals screen if the waste is slated for treatment or incineration.

Sanitary Fill Company, a Norcal Waste Systems, Inc. Subsidiary, developed a waste analysis system called the Waste Identification and Classification System (WICT™). Based on the waste streams produced at the San Francisco Household Hazardous Waste Collection Facility, WICT™ is designed to take an unknown container and identify its hazard class and its chemical constituents thereby insuring the unknown ends up in a compatible waste stream. The system uses many of the same wet chemistry tests utilized in the Hazcat™ system but the WICT™ uses only one chart. Depending on the Treatment Storage Disposal Facility (TSDF) requirements, the WICT™ can identify upwards of six chemical constituents in a product by use of six easy wet chemistry tests, draeger tubes, and a set of thirteen reagents in an anion and cation chart. The method usually costs about $5.00 per unknown depending on the number of draeger tubes used during the analysis (draeger tubes cost about $3.00 apiece.) The advantages to this system are its quick and easy steps to determine the waste stream of the unknown; its ability to handle and identify mixtures; and its acceptance at many of TSDFs in the country.

What ever system the program uses, it is important to get written approval from the TSDF. If they do not accept a particular analysis scheme, then as far as they are concerned, the program still has unknowns which require special handling. Often it only takes a training session from the program manager to convince the TSDF personnel that the analysis scheme your program is using adequately characterizes the waste.

Finally, to minimize your liability, it is important to characterize your waste stream and identify the constituents. With this knowledge in hand your program can maximize its reuse program thereby minimizing disposal dollars while making sure all containers which are being shipped out as hazardous waste are in an appropriate drum. With all containers in an appropriate drum the program ensures that all drums will be accepted by the TSDF and that the TSDF will be able to dispose or treat the program's waste in a method that will minimize dollars and long term liability.

SPEECH BY
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FOR

U.S. EPA SEVENTH NATIONAL HOUSEHOLD
HAZARDOUS WASTE MANAGEMENT CONFERENCE

DECEMBER 8-12, 1992
MINNEAPOLIS, MINNESOTA

FIRST BRANDS CORPORATION IS A BILLION DOLLAR INTERNATIONAL CONSUMER PRODUCTS COMPANY THAT MARKETS PRESTONE, STP AND SIMONIZ AUTOMOTIVE PRODUCTS, GLAD AND GLAD-LOCK WRAP AND BAGS AND SCOOP-AWAY CAT LITTER. THESE WELL-KNOWN AND SUCCESSFUL BRANDS ENJOY LONG HISTORIES WITH CONSUMERS WHO HAVE COME TO RELY ON THEIR QUALITY, CONVENIENCE AND DEPENDABILITY.

FIRST BRANDS HAS MAINTAINED THESE BUSINESSES BY CONTINUALLY MEETING EMERGING CONSUMER NEEDS AND CLOSELY MONITORING CRITICAL ISSUES THAT COULD IMPACT THEIR PERFORMANCES. ONE OF THE MOST IMPORTANT ISSUES OF OUR TIME IS CONCERN FOR THE ENVIRONMENT.

ALL OF US IN THIS ROOM TODAY KNOW ENVIRONMENTAL ISSUES ARE SIGNIFICANTLY IMPACTING CONSUMERS AND THE BUSINESS COMMUNITY. BY VIEWING ENVIRONMENTAL ISSUES AS OPPORTUNITIES, FIRST BRANDS HAS FOUND THAT DOING GOOD FOR THE ENVIRONMENT CAN ALSO BE GOOD FOR BUSINESS.

A GOOD EXAMPLE OF WHERE OUR COMPANY IS PRACTICING THIS BELIEF IS IN THE AREA OF ANTIFREEZE RECYCLING. PRESTONE TECHNOLOGY SYSTEMS, INC. IS A SUBSIDIARY FIRST BRANDS FORMED NEARLY A YEAR AGO TO IMPLEMENT WHAT WE BELIEVE

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ARE THE MOST APPROPRIATE ANSWERS FOR RECYCLING ANTIFREEZE IN NORTH AMERICA TODAY. BUT BEFORE I OUTLINE THE SPECIFICS OF WHAT PRESTONE TECHNOLOGY SYSTEMS IS DOING, I THINK IT WOULD BE HELPFUL TO GIVE YOU SOME BACKGROUND ON ANTIFREEZE AND ITS PROPERTIES.

THE MAIN INGREDIENT IN PRESTONE ANTIFREEZE, AND INDEED IN MOST ANTIFREEZE SOLD TODAY, IS ETHYLENE GLYCOL. ETHYLENE GLYCOL IS TOXIC, BUT IT IS ALSO READILY BIODEGRADABLE. IT GIVES ANTIFREEZE THE ABILITY TO PREVENT ENGINES FROM FREEZING DURING COLD WEATHER AND FROM BOILING OVER IN HOT. PRESTONE ALSO CONTAINS A PATENTED INHIBITOR PACKAGE TO HELP PROTECT VEHICLE COOLING SYSTEMS FROM RUST AND CORROSION.

IF LEFT UNCHECKED, THESE CONDITIONS CAN REDUCE A COOLING SYSTEM'S EFFICIENCY AND EVENTUALLY LEAD TO ENGINE FAILURE. IN FACT, MOST ROADSIDE BREAKDOWNS CAUSED BY COOLING SYSTEM MALFUNCTION ARE DUE TO A LACK OF REGULAR MAINTENANCE. THIS IS WHY PRESTONE ADVISES VEHICLE OWNERS TO DRAIN AND REFILL THEIR COOLING SYSTEMS ONCE A YEAR.

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ANTIFREEZE IS AN INVALUABLE FUNCTIONAL FLUID IN A VEHICLE, AND EVERY YEAR APPROXIMATELY 200 MILLION GALLONS OF IT ARE SOLD THROUGHOUT NORTH AMERICA. WHEN THIS ANTIFREEZE IS BLENDED WITH WATER TO INSTALL IN A VEHICLE, TWICE AS MUCH USED ANTIFREEZE SOLUTION IS GENERATED, OR ABOUT 400 MILLION GALLONS.

HOW THIS USED MATERIAL IS HANDLED HAS BECOME A GROWING CONCERN OF CONSUMERS, ENVIRONMENTAL ORGANIZATIONS AND STATE AND LOCAL GOVERNMENTS. SOME STATES ARE NOW REVIEWING AND EVEN ENACTING LEGISLATION THAT SPECIFICALLY ADDRESSES THE HANDLING AND DISPOSAL OF USED ANTIFREEZE. THEIR CONCERN IS VALID BECAUSE, UNFORTUNATELY, USED ANTIFREEZE IS OFTEN DISPOSED OF IMPROPERLY INTO A STORM DRAIN SYSTEM, OR IT'S DRAINED ONTO THE GROUND OR STREET.

AT FIRST BRANDS, WE BELIEVE USED ANTIFREEZE IS A RESOURCE TO BE RECYCLED AND NOT A WASTE TO THROW AWAY. FOR THIS REASON, WE SUPPORT PROPER HANDLING AND DISPOSAL OF USED ANTIFREEZE BY THE CONSUMER AND, WHEN NECESSARY, APPROPRIATE LEGISLATION. WE VIEW RECYCLING AS AN ENVIRONMENTALLY PRACTICAL LONG-TERM ALTERNATIVE TO IMPROPER DISPOSAL METHODS, BECAUSE RECYCLING:

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- SAVES RESOURCES USED TO PRODUCE NEW ANTIFREEZE;
- REDUCES THE DEMAND FOR RAW MATERIALS, AND
- HELPS CONTRIBUTE TO THE OVERALL SOLUTIONS OF OUR COUNTRY'S ENVIRONMENTAL ISSUES

THERE IS AN ISSUE CURRENTLY INFLUENCING THE FUTURE PROGRESS OF RECYCLING. IT FOCUSES ON HOW USED ANTIFREEZE MAY CONTAIN CONTAMINANTS, SUCH AS LEAD, WHICH COMES FROM THE LEAD SOLDER USED IN SOME VEHICLE RADIATORS. IF THE USED ANTIFREEZE FROM THESE VEHICLES IS DISPOSED OF IMPROPERLY, IT COULD POSE A THREAT TO THE ENVIRONMENT.

HOWEVER, OUR RESEARCH INDICATES THAT THE LEAD CONTENT IN USED ANTIFREEZE IS AN ISSUE IN LESS THAN 20 PERCENT OF THE CASES TODAY. AND, AS MORE AUTOMOBILE MANUFACTURERS CONVERT TO ALL-ALUMINUM RADIATORS, THIS PERCENTAGE WILL SIGNIFICANTLY DECREASE OVER TIME. FURTHERMORE, WE DON'T BELIEVE USED COOLANT DISPOSAL INFRASTRUCTURE DEVELOPMENT SHOULD BE CENTERED AROUND THE LEAD-CONTENT ISSUE BECAUSE IT'S NOT THE PRIMARY LONG-TERM PROBLEM.

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FROM OUR PERSPECTIVE, FIRST BRANDS BELIEVES THIS COUNTRY'S SOLID WASTE DISPOSAL CONCERNS CAN BE BEST ADDRESSED BY RECYCLING USED ANTIFREEZE, REGARDLESS OF WHETHER OR NOT THE MATERIAL CONTAINS ENOUGH LEAD TO CLASSIFY IT AS A HAZARDOUS WASTE. MOREOVER, WE FEEL USED ANTIFREEZE THAT'S DESTINED TO BE RECYCLED SHOULD NOT BE CONSIDERED A WASTE, AND THEREFORE SHOULD NOT BE SUBJECT TO HAZARDOUS WASTE REGULATION.

WE WOULD RATHER SEE USED ANTIFREEZE BE ALLOWED TO BE HANDLED, TRANSPORTED AND RECONDITIONED IN THE MOST SAFE, ECONOMICAL AND EFFICIENT MEANS AVAILABLE. WE BELIEVE CLASSIFYING IT AS A HAZARDOUS WASTE WILL DETER THE SUCCESSFUL DEVELOPMENT OF A SOUND ANTIFREEZE RECYCLING INFRASTRUCTURE.

RESOLVING THIS ISSUE NOW IS IMPORTANT BECAUSE ANTIFREEZE RECYCLING IS BECOMING A VIABLE BUSINESS CATEGORY. PRESTONE TECHNOLOGY SYSTEMS HAS BEEN IMPLEMENTING ITS BUSINESS PLAN IN THIS CATEGORY ACCORDING TO FIRST BRANDS' BLUEPRINT FOR ANTIFREEZE RECYCLING. IT FOCUSES ON TWO METHODS: ON-SITE AND OFF-SITE.

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THE ON-SITE METHOD ADDRESSES THE AUTOMOTIVE AND HEAVY-DUTY/FLEET VEHICLE SERVICE MARKETS. THE BLUEPRINT'S OFF-SITE METHOD ADDRESSES CONSUMER DO-IT-YOURSELFERS. LET'S TAKE A QUICK LOOK AT THE OFF-SITE METHOD FIRST.

IN THE OFF-SITE METHOD, A CONSUMER DRAINS AND REFILLS THE VEHICLE'S COOLING SYSTEM AND TAKES THE USED ANTIFREEZE TO A MUNICIPAL DROP-OFF CENTER LOCATED IN THE COMMUNITY. AN APPROVED HAULER THEN COLLECTS THE USED MATERIAL FROM THE DROP-OFF SITE AND TRANSPORTS IT TO A CENTRALIZED RECYCLING FACILITY.

TO HELP CONSUMERS PARTICIPATE IN THIS METHOD, FIRST BRANDS SELLS A PATENTED DO-IT-YOURSELF KIT CALLED THE PRESTONE ANTIFREEZE/COOLANT REPLACEMENT SYSTEM. IT COMES WITH ALL THE TOOLS NEEDED TO DRAIN AND REFILL THE COOLING SYSTEM USING AN ORDINARY GARDEN HOSE. AN IMPORTANT FEATURE OF THE SYSTEM IS ITS FIVE-GALLON PLASTIC CONTAINER THAT CONSUMERS CAN USE TO CONVENIENTLY CARRY THE USED ANTIFREEZE TO A DROP-OFF SITE.

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FOR THE OFF-SITE METHOD TO BE SUCCESSFUL, MUNICIPALITIES AND RESIDENTS MUST JOINTLY SEEK AND SUPPORT A RECYCLING PROGRAM. MANY MUNICIPALITIES CURRENTLY RUN OTHER RECYCLING PROGRAMS, AND WE BELIEVE THESE COULD BE EASILY EXPANDED TO INCLUDE USED ANTIFREEZE.

TO DEMONSTRATE HOW THE OFF-SITE METHOD WORKS, WE ARE CURRENTLY OPERATING AN OFF-SITE PILOT PROGRAM THAT ULTIMATELY WILL INVOLVE MORE THAN FOUR MILLION RESIDENTS. THE AREAS PARTICIPATING IN THE PROGRAM ARE:

- THE CALIFORNIA COUNTIES OF SAN MATEO AND SANTA CLARA;
- THE CONNECTICUT CITIES OF DANBURY AND NEWTOWN, AND
- THE STATE OF RHODE ISLAND

IN EACH OF THESE REGIONS, WE HAVE SUPPLIED EDUCATIONAL MATERIALS TO RESIDENTS AND HAVE HELPED MUNICIPAL OFFICIALS LOCATE DROP-OFF SITES AND ESTABLISH THEIR ANTIFREEZE RECYCLING PROGRAMS.

THE DATA WE ARE CURRENTLY COLLECTING AND ANALYZING FROM EACH OF OUR PILOT PROGRAM REGIONS COVERS COLLECTION RATES, DEMOGRAPHIC INFORMATION AND CONTAINERIZATION METHODS. EVENTUALLY, WE EXPECT TO

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TABULATE THIS INFORMATION, ANALYZE IT, AND PUBLISH THE PROGRAM'S RESULTS IN THE FORM OF A WHITE PAPER. THIS DOCUMENT WILL BE AVAILABLE FOR COMMUNITIES SEEKING TO ORGANIZE AND OPERATE SUCCESSFUL ANTIFREEZE RECYCLING PROGRAMS.

IT IS OUR INTENT TO SERVE AS AN ARCHITECT IN THE OFF-SITE PLAN TO HELP EVENTUALLY CHANGE CONSUMERS' BEHAVIOR ABOUT THE PROPER HANDLING OF USED ANTIFREEZE. OFF-SITE ANTIFREEZE RECYCLING CAN SUCCEED, BUT IT WILL REQUIRE THE ENCOURAGEMENT AND SUPPORT OF MUNICIPALITIES AND CONSUMERS ACROSS NORTH AMERICA.

BUT NOT EVERYONE CHANGES HIS OR HER OWN ANTIFREEZE; THERE ARE MILLIONS OF CONSUMERS WHO TAKE THEIR VEHICLES TO AUTOMOTIVE SERVICE CENTERS TO HAVE THE PROCEDURE DONE. AND, THERE IS ANOTHER LARGE GROUP OF HEAVY-DUTY/FLEET VEHICLE AND NEW CAR DEALERSHIP OPERATIONS WHICH HAVE THEIR OWN SPECIFIC NEEDS WHEN IT COMES TO RECYCLING USED ANTIFREEZE. IN TOTAL, THERE ARE ABOUT 220,000 OUTLETS IN THESE MARKETS. FOR THEM, WE BELIEVE ON-SITE RECYCLING IS THE BEST ANSWER.

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THE DRIVING FORCES BEHIND OUR SUCCESSFUL ON-SITE EFFORTS ARE TWO KEY BUSINESS ALLIANCES, WHICH ARE NOW IN PLACE. THE FIRST IS AN ALLIANCE WITH THE ROBINAIR DIVISION OF SPX CORPORATION OF MUSKEGON, MICHIGAN. SPX IS A VERY LARGE INTERNATIONAL COMPANY THAT PRODUCES AND MARKETS AUTOMOTIVE SERVICE EQUIPMENT THROUGHOUT THE WORLD. MANY OF YOU MAY KNOW THE COMPANY THROUGH ITS BEAR AUTOMOTIVE, KENT MOORE AND OTC DIVISIONS.

SPX IS PRODUCING AND MARKETING A UNIQUE TWO-STAGE, ON-SITE PRESTONE RECYCLING SYSTEM THAT WAS INVENTED AND PATENTED BY PTS. AN SPX SUBSIDIARY WILL ALSO MARKET THIS SYSTEM IN EUROPE. THE SYSTEM IS BEING SOLD UNDER THE PRESTONE PRO'S CHOICE EQUIPMENT TRADEMARK AND CONSISTS OF TWO SEPARATE UNITS:

- THE PRESTONE PROFILL COOLANT EXCHANGER, AND
- THE PRESTONE PROCLEAN COOLANT RECYCLER.

THE PRESTONE PROFILL COOLANT EXCHANGER SIMULTANEOUSLY DRAINS USED ANTIFREEZE FROM A VEHICLE AND INSTALLS FRESH PRODUCT. THE ADVANTAGES OF THE PRESTONE PROFILL UNIT ARE:

- IT'S FAST, TAKING ONLY 12-15 MINUTES PER CAR;

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- IT'S EFFICIENT, REMOVING UP TO 95 PERCENT OF THE COOLANT;
- IT'S ECOLOGICALLY SOUND, BECAUSE IT DOES NOT GENERATE ADDITIONAL FLUSH WATER, AND
- IT WORKS ON EVERY CAR.

THE COLLECTED USED ANTIFREEZE IS THEN PRETREATED, RECONDITIONED AND RE-INHIBITED INTO A FULLY FORMULATED AND FULLY BUFFERED ANTIFREEZE IN THE PRESTONE PROCLEAN COOLANT RECYCLER. AFTER THIS PROCESS, THE ANTIFREEZE CAN BE REUSED IMMEDIATELY IN A VEHICLE.

SEVERAL CRITICAL ADVANCES IN CHEMICAL TECHNOLOGY, PIONEERED BY PTS, ENABLE OUR PRESTONE RECYCLER TO PRODUCE HIGH QUALITY RECYCLED ANTIFREEZE THAT MEETS ALL THE PERFORMANCE STANDARDS OF AMERICAN SOCIETY OF TESTING AND MATERIALS AND THE SOCIETY OF AUTOMOTIVE ENGINEERS FOR NEW ANTIFREEZE. IT ALSO MEETS GENERAL MOTORS' STANDARDS FOR RECYCLED ANTIFREEZE. WE ARE CURRENTLY MARKETING THIS PATENTED CHEMICAL SYSTEM UNDER THE PRESTONE PROCHEM TRADEMARK.

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LET ME BRIEFLY EXPLAIN HOW OUR COOLANT RECYCLER WORKS. THE FIRST STEP INVOLVES CHEMICALLY PRETREATING THE USED ANTIFREEZE. BY ADDING PRESTONE PRECLEAN CHEMICALS, ALL CONTAMINANTS AND HEAVY METALS LIKE LEAD ARE TRAPPED INTO A SOLID, CLAY-LIKE MASS, WHICH IS NOT HAZARDOUS ACCORDING TO FEDERAL EPA TEST STANDARDS AND IN MOST CASES CAN SIMPLY BE DISCARDED.

AFTER THE PRETREATMENT STEP, THE MATERIAL IS RUN THROUGH A COMPLEX FILTRATION CHAIN TO CLEAN IT FURTHER. THE THIRD STEP INVOLVES ADDING PATENTED PRESTONE RECHARGE CHEMICALS TO RE-INHIBIT THE USED ANTIFREEZE. RE-INHIBITING IS ESSENTIAL TO RESTORING THE RECYCLED MATERIAL'S RUST AND CORROSION CAPABILITIES TO THOSE OF NEW ANTIFREEZE. THE PRESTONE ADJUSTER ADDITIVE MAY BE ADDED AS THE LAST STEP TO HELP BRING THE RECYCLED ANTIFREEZE'S FREEZE POINT WITHIN RECOMMENDED LEVELS IF NECESSARY.

IMPORTANT TO THE SUCCESS OF THIS PROCESS IS THE PATENTED CUSTOM RE-INHIBITOR PACKAGE. IT HAS PLAYED A LEADING ROLE IN THE ADVANCEMENT OF OUR BUSINESS. FOR YEARS OUR INDUSTRY WAS UNABLE TO FORMULATE A CUSTOM CHEMICAL

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ADDITIVE PACKAGE THAT COULD RE-INHIBIT ALL THE WIDELY VARYING CONDITIONS OF USED ANTIFREEZE FOUND FROM VEHICLE TO VEHICLE.

THE CUSTOM CHEMICAL RE-INHIBITOR PACKAGE WE DEVELOPED EFFECTIVELY ADDRESSES THIS NEED BY ENABLING ALL RECYCLED ANTIFREEZE TO MEET INDUSTRY CORROSION AND RUST PROTECTION PERFORMANCE STANDARDS FOR FRESH PRODUCT. THESE INCLUDE STANDARDS SET BY THE SAE AND ASTM. IN ADDITION, OUR RE-INHIBITOR PACKAGE IS EFFECTIVE WITHOUT USING NITRITES, WHICH CAN BE HARMFUL.

AS I SAID EARLIER, ANTIFREEZE RECYCLING TECHNOLOGY IS CURRENTLY OFFERED BY SEVERAL OTHER COMPANIES. BUT GENERAL MOTORS HAS ONLY LENT ITS ENDORSEMENT TO SEVEN ON-SITE RECYCLING SYSTEMS, AND WE'RE PROUD TO BE THE RE-INHIBITOR SUPPLIER TO THE MAJORITY OF THEM. WE ARE ALSO WORKING CLOSELY WITH OTHER ORIGINAL EQUIPMENT MANUFACTURERS AS THEY DEVELOP AND EVALUATE THEIR OWN STANDARDS FOR RECYCLED ANTIFREEZE.

OUR RE-INHIBITOR PACKAGE AND PRESTONE RECYCLING SYSTEM SERVE AS THE CORE OF PRESTONE TECHNOLOGY SYSTEMS' ON-SITE ANTIFREEZE RECYCLING BUSINESS.

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ADDITIONALLY, WE WILL SUPPLY OUR CUSTOM RE-INHIBITOR PACKAGES TO OTHER SELECT RECYCLING EQUIPMENT COMPANIES; HOWEVER, WE WILL ONLY SUPPLY COMPANIES USING ANTIFREEZE RECYCLING METHODS THAT MEET OUR STRICT REQUIREMENTS.

HOW IS OUR SYSTEM DIFFERENT FROM THE OTHERS? BESIDES THE CHEMICAL PRETREATMENT AND THE CUSTOM RE-INHIBITING FEATURE, THE PRESTONE RECYCLING SYSTEM IS A TOTAL SYSTEM THAT OFFERS AN EFFECTIVE AND EFFICIENT METHOD OF REMOVAL OF USED ANTIFREEZE FROM THE VEHICLE, AS WELL AS A CONSISTENT, STABLE AND BUFFERED PRODUCT THAT EXCEEDS ALL INDUSTRY PERFORMANCE STANDARDS.

ANOTHER INNOVATION IN OUR ON-SITE RECYCLING BUSINESS ACTIVITY IS REPRESENTED BY MOBILE ANTIFREEZE RECYCLING. THIS IS A RESULT OF AN AGREEMENT BETWEEN PRESTONE TECHNOLOGY SYSTEMS AND AMERICAN FLUID TECHNOLOGY. MOBILE RECYCLING IS A NEW AND EXCITING DIMENSION IN ON-SITE ANTIFREEZE RECYCLING. MORE THAN 50 MOBILE ANTIFREEZE RECYCLING FRANCHISE TERRITORIES HAVE ALREADY BEEN SOLD AND WE ANTICIPATE THAT THIS NUMBER WILL INCREASE SIGNIFICANTLY IN THE NEXT YEAR.

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THE FRANCHISES CONSIST OF MOBILE ANTIFREEZE RECYCLING VANS OPERATING UNDER THE PRESTONE AND AFT BRAND NAMES. THE VANS FEATURE PRESTONE RECYCLING EQUIPMENT AND EXCLUSIVELY USE THE PRESTONE RECYCLING INHIBITOR FORMULAS THAT ARE SIMILAR TO THOSE I DISCUSSED EARLIER. THIS RECYCLING TECHNOLOGY IS OWNED BY PTS AND FEATURES AN EXCLUSIVE CENTRIFUGE PROCESS. EACH VAN CAN RECYCLE UP TO 300 GALLONS OF USED ANTIFREEZE ON SITE EVERY HOUR AT A COMMERCIAL FACILITY, RETURNING TO THE CUSTOMER A FULLY RECYCLED PRODUCT THAT EXCEEDS INDUSTRY PERFORMANCE STANDARDS AND IS READY FOR REUSE.

FOR COMMERCIAL AUTOMOTIVE SERVICE FACILITIES THAT COLLECT ANTIFREEZE BUT DON'T EMPLOY ON-SITE EQUIPMENT, RECYCLING THEIR COLLECTED MATERIAL IS AS EASY AS PICKING UP THE PHONE AND CALLING THE NEAREST FRANCHISE SERVICE. THE FRANCHISES OFFER SERVICE FACILITIES MANY UNIQUE ADVANTAGES:

- THEY DO NOT REQUIRE CAPITAL INVESTMENT;
- THERE ARE NO EXPENDITURES FOR LABOR AND MAINTENANCE;
- THE ON-SITE SYSTEM REDUCES DISPOSABLE WASTE BY UP TO 99 PERCENT, AND

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- THE RECYCLED ANTIFREEZE PRODUCED IS GUARANTEED TO EXCEED ALL INDUSTRY PERFORMANCE STANDARDS FOR NEW PRODUCT.

PRESTONE TECHNOLOGY SYSTEMS IS RAPIDLY MOVING FORWARD IN ITS EFFORT TO HELP MAKE ANTIFREEZE RECYCLING A WIDESPREAD PRACTICE THROUGHOUT NORTH AMERICA. THE RESULTS SO FAR ARE ENCOURAGING;

- ORDERS ARE CONTINUING TO COME IN FOR OUR ON-SITE SYSTEM;
- THE MOBILE RECYCLING FRANCHISES ARE GROWING IN NUMBER EVERY MONTH, AND
- OUR PILOT PROGRAM ACTIVITIES ARE INSTILLING THE CONCEPT OF ANTIFREEZE RECYCLING AND HELPING TO CHANGE CONSUMER BEHAVIOR.

WE BELIEVE THAT, WHEN IT COMES TO SOLID WASTE DISPOSAL ISSUES, THE BUSINESS COMMUNITY HAS THE RESOURCES TO IDENTIFY AND DEVELOP REAL SOLUTIONS. THE RECENT TECHNICAL AND BUSINESS ACHIEVEMENTS OF PRESTONE TECHNOLOGY SYSTEMS PORTRAY HOW THIS PHILOSOPHY CAN BE PUT TO WORK ON A PRACTICAL SCALE. WE HAVE TAKEN A

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LEADERSHIP ROLE IN ANTIFREEZE RECYCLING AND CAN SAY WITH PRIDE THAT IT IS BENEFITING THE ENVIRONMENT, WHILE ALSO SERVING AS AN INNOVATIVE CATALYST FOR ECONOMIC GROWTH.

I APPRECIATE YOUR ATTENTION THIS MORNING. IF ANYONE HAS QUESTIONS, I WOULD BE HAPPY TO ANSWER THEM FOR YOU AT THIS TIME...

# # #

LOAD INSPECTION - HOW TO TRAIN EMPLOYEES

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1. Introduction

Recently, 40 CFR Subpart C, Parts 257 and 258 were finally published September 11, 1991 in the Federal Register. The proposed rule was published in August, 1988 and every state with the exception of a few were drafted changes in landfill operations that would meet the proposed criteria. The rule we more commonly know as "Subtitle D".

The portion of the rule I propose to discuss today is:

> 258.20 Procedures for excluding the receipt of hazardous waste.
>
> (a) Owners or operators of all MSWLF units must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes as defined in Part 261 of this title and polychlorinated biphenyls (PCB) wastes as defined in Part 761 of this title. This program must include, at a minimum:
>
> (1) Random inspections of incoming loads unless the owner or operator takes other steps to ensure that incoming loads do not contain regulated hazardous wastes or PCB wastes;
>
> (2) Records of any inspections;
>
> (3) Training of facility personnel to recognize regulated hazardous waste and PCB wastes; and
>
> (4) Notification of State Director of authorized States under Subtitle C of RCRA or the EPA Regional Administrator if in an unauthorized State if a regulated hazardous waste or PCB waste is discovered at the facility.
>
> (b) For purposes of this section, regulated hazardous waste means a solid waste that is a hazardous waste, as defined in 40 CFR 261.3, that is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b) or was not generated by a conditionally exempt small quantity generator as defined in §261.f of this title.

1.1 How to Get Started

The Des Moines Metropolitan Area Solid Waste Agency recognized early that the rule would be final in the near

future. Requests had also been made by our union landfill employees to provide some hazardous waste and first aid training through their Union Contract. Since the Agency has worked for the past several years with the HazMat Team and the Des Moines Fire Department, we contacted the HazMat Specialist to see if he could provide the training program. The Specialist agreed to provide the training over a four-hour period.

Subtitle D was still in the proposed stages so that authorization for training fell under SARA Title I, §126 which states that employees must train the employees with regard to chemical releases. Our employees were told that their training would only cover the "First Responder Awareness Level".

Under the awareness level, they may:

1. **DISCOVER A RELEASE;**
2. **MAKE NOTIFICATION; and**
3. **TAKE NO OTHER ACTION EXCEPT TO MOVE TO A SAFE AREA.**

Why?

1. **NO PROTECTION (PROTECTIVE CLOTHING); and**
2. **AVOID CONTACT OF EXPOSURE.**

2. First Responder Awareness Level

First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

2.1 An understanding of what hazardous materials are and the risks associated with them in an accident.

2.2 An understanding of the potential outcomes associated with an emergency created when hazardous materials are present.

2.3 The ability to recognize the presence of hazardous materials in an emergency.

2.4 The ability to identify the hazardous materials, if possible.

2.5 An understanding of the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the United States Department of Transportation's Emergency Response Guidebook.

2.6 The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

3. First Responder Operations Level

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operations level shall have received at least 8 hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

3.1 Knowledge of the basic hazard and risk assessment techniques.

3.2 Know how to select and use, personal protective equipment provided to the first responder operations level.

3.3 An understanding of basic hazardous materials terms.

3.4 Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.

3.5 Know how to implement basic decontamination procedures.

3.6 An understanding of the relevant standard operating procedures and termination procedures.

4. What are Hazardous Materials?

A general definition of a hazardous material is any substance that jumps out of its container at you when something goes wrong and hurts or harms the things it touches or impinges upon.

The General Department of Transportation classifications and examples are listed in Table I below.

GENERAL CHARACTERISTICS AND EXAMPLES OF HAZARDOUS MATERIALS

GENERAL CATEGORY DOT CLASSIFICATIONS	EXAMPLES	GENERAL HAZARDOUS PROPERTIES
Explosives		
Class A Explosive	Dynamite, TNT, Black Powder	Sensitive to heat and shock
Class B Explosive	Propellant Powders, Rocket Motors	Contamination could cause explosion
Class C Explosive	Common Fireworks, Small Arms Ammunition	Thermal and mechanical impact
Blasting Agents	Nitro Carbo Nitrate	
Compressed Gases		
Flammable Gas	Acetylene, Butane, Hydrogen, Propane	BLEVE potential
Nonflammable Gas	Carbon Dioxide, Sulfur Dioxide	Flammability hazard
Special Forms		
Liquified	Butane, LNG, Nitrogen, Propane	Liquified gases – cold temperatures – frostbite – expansion ratio high
Cryogenic	Ethylene, Hydrogen, Nitrogen	
Gas in solution	Acetylene	
Flammable Liquids		
Pyrophonc Liquids	Aluminum Alkyls, Alkyl Boranes	Flammability
Flammable Liquids	Acetone, Gasoline, Methyl Alcohol	Explosion potention
Combustible Liquid	Fuel Oil, Stoddard Solvent	BLEVE
		Vapor/air
		Potentially corrosive, toxic
		thermally unstable
Flammable Solids		
Flammable Solid	Magnesium, Titanium	Readily ignite and burn explosively,
Water Reactive	Calcium Carbide, Sodium Hydnde	some spontaneously
Spontaneously Combustible	Phosphorus, Sodium, Potassium	Water reactive potentials
		Toxic and corrosive potentials
Oxidizing Materials		
Oxidizer	Lithium Peroxide	Supply oxygen to support combustion of
Organic Peroxide	Benzoyl Peroxide, Peracetic Acid	normally nonflammable matenals
		Explosively sensitive to heat, shock,
		fnction
		Potentially toxic
Poisonous Materials		
Class A Poison	Arsine, Hydrocyanic Acid, Phosgene	Harm from inhalation, ingestion, absorption
Class B Poison	Aniline, Arsenic, Methyl Bromide	
Irritant	Tear Gas, Xylyl Bromide	Flammability potential
Etiologic Agent	Anthrax, Botulism, Rabies, Tetnus	
Radioactive Materials		
Radioactive I	Plutonium, Cobalt, Uranium,	Harm – internal and external
Radioactive II	Uranium Hexafluonde	Contaminates –
Radioactive III		Immediate area
		Smoke, clothing, water
Corrosive Materials		
Corrosive	Acids – Hydrochlonc Acid, Oleum	Harm – disintegration of tissues,
	Sulfunc Acid	external
	Bases – Caustic Soda, Caustic Potash	Oxidizing effect
		Splatter potential
Other		
ORM A	Dry Ice, Carbon Tetrachlonde	Noxious
ORM B	Quicklime, Metallic Mercury	Corrosive
ORM C	Battery Parts, Bleaching Powder	
ORM D	Consumer Commodities	
ORM E	Hazardous Substances and Wastes	

5. Detection of a Hazardous Material

There are six sets of clues in detecting a hazardous waste. Those clues are as follows:

Occupancy and Location - where did the truck come from, i.e., hospital, manufacturing plant, etc?

Container Shape -	drums, cylinders, canisters, lead boxes
Markings and Colors -	some companies color code their containers, i.e., red (flammable) and yellow (corrosive)
Placards and Labels -	poison, flammable liquids, corrosive (see Attachment 1)
Shipping Papers -	manifests
Senses -	hear hissing noises, see vapors, feel cold sensations, smell odors

Under the six sets of clues, the risk to the employee runs from low (at #1) to high (at #6). The closer the employee gets to a substance for identification, the higher the risk of contamination.

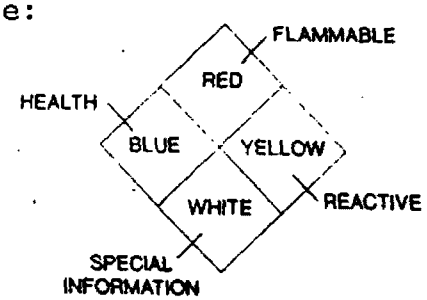
5.1 There are three words affixed to certain labels which can assist your staff in determining a hazardous waste. Those are:

CAUTION - Mildly toxic
WARNING - Moderately toxic
DANGER - Highly toxic

6. Department of Transportation's Emergency Response Guidebook

We at the Des Moines Metropolitan Area Solid Waste Agency felt it was important for our employees to learn how to use the DOT Emergency Response Guidebook. If they are close enough to read a label and ingredients, the Guidebook can help them understand the hazards. It will also give information for evacuation and isolation for not only employee protection but also for haulers and the general public. Each of our trained employees has a personal pocket-size Guidebook for his/her use plus an additional Guidebook in the possession of the working foreman and another at the main shop.

Some of the new placards are color coded, either in a bar code or a diamond shape:



7. Steps to Follow after a Hazardous Substance is Discovered

Detect
↕
Identify
↕
Follow Safety Plan or Leave the Area
(upwind, uphill, safe distance)
↕
Isolate Area
↕
Notify Proper Authorities
(Call 911)

7.1 Your Safety Plan Should Include the Following:

1. Who is in charge?
2. What evacuation procedures must you follow?
3. Who will provide the waste identification information?
4. How will you isolate the area?

Your safety plan should also include telephone numbers of fire protection, police protection, local HazMat team, and the closest emergency hospital to the site. Also, you should make sure that all of these agencies are aware of your plan and know how they will work with you.

7.2 Waste Identification Form

You need to develop a form to gather information to help identify your waste. Those forms may include, but are not limited to, some of the following:

Container size_____ Container shape_____

Label_____

Active ingredients_____

Manufacturer name_____

Shipping information_____

Liquid_____/Solid_____ Color_____

Odor observed, if any_____

Vapors identified_____

All of this information may help your HazMat team or fire protection specialist identify the waste and provide you with information for safety.

8. Conclusion

I am not sure that the specific training provided for our landfill and transfer station employees was the extent and intent of the Environmental Protection Agency in §258.20. However, I do feel that we have offered a level of protection for our employees and the public and private sectors that utilize the landfill and transfer station as well as keep hazardous wastes out.

After our training this summer, our sense of smell detected a strong solvent odor emanating from several drums of paint sludge which had been approved for disposal based on the TCLP analysis. Upon further investigation, it was determined that the drums did not meet the specifications the company had noted. We have now developed a disposal process with this company prior to any additional acceptance of their paint sludge.

For us, the program and training has proved invaluable; and we shall continue to expand and elaborate in areas where needed. Perhaps more training programs will be made available by the State or Federal Governments that specifically address this portion of the Rule.

In addition, the Des Moines Metropolitan Area Solid Waste Agency operates a special waste authorization program in conjunction with the Iowa Department of Natural Resources' program. I have the opportunity to review TCLP tests, MSDS sheets, and letters containing knowledge of process from our commercial and industrial manufacturers. We can accept, reject, or require special handling of any specialized waste at our facility.

9. Other Programs in Other States

There are several load inspection programs effectively operating in other states. For example, Ada County, Idaho, under the direction of David Neal, has developed a program that pulls household hazardous wastes from their load inspection program. In one week they may recover 150 gallons of latex paint, 20-30 gallons of oil based paint, 15 gallons of solvents and thinners, 15 gallons of general household hazardous waste, and 40 lead acid batteries. Once a year, they have a household hazardous waste cleanup day, much like our annual Toxic Cleanup Day. A local paint manufacturer blends the latex paints for reuse, and they are working to blend the oil based paint as well. Training for Mr. Neal's staff was conducted through an EPA 40-hour

course. The course is entitled "Hazardous Materials Incident Response/Personal Protection and Safety". A well thought of recommendation from David Neal was to have your inspection staff undergo vaccination for Hepatitis B and have regular Tetanus shots.

Daytona Beach, Florida, under the direction of Linda Lee Anderson, has solicited the cooperation of area waste haulers to provide stickers on trash cans indicating "Your refuse service cannot take pollutants". There is a telephone number listed for individuals to call for information on proper disposal of their unacceptable materials.

In California, under the Amendments to Title 23 of the California Code of Regulations, solid waste disposal facilities are required to implement a periodic load checking program. The essential elements of the program very closely follow §258.20 of Subtitle D. This program is more closely aligned to the intent of the Federal Rule.

As we all embark into a load inspection program, we need to keep two things in mind: 1) the program should be designed to further eliminate the potential for further environmental pollution entering landfills; and 2) the program should be designed to protect the health, safety, and welfare of employees and the public. Hopefully, we can share these experiences with others.

Household Hazardous Waste Budgeting: From One-days to Permanent Facilities

Rachel Rosenzweig
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When planning a Household Hazardous Waste (HHW) program, whether it be for a one-day event, a mobile program or a fixed facility, the key component is just that: planning. Any HHW program developer, coordinator or manager will tell anyone who is thinking of sponsoring an HHW program that planning is paramount to a successful program. And one very important aspect of having a successful program is having the sufficient funding to pay for everything you want to accomplish. As it is said, "if you've got the money, we've got the goods". The following information may be used as a basic guideline to most of the expenditures that will be incurred for an HHW program. Whether you do a one-day per year program or have a five-day per week fixed facility, there are certain costs that will be common to all HHW programs. Some of these include the following:

1. Development costs:

Before you take in your first can of paint or first jar of Malathion you have to have a program that can properly manage such items. For entities that choose to develop either mobile or permanent facilities, they will likely incur the costs of consultants and engineers. They will work with you on developing both an Operational Plan under which the program will run, as well as design a facility that will properly house stored materials until they are handled by a licensed hazardous waste hauler. In addition, there will also be legal fees to consider as RFQs and RFPs are drawn up to choose the most qualified vendor to handle materials collected. While these costs are generally not part of an annual HHW budget, they have to come from somewhere, so make sure you've got the funds set aside.

2. Waste Management costs:

This category will more than likely be the costliest item on your annual budget. It is not uncommon for waste management costs to range from $50,000 to $200,000 whether it be a one-day, mobile or permanent program. These costs will be directly related to the number of participants served and what they bring in. For example, out of a budget of approximately $326,000 for the Lancaster County Solid Waste Management Authority's (LCSWMA) permanent HHW Facility, $200,000 is dedicated to covering disposal costs which equates to 61% of our budget. These costs can oftentimes be directly related to publicity efforts. The more money dedicated towards publicizing the program, the more people will respond, which will result in more materials needing to be properly managed, resulting in more money needing to be spent.

3. Publicity:

For one-day programs in particular, publicizing in the newspaper, on the radio and TV, and with flyers and posters are some of the more popular ways of getting the word out. Additional publicity methods include inserting information into tax or utility bills, or paychecks (if a company will agree to it), getting into the schools and sending flyers home with the kids, etc. For permanent programs, incorporating the program's pertinent information such as days and hours of operation, materials accepted and not accepted, etc. can be included in the overall information package of environmental management developed by the sponsoring agency, as well as advertising in newspaper ads and articles; TV PSAs; disseminating information at town and environmental fairs; public presentations; etc. Mobile programs will want to combine both one-day and permanent program publicity efforts as they are somewhat of a "permanent program on wheels".

4. Staffing:

Another key area to budget for is staffing. For one-day programs, it is not unusual to have a score of

volunteers helping out by directing traffic, giving participants questionnaires, etc., jobs that do not require technical expertise. Fortunately for the organizers, these much needed people don't get paid and are usually glad to help out. A few slices of pizza and some sodas generally help keep everybody happy. Staffing costs for one-day programs are usually the labor costs of the hazardous waste hauling company's staff and these costs are usually included in the total disposal fee or as a separate set-up and tear-down fee. For permanent programs, staffing costs will vary according to the number of staff employed at the facility, as well as the number of days per week the facility is operational. For example, LCSWMA's facility is open five (5) days per week, two (2) evenings per week and two (2) Saturdays per month, which has resulted in the need to budget for a minimum of 7.5 hours of overtime each week. In addition, with permanent programs that have a full-time staff, benefits must also be taken into account. Included are items such as worker's comp, insurance, hospitalization, pension contributions, physicals, as well as a clothing allowance and uniforms. Out of our annual HHW budget, total costs for two (2) full-time employees run about 31% of our budget. Mobile facility programs that employ their own staff should take into consideration the same costs as a permanent program.

Training for staff must also be considered, as it is imperative to have trained employees handling materials. LCSWMA incorporates both initial, as well as annual update training into the contract held with the hazardous waste vendor. If this is not feasible, there are training courses which generally run in the hundreds of dollars, available for hazardous waste site workers.

5. Siting for a One-day Program:

If hosting a one-day program, the sponsoring agency will want to obtain a site that is large enough to accommodate the event and relatively central to the overall area being served. Some possibilities are county-owned properties, such as parks and fire training schools, and school parking lots. However, these sites may not be free of charge and their costs must be taken into consideration when budgeting. For example, the County Fire School in Mercer County, NJ charges the Mercer County Improvement Authority $750 per clean-up event to use its site. In addition, any site used, whether for a one-day, mobile or permanent program, may require additional insurance and/or permits, which often have associated fees. Each state agency will have its own rules and regulations to abide by.

6. Developing a Mobile or Permanent Facility:

Permanent programs are usually situated in a building or structure dedicated to HHW. Therefore, whether for a new or retrofitted building, certain aspects have to be considered along with their associated costs. Included are:

1. Consultants' or Engineering costs

2. Construction costs, which may include the following items:
   - main storage areas (either pre-fab buildings or concrete block walls)
   - fire-suppression system
   - ventilation equipment (heating, air supply/exhaust, fume hood)
   - explosion-proof lighting
   - blast-relief panels
   - smoke detection units
   - three-hour fire-rated walls and fire doors
   - shower and eye-wash station(s)
   - epoxy flooring
   - painting
   - containment units/bays and grating
   - extra drum storage area
   - waste oil handling area
   - trash/waste disposal costs

- lab area for unknowns testing
- office space
- employee locker room and restrooms
- security system (fencing, alarms, etc.)

When considering the purchase of either prefabricated buildings or the construction of a permanent facility, the costs per square foot can range from the low end of $22 for modified trailers to over $250 per square foot for some fixed facilities. While these figures would be considered part of the capital costs and therefore amortized over the life of a program, they must be considered in budgeting for a HHW program.

7. Capital costs:

While one-day HHW programs have no actual capital costs, there are certain items that can be amortized over the life of the program for either a mobile or permanent program. The largest cost will obviously be the mobile unit(s) or fixed facility that is utilized or constructed. Other items such as work tables, chairs, push carts, drum dollies, pallet jacks, a paint can crushing machine, a Self Contained Breathing Apparatus (SCBA), a dumpster, reference materials, storage cabinets, shelving units, grounding rods and cables, step ladders and lab equipment are some of the more common items that are considered to be capital costs.

8. Supplies and Equipment:

This category, unlike capital costs, include those items that have an ongoing need to be replenished. It is important to have sufficient quantities of such supplies on hand as they are often used on a daily basis. Some of the more common items needed for any HHW program whether it be for a mobile or permanent program include the following:

A. Safety supplies:

- tyvek suits
- respirators and cartridges
- gloves (nitrile and leather)
- first aid and burn kits
- boots
- safety glasses/goggles
- fire extinguishers
- gas meter (optional)

B. Spill clean-up/containment:

- absorbent
- booms/spill pads
- plastic for walls and floor covering
- plastic bags for leaking containers (various sizes)
- mercury spill kit
- clean rags

C. Containers:

- empty drums (various sizes) and labels
- containment/sample jars (various sizes)
- 5-gallon buckets with lids for battery disposal
- overpack drums and oversized "dish" bins for leaking containers

D. Tools and Operating Equipment:

- brooms, shovel, dust pan
- consolidation funnels for drums
- pH paper/chlor-d-tect kits
- duct tape (!!!)
- QC rods
- barricade tape
- pallets/plywood
- various tools: screwdrivers, pliers, drum wrench, hammer, scoops, spatulas/spoonalas

E. Office Supplies:

- clipboards and pens

- copying capabilities for forms and/or questionnaires
- marker pens for writing on steel drums

F. Other:
- clock
- HHW wheels/public information sheets and handouts
- signs for doors and walls, interior and exterior of facility

Actual costs:

When all of the costs to hosting an HHW program are added together, their total costs are high when compared to "regular MSW" waste management practices. In fact, the cost per participant may also seem quite high. For example, LCSWMA's cost per household serviced in 1991 was almost $100 based on our actual operating expenses of $227,000 and just under 2,300 participants serviced. On the whole, this figure seems to be evolving into the national average of cost per participant whether for one-day or permanent programs. While it was initially anticipated that permanent programs would lower costs per participant over time, it appears that they actually cost about the same as a one-day program per participant. However, it is hoped that as participants make return visits to permanent HHW facilities with less material per visit, costs (mainly those for disposal) will go down. It should also be kept in mind that for their costs, permanent programs, unlike one-day events, provide ongoing availability to the public.

When planning an HHW program, another one of the key elements is to estimate the number of participants that will be serviced annually by the amount of material anticipated to be received. By using the national average of serving approximately 2% - 5% of an area's population and with each participant bringing in approximately 100 lbs. of HHW, the budgeting process for the amount of space needed, the number of staff to be employed, as well as the amount of supplies and equipment required can be determined more easily. In addition, publicity efforts will also be directly related to the anticipated cost per participant serviced and the actual amount of funding you have available to you. For example, if you discover that your funding will exceed anticipated costs, you might be able to allocate a bit more to publicity efforts, which will in turn affect both your participation rates, as well as your waste management practices and costs.

Cost reduction efforts:

In an effort to reduce the expenses associated with the various methods and costs of waste management for HHW, which include incineration, landfilling, neutralization and wastewater treatment, some communities have ambitiously initiated waste reduction efforts in the form of waste exchanges. For example, the City of Santa Monica, CA has reduced the amount of materials being handled by their hazardous waste vendor by 40 %. Recycling certain items such as used motor oil, antifreeze, lead-acid batteries and Ni-cad and buttoncell household batteries is another simple way to reduce disposal costs. Quite a few communities on the West Coast have found recycling outlets for both their waste oil-based and latex paint streams and give the refurbished paint to anti-graffiti groups or other non-profit groups. A few HHW programs have begun using aerosol can puncturing units to empty the contents of partially full cans, which has not only resulted in the savings of quite a lot of money when compared to their previous method of disposal, but also created a revenue in their ferrous metal value. For example, LCSWMA's permanent HHW program has incorporated the use of such a unit and now pays only $115 to dispose of the contents of 3 to 4 55-gallon drums which would have cost $495 a piece to dispose of "the old way".

In summation, an HHW program can run the gamut of possible costs, from the low of just a few thousand dollars for specialized clean-ups such as an "oil-only" clean-up day to managing a million dollar plus budget. Either way, the most important fact to consider is the need to plan and develop both a program and a budget that will fit your community's needs and abilities.

Workshop 4-A - How To's
Funding Via EPA's Enforcement Efforts
Brian Rimar, U.S. EPA Region VIII

* Much of the information contained in this presentation is found in "Pollution Prevention Through Compliance and Enforcement", available from the U.S. Environmental Protection Agency (EPA) Office of Pesticides and Toxic Substances, (202) 260-3807.

* History
- In 1990 Congress passed the Pollution Prevention Act, calling for pollution prevention (P2) to be a national objective.
- The EPA Office of Enforcement has issued a policy statement which encourages compliance and enforcement programs to use the settlement process to identify and implement P2 activities.

* Process
- EPA can require the violator to use P2 to redress the original violation or to include supplemental environmental projects (SEP's), previously called environmentally beneficial expenditures.
- Violations and penalties can fall under a variety of environmental statutes; CERCLA, EPCRA, RCRA, CWA, SDWA, FIFRA, TSCA, SARA, etc.
- As part of a settlement agreement a defendant might agree to conduct a project which reduces risks posed to human health and the environment.
- Many agreements with SEP's include a change of industrial process or a material substitution. However, the acceptable range of SEP's is widening to include P2 programs such as household hazardous waste (HHW) collections, HHW reprocessing, and HHW education programs.

* Case Studies
- Longmont Foods Inc. of Colorado will be sending the solid waste from their slaughter house to a bio-gas project rather than a landfill, under a SEP.
- City and County of Denver, Colorado, will fund a HHW education program and partially fund start-up costs for a paint reprocessing facility. This SEP was funded by fines from a CERCLA consent decree violation.
- Disneyland of California instituted waste minimization measures and educated their employees on hazardous waste reduction following a RCRA violation.

* How To Access SEP's

- Most of the EPA regional offices have a Regional Enforcement Officer and/or a database of current enforcement actions under all statutes. This information may provide enforcement cases where SEP's would be appropriate.

- If you are familiar with a particular enforcement case, work with the EPA project manager or compliance officer to encourage a SEP. In some EPA programs a SEP counts as an extra "bean" for the EPA employee.

- Make the SEP easy for the EPA. Many project officers are not familiar with the details of a HHW project, don't expect them to do the leg-work to initiate a program.

- Realize the limitations of SEP's. Some enforcement actions may not be appropriate for this program. Attorneys from both EPA and the Department of Justice may not be familiar with the program, work with them on potential projects.

- Don't forget to promote the positive benefits of a SEP, such as good media coverage for the violator, or increased cooperation between EPA and local governments.

CREATIVE USE OF STATE ENFORCEMENT EFFORTS

by

Judi Frantz

California Environmental Protection Agency
Department of Toxic Substances Control

When hazardous waste facilities are found to be out of compliance with governing laws and regulations, the responsible regulatory agency has several options for obtaining compliance. When the hazardous waste facility happens to be a household hazardous waste (HHW) facility, it can put the responsible regulatory agency in a very difficult and awkward situation.

Criminal, civil and administrative actions are the most common regulatory actions taken to obtain compliance. Criminal actions are taken for the most severe violations, i.e., knowingly endangering public health and the environment. These types of violations usually result in court actions that focus on imprisonment of the violator and cessation of facility operations.

Is that what a regulatory agency really wants to do to a program as beneficial as a household hazardous waste collection facility?

Civil and administrative actions are used for violations of a less severe nature, i.e., storage or incompatible wastes, improper drum labeling, recordkeeping violations, etc., And are an excellent opportunity for negotiating a mutually agreeable settlement prior to filing the action with a court of law. This "settlement agreement" is a legal document that usually lists conditions for mitigating the violations, and may contain provisions for paying fines and implementing some form of pollution prevention. The settlement agreement can also provide a vehicle to obtain compliance without shutting down the operation(s) of a HHW facility. California has now used this approach in it's first enforcement case involving a HHW facility.

The settlement agreement process:

The settlement agreement process is a two-step process: 1) the corrective action order and complaint for penalty, and 2) the settlement agreement and order. The corrective action order notifies the facility that it is in violation of specific laws or regulations, identifies those laws or regulations, and lists the specific violations. A schedule of compliance listing the

specific actions that must be implemented is also included. Correction of the violations is mandatory, and it not typically given monetary credit in the settlement agreement.

The next step is the assessment of a penalty. Monetary penalties are typically assessed as a punitive deterrent for future violations. The penalty (or fine) is imposed in addition to the requirement to correct the violation, and is the "bargaining chip" that can be negotiated for conducting supplemental environmental enhancement or pollution prevention projects. The penalty is usually based on the seriousness of the violations and must be defendable by the regulatory agency. Penalties are sometimes calculated by estimating the monetary savings that the facility accrued as a result of being out of compliance, i.e. if a facility stored hazardous waste onsite for longer than 90 days without filing for a permit, the facility may have "saved" $50,000 in transportation and disposal costs. Thus the penalty could be assessed at $50,000. And -- here comes the interesting part -- some portion of that penalty can be negotiated for the performance of some form of environmental enhancement or pollution prevention activities. Such negotiations usually occur during a hearing provided to each violator.

Without getting too far afield here, I want to mention that there is debate among some governmental agencies to the effect that allowing environmental enhancement or pollution prevention activities to be negotiated as part of a penalty may reward a facility for being in violation. Other arguments center around the need to collect fines to support regulatory programs, and others still argue that they don't have the time or resources to perform supplemental environmental projects in the settlement agreement process. These arguments are classic institutional barriers to pollution prevention that must be overcome in order to assure that industries do everything possible to eliminate or reduce the generation of hazardous waste.

But the option of negotiating part of the penalty into environmental enhancement or pollution prevention activities does help solve several unique problems that are faced when enforcement action must be taken against a household hazardous waste facility, such as:

1) We, the State, encourage and support these very beneficial programs; we really don't want to shut them down.

2) We are dealing with another governmental agency - in california all of these facilities are operated by local cities and counties.

3) Getting actual dollars in fines and penalties out of financially strapped local government agencies is like pulling hens teeth!

4) We, the State, cannot hold facilities operated by another governmental agency to a different standard than we do any other hazardous waste industry.

5) While closing down a household hazardous waste facility is the last thing we want to do, we do have to ensure that they are run safely and in accordance with all laws and regulations.

So how does it work?

Our first, but unfortunately not last, experience occurred approximately two and a half years ago and involved the city of Santa Monica, which up until then one of our premier and stellar HHW facilities. We received a complaint, and upon investigating found that several serious violations were, in fact, occurring. Instead of safely and properly managing the HHW received, the HHW was being stockpiled. The facility was filled to capacity, and an adjacent building was also filled - literally to the rafters.

I assured Brian Johnson that I would stress the fact that this all occurred under the previous administration - and I'm more than happy to do that.

What had happened was the staff working at the Santa Monica facility were reassigned to other duties, but the facility itself was not closed and HHW continued to arrive. The end result was a tremendous stockpiling of all of the HHW as well as all of the emergency clean up wastes accumulated during the same period of time.

Because of the risk involved, the first thing we had to do was shut down the facility; then we issued an order for all of the hazardous waste to be removed -- the facility could not re-open until this had been done. Those two actions do not, by any means, constitute anything creative on our part. But what happened next did.

In assessing a penalty and discussing the proposed fine with city officials, it became immediately apparent that we had to take a different approach. To be perfectly honest, the city's response to the proposed penalty was to tell us politely to take a flying leap! They said they absolutely would not pay the proposed $325,000 fine; they also said it was o.k. with them if the facility never re-opened.

That certainly left us with a dilemma: how to get a fine or penalty -- or the equivalent of one -- out of them and get their facility back on-line?!?!

Ultimately, the brainstorming sessions resulted in a proposal that was creative: Have the city pay a minimal fine, but also require them to finance, organize and conduct an educational program on the proper management and operation of a household hazardous waste collection program or facility. The proposal, if accepted, would accomplish several things:

1) We would recover enough in the actual penalty to cover the $13,250 cost of our investigation;

2) Their facility could re-open;

3) Additional penalty value of approximately $25,000 would be covered in the educational program;

4) Equally important, the educational program would provide a real benefit to other local governmental agencies throughout california who were planning or already operating a HHW program;

5) And possibly most important of all, the city thought they were getting a bargain!

There were many specific conditions included in the settlement agreement language: the education program had to begin within six months of the settlement agreement date; it had to consist of classroom instruction at an accredited college or university; it had to include an internship program; there was a target audience of other municipalities; the city had to make "reasonable" efforts to advertise or otherwise publicize the program; and they had to submit to us for review and approval both a written proposal and the curriculum for the program. We put them on "probation" and beefed up our inspection schedule as well.

The results?

The city accepted the proposal, the settlement agreement was signed, the facility re-opened, the $13,250 fine was paid, and the education program was held at Santa Monica City College with approximately 45 "students" in attendance who paid no fees or tuition for the four-day course. In the end, the program actually cost the city closer to $35,000.

Two additional benefits that we had not anticipated also occurred: (1) the HHW facility was transferred from the city's Department of General Services and now reports directly to the city manager; and (2) Brian Johnson became general manager of Santa Monica's HHW program. There haven't been any problems at the facility since.

Are we, the State, happy with the results?

In a word, yes.

Have there been any other violations at any other household hazardous waste facilities in California?

Yes. In fact, there is one case currently pending where a facility operated illegally for six months, another where some filled drums were accidentally "overlooked" for several months instead of being transported to a TSDF, and yet another where some unauthorized waste was accepted. In the case where the facility operated illegally for six months, the facility has since received it's authorization to operate, but the enforcement action for the previous violations is yet to be resolved. We are currently looking at options for creative terms, including ideas gleaned from the local agency's household hazardous waste element in their general plan, such as:

1) Requiring the facility to accept cesqg waste, which they currently do not do, but plan to do at some unspecified date in the future.

2) Requiring the local agency to implement their k-12 HHW education program now rather than in three years as is currently planned.

3) Requiring the local agency to conduct an agricultural pesticide collection program for banned, restricted or outdated pesticides from commercial growers in their jurisdiction.

4) Requiring the local agency to conduct one-day HHW collection events in the areas of their jurisdiction not served by their permanent HHW facility.

5) Requiring the local agency to expedite their plan and schedule for a mobile HHW collection unit to serve the other areas of their jurisdiction.

Will we use creative settlement terms in future enforcement cases against HHW facilities?

Absolutely. Even though we are increasing our efforts to provide more regulatory assistance to household hazardous waste facilities and programs, we know this is not a perfect world. As more HHW facilities come on-line, we can probably expect more problem situations to occur now and then. Over-zealous inspectors will undoubtedly be a contributing factor as well. And when needed, we will try creative terms and conditions because they can turn a very difficult enforcement case into a win-win situation for us all.

COMPONENTS OF A COMPREHENSIVE CESQG PROGRAM

Ned Brooks, Minnesota Pollution Control Agency

OVERVIEW OF PRIMARY COMPONENTS

- Identification of generators
- Education and assistance
- Compliance and enforcement
- Off-site waste management
- Evaluation

CESQG/HHW MANAGEMENT PROGRAMS

- Similarities
  - Large population
  - Regulation or lack of
  - Waste, waste management
  - Education needs, goals
  - Federal/state/local involvement
- Differences
  - Waste, waste management
  - CESQG - business activity
  - Regulation

IDENTIFICATION OF CESQGS

- Important and difficult
- Passive
  - Voluntary
  - Obtain ID number for disposal
- Active
  - Mailing to list of likely generators
    - SIC
    - Telephone book
    - Business license/Tax ID
    - Marketing lists
  - Work with trade groups
  - Door-to-door survey

CESQG EDUCATION AND ASSISTANCE

- CESQGS need information on:
  - Identification of hazardous waste
  - Waste management
  - Reduction
- Tools:
  - Printed material
  - Workshops, seminars, meetings
  - Telephone advice
  - Site visits/consultations

CESQG EDUCATION AND ASSISTANCE

- CESQGS need information on:
  - Identification of hazardous waste
  - Waste management
  - Reduction
- Tools:
  - Printed material
  - Workshops, seminars, meetings

- Telephone advice
- Site visits/consultations

Suggestions:

- Emphasize benefits business
- Be concise, specific
- Involve business groups, suppliers

CESQG COMPLIANCE THROUGH ENFORCEMENT

- Compliance through education preferred
- Some CESQGS will not respond to education alone
- Enforcement action may be required as a result of:
  - Complaint investigations
  - Regular inspections
- Fear of enforcement strong deterrent
- The word will get around

OFF-SITE CESQG WASTE MANAGEMENT METHODS

- Municipal waste streams
- Licensed transporter delivers to permitted facility
- CESQG self transport to collection site
  - Temporary
  - Permanent
  - Combined HHW/CESQG
- Consolidate with other businesses

OFF-SITE WASTE MANAGEMENT - RECYCLING, TREATMENT, DISPOSAL

Barriers:

- Lack of services available
- Lack of knowledge of services
- Transport, analytical, disposal too costly
- Too complex, bureaucratic
- Regulation of CESQGS does not allow self transport
- Lack of regulation - no incentive

CESQG COLLECTION - FEDERAL REQUIREMENTS

- Not regulated as a HW program per RCRA
- No permit or ID number required
- No accumulation limit
- Self transport is allowed
- No limit on storage time
- No subtitle C permit
- HHW/CESQG same facility, same drum

CESQG COLLECTION PROGRAM ISSUES

- Must keep S/LQGS out
- Who is the generator, especially if combined with HHW?
- Can liability still be traced back to CESQG?
- To what level are costs subsidized?
- Transport to site
  - Safety
  - Regulated by MNDOT as a hazardous material?
- Role of reduction

Household Hazardous Waste Collection Programs Managing Nonhousehold Hazardous Wastes: An Overview of RCRA Regulations

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1. Introduction

Municipalities and other managers of household hazardous waste (HHW) collection programs are expressing interest in collecting hazardous waste from small businesses that generate small quantities of hazardous waste. Collection program managers considering managing hazardous waste generated by businesses, commercial operations, and industries should be aware that such waste is not excluded from the Resource Conservation and Recovery Act (RCRA) hazardous waste regulations under the household waste exclusion (40 CFR §261.4(b)(1)) and may be subject to additional requirements.

Managers of programs considering collecting nonhousehold hazardous waste should become familiar with state regulations governing the management of such waste, or if in nonauthorized states, the federal regulations. (Most state regulatory programs are based on, and are similar to, the federal program.) This paper discusses the federal regulations governing management of such waste by HHW collection programs.

2. Conditionally Exempt Small Quantity Generator Hazardous Waste

In general, hazardous waste generated by nonhousehold establishments is subject to the full hazardous regulatory program set forth in Parts 260 through 272 of Title 40 of the Code of Federal Regulations (CFR). There are regulations governing hazardous waste generators (40 CFR Part 262), hazardous waste transporters (40 CFR 263), persons treating, storing, or disposing of hazardous waste (40 CFR Parts 264 and 265), and permits for persons managing hazardous waste (40 CFR Part 270). In addition there are land disposal restrictions regulations (40 CFR Part 268) which require that hazardous wastes be treated to meet specified standards prior to land disposal.

However, under the federal regulations, there is a conditional exemption provided for hazardous waste generated by generators known as Conditionally Exempt Small Quantity Generators (CESQGs). These CESQGs are nonhouseholds (e.g., retail stores, office buildings, restaurants, shopping centers, small commercial or industrial operations) that generate 100 kilograms or less of hazardous waste per month (kg/mo)[1], and/or 1 kg/mo or less of acutely hazardous waste (or 100 kg/mo of acutely hazardous waste spill residues). The procedure used to calculate the amount of hazardous waste generated per month is set forth in 40 CFR §261.5, paragraphs (c), (d), and (e). The calculation requires the generator to total all hazardous wastes generated within the month, except several specific wastes which are not counted. Those wastes not included in the calculation are:

- Used oil that is recycled on-site or sent off-site for recycling;
- Spent lead-acid batteries that are reclaimed;
- Hazardous waste that is not subject to regulation or that is subject only to requirements for waste identification, EPA Identification Numbers, and Biennial Reports (e.g., a hazardous spent solvent that is reclaimed at the generator's site immediately after generation without any storage prior to reclamation);
- Hazardous waste that has already been counted once including waste removed from on-site storage or waste produced by on-site treatment (including reclamation); and

[1]Translated from weight to volume, 100 kg of hazardous wastes that have a density similar to water occupy about one-half of a 55-gallon drum (or the volume of approximately 27 gallons of water). 100 kg of paints probably take up slightly less volume, while 100 kg of hydrocarbon liquids such as nonhalogenated solvents probably take up slightly more volume.

- Hazardous spent materials that are generated, reclaimed, and subsequently reused on-site, so long as such spent materials have been counted once.

Under the federal hazardous waste regulations, hazardous waste generated by CESQGs is subject only to the limited requirements set forth in 40 CFR §261.5, rather than the full hazardous waste regulations, provided the CESQG complies with the following requirements:

1) CESQGs must follow the waste identification procedures of 40 CFR §262.11 to determine whether their wastes are hazardous, and to determine what the appropriate waste codes are for the wastes (§261.5(f)(1) and (g)(1));
2) CESQGs may not accumulate greater than 1,000 kg of hazardous waste (or 1 kg of acutely hazardous waste or 100 kg of acutely hazardous waste spill residues) on-site at any time (§261.5(f)(2) and (g)(2)); and
3) CESQGs must either treat or dispose of their hazardous wastes in an on-site facility or ensure delivery to an off-site treatment, storage, or disposal facility, either of which, if located in the U.S., is:
    A) Permitted to manage hazardous waste under Part 270 of the federal hazardous waste regulations;
    B) Granted interim status to manage hazardous waste under Parts 265 and 270 of the federal hazardous waste regulations;
    C) Authorized to manage hazardous waste by a state with a hazardous waste management program approved under Part 271 of the federal hazardous waste regulations;
    D) Permitted, licensed, or registered by a state to manage municipal or industrial solid waste; or
    E) A facility which:
        a) Beneficially uses or reuses, or legitimately recycles or reclaims its waste; or
        b) Treats its waste prior to beneficial reuse, or legitimate recycling or reclamation. (§261.5(f)(3) and (g)(3))

Under the third requirement, CESQGs may take their hazardous waste to a HHW collection program (or to any other waste collection or management facility) that is not a permitted or interim status hazardous waste management facility if the program meets criteria D and/or E listed above. In other words, for CESQGs to take their waste to a collection program, the program must either use, reuse, or recycle the waste or be permitted, licensed, or registered by the state to manage municipal or industrial solid waste. Some states may have programs set up to permit, license, or register HHW collection programs. Other states may not have formal programs developed. EPA has stated, however, that this requirement was not intended to impose on states any particular procedure for approval of such facilities. All that is required under the regulations is that the state have some mechanism for approving facilities that manage CESQG waste. EPA has confirmed that any mechanism the state chooses is acceptable to meet this requirement. Thus, an exchange of letters could be an appropriate way to achieve "registration" of a facility, if that is the procedure selected by the state for this purpose (the term registration is not defined in the regulations). (See attached letter dated October 9, 1986 from Mark A. Greenwood, Assistant General Counsel, U.S. EPA, to Joan H. Peck, Chief, Waste Evaluation Unit, State of Michigan Department of Natural Resources.)

It is important that programs planning to accept CESQG waste work closely with the appropriate state agency to identify the procedures necessary for compliance with 40 CFR §261.5. To demonstrate compliance, programs may wish to maintain documentation of the state "registration," such as a copy of a permit or letter. CESQGs may also request copies of such documentation to verify that they have taken their hazardous waste to a facility that meets the requirements of 40 CFR 261.5(f)(3) and (g)(3).

As long as a collection program accepting CESQG waste has met the requirements for receipt of CESQG waste (i.e., recycling or state permitting, licensing, or "registration"), there are no additional

requirements specified for management of CESQG waste under the federal hazardous waste regulations.[2] Thus, there is no limit on the amount of CESQG waste that may be managed at the collection facility or the length of time waste may remain at the facility, and there are no requirements applicable to transportation of the waste[3].

It should be cautioned, however, that there are several provisions that restrict management of mixtures of other wastes and CESQG waste under the CESQG regulations. This issue is discussed further in Section 3 of this paper.

3. Management of Fully Regulated Hazardous Waste

HHW collection programs considering collection of CESQG waste should be aware of the regulations governing management of waste generated by fully regulated generators (those that generate more than 100 kg/mo of hazardous waste, more than 1 kg/mo of acutely hazardous waste, or more than 100 kg/mo of acutely hazardous waste spill residues). Most importantly, all fully regulated generators must transport their waste using a hazardous waste manifest, may only send their waste to permitted or interim status hazardous waste management facilities or certain recycling facilities,[4] and must fully comply with the land disposal restrictions program. **Thus, collection programs that are not permitted or interim status hazardous waste management facilities (or certain recycling facilities) may not accept hazardous waste from generators who generate greater than 100 kg/mo.**

To protect themselves from unknowing illegal management of fully regulated hazardous waste, collection programs may develop procedures to ensure that all waste accepted actually is CESQG waste. A full understanding of the hazardous waste regulations will assist in developing successful procedures, as will an awareness of the difficulties inherent in distinguishing waste generated by CESQGs from that generated by fully regulated generators. Specifically, such wastes may be physically and chemically identical; the classification is based only on the generator's waste generation rate. Thus, collection programs will be relying on information provided by generators to ensure that only CESQG waste is accepted. Therefore, it is in the collection programs' interest to verify that generators from whom CESQG wastes are accepted understand the hazardous waste regulations. Collection programs may also want to discuss with their legal counsel whether it may be appropriate to obtain from generators documentation of their generator category.

Collection programs may find that it is necessary to assist generators in determining whether they are CESQGs or fully regulated generators. In this educational role, program operators also have an opportunity to make generators aware of waste minimization practices that may allow them to reduce their waste generation enough to remain under the CESQG limits. Thus, generators whose past practices have generated larger hazardous waste quantities could alter their operations so that they generate smaller amounts and are regulated under the limited CESQG regulations (rather than the full hazardous waste regulations).

4. Management of CESQG Waste Mixtures

The CESQG regulations contain three provisions addressing management of mixtures of CESQG

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[2]The collection program must of course comply with any requirements imposed under the state permitting, licensing, or registration.

[3]For both generators and collection programs, as long as packaging and transport is in compliance with applicable Department of Transportation (DOT) regulations, use of manifests and hazardous waste transporters is not required. Thus, if in compliance with DOT requirements, CESQGs may transport waste to a collection program themselves.

[4] Or, for hazardous waste regulated only within the state, to certain out-of-state facilities. See the definition of "designated facility" in 40 CFR 260.10.

waste and other wastes (e.g., wastes that have been poured or placed into the same drum or container with CESQG wastes). First, 40 CFR §261.5(i) states that CESQG waste mixed with waste that exceeds a quantity limit (i.e., >100 k/mo of hazardous waste, >1 kg/mo of acutely hazardous waste, or >100 kg/mo of acutely hazardous waste spill residues), is subject to full regulation. Thus, a facility managing mixtures of CESQG waste and fully regulated waste would be subject to the full hazardous waste regulations (40 CFR Parts 262 through 272), rather than the CESQG regulations of 40 CFR §261.5.

Second, 40 CFR §261.5(j) specifies that mixtures of CESQG waste and used oil that are to be burned for energy recovery are subject to the used oil burned for energy regulations set forth in Subpart E of 40 CFR Part 266.

Third, 40 CFR §261.5(h) states that CESQG waste "may be mixed with non-hazardous waste and remain subject to [the CESQG] reduced requirements even though the resultant mixture exceeds the quantity limitations identified in [the 40 CFR §261.5 CESQG regulations], **unless the mixture meets any of the characteristics of hazardous waste identified in [40 CFR Part 261] Subpart C.**" (Note that HHW is excluded from the definition of hazardous waste and is thus, by definition, non-hazardous waste.)

EPA is currently developing guidance on how programs that manage CESQG waste together with HHW may comply with the federal hazardous waste regulations. This guidance should be available in 1992. Programs interested in managing both HHW and CESQG should contact their state, and if in a state not authorized to implement the hazardous waste program, their EPA Regional Office, to obtain further information.

5. State Regulations

This paper reviews the federal regulatory requirements for HHW collection programs considering collecting hazardous waste not excluded under the household waste exclusion. It must be emphasized, however, that in many states the hazardous waste program is implemented by state agencies, using state regulatory analogs rather than the federal regulations. Some states may not have a CESQG exclusion, may use different quantity cut-offs, or may have different requirements for management of CESQG waste. Thus, HHW collection programs should check with their state hazardous waste regulatory agencies to identify any additional requirements under state hazardous waste regulations.

OVERVIEW OF STATE CESQG DEFINITIONS, LAWS AND REGULATIONS

DANA DUXBURY
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Introduction

Under Section 261.5 of Title 40 of the Code of Federal Regulations, a CESQG is conditionally exempt from the full hazardous waste regulations if they meet certain requirements. In 40 CFR 261.5(f)(3) and g(3), CESQGs must send their waste to either a federally permitted or interim status hazardous waste management facility, a state authorized hazardous waste management facility, a recycling facility , or a facility permitted, licensed, or registered by a state to manage municipal or industrial solid waste.

Each state which has been authorized under RCRA to implement the Federal statue has the ability to develop more stringent regulations. For the 0-100 kilogram per month generator, some states have developed more stringent regulations including not giving them any conditional exemptions from managing their waste as a hazardous waste (which would not allow them to send their waste to a solid waste management facility) and have often called them by another term. Consequently, in this document when we refer to these generators at the state level we will describe them as "0-100 kilogram per month hazardous waste generators" not CESQGs. When we refer to RCRA, we will use the term CESQG.

State Issues

Certain states (California, Minnesota and Washington) are developing aggressive very small quantity hazardous waste generator and/or combined HHW/very small quantity generator programs to facilitate the identification, education, and technical assistance to these generators as well as to encourage collection and proper management of their hazardous wastes. Collection of the 0-100 kilogram per month generator waste is being advocated and facilitated in some states even though such a generator is not regulated as a Subtitle C hazardous waste generator in the state (WA) as well as in states where they regulate down to zero (California and Minnesota). California and Minnesota recently revised regulations, making it simpler and less expensive for the very small quantity generator to participate.

Collection programs for very small quantity generators are still subject to state regulations and must be permitted by the state in some manner. Some states that have developed guidelines or regulations for one-day and/or permanent collection programs treat HHW and very small quantity generator wastes as solid waste and, therefore, the collection programs are also considered to be solid waste programs. The guidelines or

regulations for these "solid waste" facilities, however, require that the wastes be managed as though they are regulated hazardous wastes: identified; separated by hazard class; labeled and manifested, and sent for reuse, recycling, or to a hazardous waste facility - not a solid waste facility. Personnel need to receive hazardous materials training, and safety plans are required.

Some states are passing laws preventing the disposal of both HHW and very small hazardous waste quantity generator waste with municipal solid waste (MSW). Wastewater treatment facility regulations are also limiting what can be poured down the drain into the sewer system.

New England State Issues, Laws, Regulations that Apply

A. Massachusetts

The State of Massachusetts defines generators of less than 100 kilograms per month (previously 20-100 kilograms per month) of hazardous wastes (and no acutely hazardous waste) as "Very Small Quantity Generators" (VSQGs) This definition is within the Hazardous Waste Management Regulations at 310 CMR 30.353. In CMR 30.390-392, the State codes Special Provisions for Accumulation of Household Hazardous Waste and/or Hazardous Waste Generated by Very Small Quantity Generators. These regulations allow VSQGs to participate at 1-day collections and HHW collection centers, but unlike the households, require the VSQGs to register and obtain a receipt for their wastes. The VSQGs are allowed to self-transport their wastes, up to 55 gallons at one time. (The VSQG may also choose to use a licensed transporter, in which case they do need an ID number for their manifest. The VSQG who self-transports does not need an ID number .) The VSQGs are permitted to take their hazardous waste to another generator, to a recycling facility, or to a treatment, storage or disposal facility (TSDF).

In Massachusetts, there are 24 TSDFs (15 of which are commercial), 640 LQGs, 3200 SQGs, and 13,500 VSQGs (including those handling just used oil), and 20 inspectors. The new multi-media facility master file enables the state to encourage source reduction and proper management. Licensed transporters typically provide milk-run service for oil, parts cleaners and dentists for silver recycling. The Upper Blackstone Waste Water Treatment Facility has a new program to accept for recycling silver, oil, and antifreeze from households and VSQGs. Licensed transporters are one network through which the State informs the regulated community. The transporters will also educate businesses on proper preparation, segregation, packaging, and storage of wastes until collected. It was noted that one trade association and one regional economic development agency had offered to facilitate the set-up of collections for their members and local businesses but both had been discouraged by the fear of becoming a liable party if anything should go wrong.

B. New Hampshire

The State of New Hampshire defines hazardous waste generators of less than 100 kilograms per month as "Small Quantity Generators" (SQGs). Those generators of greater than 100 kilograms per month are "Full Quantity Generators" (FQGs). The generators of less than 100 kilograms per month have an extended storage time, and may self-transport up to 20 gallons to a permitted facility. New Hampshire's policy is to not permit SQG wastes at HHW collections. SQGs are regulated under the New Hampshire Hazardous Waste Rules (New Hampshire Code of Administrative Rules, Env-Wm 500). The State of New Hampshire Department of Environmental Services offers a non-regulatory waste reduction and pollution prevention program to both SQGs and FQGs. The program provides hazardous waste generators suggestions for waste reduction and offers on-site inspections to help industry decrease the production of hazardous wastes.

New Hampshire has no TSDFs, 115 FQGs, and 2318 SQGs and 5 inspectors. They use funds from fees on hazardous waste ($0.03/lb on non-recycled waste and used oil sent for energy recovery) and fines to provide HHW grants for collection programs and education. The funds (about $200,000 per year) have been used mostly on collection events to date but could be used for permanent facilities also.

C. Vermont

The State of Vermont funded surveys in each region to identify conditionally exempt small quantity generators (ESQGs) and quantify the types of waste they generate. Businesses are regulated if they generate more than 100 kilograms per month of hazardous wastes, as defined by RCRA, listed by RCRA, or as defined by Vermont.

The State has developed a Guidance Document & Application Form for Unregulated Hazardous Waste Facilities. ESQGs are permitted to self-transport and send hazardous waste to solid waste facilities certified to accept such wastes. Special provisions for HHW facilities accepting ESQG wastes include:

- procedures for recording information about ESQGs such as name, types and quantities of wastes brought and dates;
- containers of wastes from ESQGs must be removed within 90 days from the time the container is filled;
- proof that Vermont's Hazardous Materials Management Division (HMMD) has been notified of hazardous waste activity, that they have given a generator identification number, that they have been notified of reuse or recycling activities and any additional requirements have been satisfied;
- procedures for collecting a tax on the quantity of hazardous waste generated, based on the destination for the waste, as follows:

1. Hazardous waste to be reclaimed, recycled or recovered for beneficial purposes shall be taxed at $0.11 per gallon of liquid, or $0.01 & 4/10 per pound of solid;
2. Hazardous waste destined for treatment shall be taxed at $0.22 per gallon of liquid or $0.02 & 8/10 per pound of solid;
3. Hazardous waste destined for long-term storage shall be taxed at $0.33 per gallon of liquid of $0.04 and 2/10 per pound of solid;
4. Hazardous waste destined for land disposal or land treatment shall be taxed at $0.44 per gallon of liquid or $0.05 & 6/10 per pound of solid.

- Measures to ensure hazardous waste are packaged and labeled in accordance with Department of Motor Vehicles (DMV) regulations before they are transported off-site.

- Measures to ensure that waste shall only be offered to transporters or TSD facilities that have an identification number.

- Procedures for manifesting waste shipments, storage of manifests for up to three years, and submittal of "exception reports" to HMMD if copies of completed manifest forms are not received within 45 days.

- Submittal of annual reports to the Agency of Natural Resources (ANR).

- Provisions in the closure plan to ensure removal of all wastes to a facility licensed to handle that waste, written notice prior to closure to ANR, and that certification of closure will be completed in accordance with the regulations within 90 days after completion of closure.

In addition to these provisions, Vermont has banned certain unregulated hazardous wastes from being disposed of in landfills. There are 75-80 LQGs, 400-500 SQGs and they recently surveyed VSQGs and estimate there are 2500-12000 ESGQs and 2 inspectors. One TSDF is permitted to accept non-manifested ESQG waste. Funding for collection programs has come from surcharges on solid waste facilities (currently all landfills) in the state. Also, private landfill owners and district surcharges provide additional funding. The Associated Industries of Vermont fund and sponsor a WasteCap program and the Vermont Pollution Prevention Division funds a Retired Engineers And Professionals (REAP) program. The WasteCap and REAP programs provide source reduction education to businesses. The Montshire Museum facilitates meetings of the Upper Valley Compliance Officers Network (UVCON) which helps share information about source reduction and compliance issues. Another information sharing opportunity is the Burlington Area meeting of loss control specialists.

D. Maine

Maine regulates all businesses generating hazardous waste; those generating up to 100 kilograms per months are "SQGs". The SQGs are required to package, label, manifest, use a hazardous waste transporter and hazardous waste facilities for management of their hazardous waste. The SQG waste is not exempt from the proper hazardous waste treatment and disposal requirements of larger quantity generators and is therefore not allowed to be mixed with household hazardous waste and disposed of in inappropriate Subtitle D facilities. Maine also has a strict storage limit for SQGs which permits storage of up to only 100 kilograms. The SQGs do not have the requirements for developing personnel training and hazardous waste contingency plans, daily inspection logs and annual reporting required of regulated generators under RCRA. Generator seminars have been offered every two years, sometimes with specific emphasis on targeted audiences such as auto body shops, dry cleaners, and boat yards. Since a significant majority of the businesses in Maine fall under the 100 kilograms per month limit, most of the state's business waste would be conditionally exempt if the state followed the RCRA exemptions. The State of Maine recommends milk-runs to pre-registered SQGs since they are prohibited from transporting their own waste to a central site. Maine has approximately 10 TSDFs, 110 LQGs, and 1100 SQGs (by the RCRA definition, i.e., those generating 100-1000 kilograms per month) and 5-10,000 SQGs (using the State definition, equivalent to RCRA CESQGs, i.e., those generating under 100 kilograms per month) and 6 inspectors.

The Maine Waste Management Agency has mandated that the State offer HHW collections by 1995 (revised from 1992 in original, due to lack of funding). They attempted to pass a hazardous materials tax but it did not pass. There appears to be some inconsistency between the mandates for the solid waste and the hazardous waste regulations.

E. Rhode Island

Rhode Island regulates all businesses generating hazardous waste, small and large are all referred to as "generators". All generators are required to package, label, manifest, use a hazardous waste transporter and hazardous waste facilities for management of their hazardous waste. The small businesses are not allowed to dispose of their hazardous waste with the municipal or industrial solid waste stream, nor can they participate in collection events or collection facilities geared for HHW. Since a significant majority of the businesses in Rhode Island fall under the 100 kilograms per month category, most of the state's business waste would be conditionally exempt if the state followed the RCRA exemptions. The State allows them to accumulate 1 drum's worth of hazardous waste before the 90-day storage limit begins. The State maintains a computer tracking system which lists all known generators. Generators get onto the list through having a hazardous waste pickup by a contractor, through reporting by others (including competitors) and waste haulers, or through inspections done by the enforcement people.

Rhode Island has 3 TSDFs, 80-100 LQGs, and 4,000 other generators. The

TSDFs are regulated as hazardous waste generators.

F. Connecticut

The State of Connecticut has exemptions for businesses that generate less than 100 kilograms per month of hazardous waste but they do not allow all of the options allowed by RCRA. Specifically, Connecticut does not allow CESQGs to send their wastes to MSW facilities. The only options are TSDFs. Currently, the Connecticut regulations do not allow CESQG wastes to go to a HHW facility or collection event. The HHW programs would require a hazardous waste special permit to accept CESQG wastes. A future option would be to change the regulations for SW permits to allow CESQG wastes.

Connecticut has 12 permitted, commercial TSDFs. They estimate, based on 1991 report filings, that the state has approximately 475 LQGs, at least 1400 SQGs, an undetermined number of CESQGs, and currently have 7 inspectors. They have no required notification for small businesses or exact figures on the number of CESQGs. HazWaste Central is looking into opening to CESQGs in the future. They have found that there are more frequent CESQG business closings due to economic difficulties.

Types of Programs in Existence

A. Very small quantity generators at separate time as HHW event collection (Marin County)

The State of California regulates all generators of hazardous waste, including those who generate less than 100 kilograms per month. The smallest quantity generators are defined as very small quantity generators (VSQGs). They have, however, amended their regulatory requirements to enable HHW programs to collect and manage HHW and wastes from the VSQGs. Specifically, the State has required HHW collection programs to allow participation by VSQGs, has expanded the exemption from tax, fee, permit, and reporting requirements to cover programs accepting HHW and VSQG wastes, and has required that HHW and VSQG wastes be addressed in the solid waste planning processes.

Marin County, California ran separate events for collection of VSQG wastes. The County held the events at the same site as the HHW collections and used the same EPA Identification number. Businesses were required to call for appointments and to pay for the costs of transportation and disposal of their wastes. The County set up a phone line with a recorded message for businesses to leave information on the type and amounts of wastes they wished to bring to the collection. The County staff would call back with appointment times and cost information and follow-up with a confirmation letter and further information. There were six different collection days, each at

different locations. Four appointments were scheduled for each 15 minutes. Compared to the household collection, the VSQGs brought in slightly more (96 lbs per business) than the average household (77 lbs per household). Nearly half of the participating VSQGs were from construction-related businesses. Other businesses were schools, nurseries, printers, artists, and various others. The costs charged to VSQGs ranged from $4 per gallon for latex paint, $7 per gallon for wastes to be sent for burning as supplemental fuel, and $10 per gallon or approximately $1 per pound for wastes requiring chemical treatment, to $5.50 per pound or $44 per gallon for destructive incineration.

B. VSQGs in separate lines at event collection (Santa Barbara)

In this program, the VSQGs are served at the same time as residents, but they use a separate line to permit additional time for the additional requirements of handling the VSQG wastes.

C. CESQGs at a permanent facility (Anchorage)

In Alaska, very small quantity generators of hazardous waste are called CESQGs and their regulations mirror RCRA. Anchorage Alaska's permanent HHW facility accepts CESQG wastes (they are not regulated by the State as hazardous waste generators). The participation by CESQGs has increased from 262 (11 percent of total participation) to 376 CESQGs (15 percent) in the calendar year. The average quantity of wastes received from the CESQGs (683.4 lbs including antifreeze, motor oil and batteries, which are not subject to the 220 lbs/month limit) is considerably larger than the average amount per household (74.5 lbs). This is reflected in the fact that overall, 43 percent of their waste is from CESQGs, although only 15 percent of their participants are CESQGs.

The fees charged CESQGs range from $.05 per pound for latex paint, $.50 per pound for solvent-based paints and related materials to $1.00 per pound and from $.70 to $1.00 per gallon for oils and fuels. They also offer pickup service for an additional fee of $10 per household and $25 per CESQG, although they have recommended raising the pickup fee to reflect actual costs.

D. Very small quantity generators at a commercial TSDF (Seattle)

The State of Washington considers HHW and very small quantity generator waste "Moderate Risk Waste" (MWR). The state does not regulate businesses that generate less than 100 kilograms per month of hazardous waste as a fully regulated generator but, it has a requirement for including HHW and very small quantity generator wastes in the solid waste planning process.

In Seattle, at Burlington Environmental's TSDF, pre-registered very small quantity generators which self transport their waste are given 15-minute appointments and pay $10/gal or $1/pound or a $15 minimum to bring their hazardous waste. The

facility is open for very small quantity generators on the last Tuesday and/or Wednesday of each month. They have had a increase in participation from 6-10 per month in the first six months to 45-50 per month. The average cost is $125 per very small quantity generator and they are getting a large number of repeaters; 30 percent of the 1990 customers use the facility every other month. The company's concerns include ensuring that these generators meet DOT regulations and tracking them.

E. Specialized collections only for select very small quantity generators (farm pesticide collections)

States with significant farming populations, such as Michigan and Vermont, have held specialized collection events for farmers in order to collect unwanted and out-of-date pesticides.

F. Identification & Technical Assistance

In Seattle, Washington, Seattle's METRO has developed an aggressive program to identify and assist the very small businesses generating hazardous waste which are called in Washington State, along with HHW, Moderate Risk Waste Generators and are not subject to state hazardous waste regulations. As mentioned earlier, the counties and localities are required to develop a solid waste plan identifying how this waste will kept out of the solid waste stream and what collection and source reduction efforts will be developed. They cite the need for information about identification of hazardous waste, waste management options and pollution prevention opportunities. They have also discovered that there are a great many unidentified very small businesses operating evenings or week-ends. They are gathering detailed information about two small business types, automotive and silk screen printers, to determine how the City can be of further assistance.

G. Other

"Milk runs" are often encouraged by states where the very small quantity generators are regulated. In this type of collection, a licensed hazardous waste transporter makes a series of stops at similar small businesses in an area to pick up their hazardous wastes. Vermont has also allowed communities to collect paint from these generators at paint drop & swap programs.

CHANGING CONSERVATION ATTITUDES, KNOWLEDGE AND BEHAVIOR

EPA Conference, Household Hazardous Waste, December, 1992
Shirley Niemeyer, Ph.D., Extension Specialist, University of Nebraska-Lincoln

We are talking about attitude, knowledge and behavior change - but just think about how hard it is for us to change our own behavior - are we models of what we talk about? Changing attitudes and behavior is not easy - there are no simple procedures, no "magic formulas". There are lots of theories, and some controversy, about how attitude and behavior change comes about. The focus today is on a few of the methods that can be applied to education.

Overview of Attitude and Behavior Change

1. People do not come to us or to educational settings with a blank slate. People come with pre-conceived ideas, culture, attitudes, existing knowledge and behaviors. What our learners already know and their existing attitudes influences how the message is received. Consider the audience receiving the program. How much attitude and behavior change do we think we can bring about?

2. We must feel a sense of responsibility for the behavior change we want to or do bring about. We have a responsibility to continue to evaluate formally and informally to see where that behavior change may be leading us as a group or society - in terms of the environment.

   Example: Recommendations may be made to make your own cleaner of x and y, but later x and y may prove to be similar in environmental costs or create a different problem.

3. The behavior change that comes about may not be the one we planned to accomplish.

   Example: In 1986, to determine how effective the special household hazardous waste collection day had been in Marin County, the Garbage Project sorted samples of the garbage before and after the county's first publicized "Toxics Away" Day. The results were contrary to the behavior expected. The garbage discarded after the Toxics Away Day contained more than twice as much hazardous material by weight as the garbage that had been discarded before the collection day. Probably the intense media campaign to create awareness of the collection day did create awareness. Because the collection was one day only with no future collection days announced, many homeowners, newly aware of the hazardous waste in their homes, and having missed the collection day, may have decided to get rid of their hazardous waste and threw it out.

4. When we design or manage a program - we must look at the big picture - the holistic approach.

   Design the program. Consider the needs of the targeted audience and think about the objectives and how to reach those objectives. Think about what may happen if behavior change does occur - what are the other issues you will then have to deal with or what may be some unforeseen circumstances. Consciously evaluate. Evaluate the behavior or what happened as result of the change.

   Bring in others to your team - bring in educators, psychologists - people from different perspectives and disciplines. It will enrich the designed learning experience and your program.

5. Communication is difficult. There are thousands and thousands of competitive messages being sent to our targeted audiences. Audiences ignore many of the messages - they simply don't see them or hear them - they tune them out. Before we can bring about behavior change, get their attention. The message must be processed and evaluated by the learner.

6. Operate with the media - give clear messages as educators. Media may focus on the extreme of the message about household hazardous waste. Make sure the message is clear about the risks and benefits. If we dwell on the risks and say nothing about the benefits, the message conveyed in the media may be the extreme risk to catch attention.

7. To change behavior, the topic must have some direct relevance to the learner.

8. Behavior may fade - revert back unless it is aided.

Approaches to Encouraging Behavior Change

There are many approaches and theories to attitude, skills and behavior change. In presenting these seven approaches, the following four aspects are discussed:

- Characteristics of approach
- Educational approaches within these seven
- How the outcomes are influenced by other factors
- Examples of each of the seven

The Seven Approaches to Encouraging Behavior Change include:

- Persuasive Communication
- Attitude-Consistent Conservation Behavior - those predisposed to conservation
- Material Incentives and Disincentives
- Social Incentives and Disincentives
- Models of Conservation Behavior - use of role models
- Implementation of Intentions - minimizing inhibiting factors to the behavior
- Feedback on Efforts - Effectiveness of efforts

The information discussed is based on work by Cook and Berrenberg (1981) and introduces a framework or summary of the conservation behavior literature and comparisons across studies. The seven approaches to encouraging conservation behavior are from common concepts from the research of behavioral scientists work on energy and water conservation and recycling.

Think about how these methods apply to changing peoples' behavior related to potentially hazardous household waste. Think of specific examples that apply to your programs.

1. Persuasive Communication

   1). Characteristics: Appeals to fear of disastrous consequences or relates conservation to achieving valued goals such as personal and family security, or preservation of natural resources for use in the future. Persuasive communication is often seen in advertisement.

   2). Educational Approaches: Include information about resource shortage - usually in crisis terms or predictions of negative consequences.

   3). Outcome influenced by: Context of the experience, characteristics of person, and/or evidence of crisis. Impact could be reduced if the recommended changes in behavior deviate too far from existing beliefs - if an educator gets too far out in predicting disastrous consequences - impact may be reduced. Great discrepancies between the individual's beliefs and those advocated by a communication or message are likely to reduce attention to the message and may contribute to creating opposing thoughts.

   As educators, we need to be careful of fear appeal with children - they can be made aware of the problem with out being made to feel its fearful, disastrous, their fault or their responsibility to change the world.

   4). Examples: Pollution of water, air, or soil; cost escalation; that local sewage system will be impacted; or that they are preserving the natural resources of soil and water by reducing amount of household hazardous waste used and disposed. Appeals to "your actions can save natural resources - preserving our heritage of abundance of resources for our children and future generations".

2. Attitude-Consistent Conservation Behavior

1). Characteristics: The person is already predisposed to pollution reduction actions - the attitudes and beliefs are consistent or supportive of doing something about the problem. Positive attitude already exists about environmental responsible behavior.

2). Educational Approaches: Link actions to pro-conservation attitudes. Help people see how they could put their pro-environmental attitudes into actions.

3). Outcome Influenced By: Whether the situation is supportive of the behavior. Social norms may be part of the situation that supports or constrains/prevents the behavior. The learner may lack knowledge that an action would be consistent with a pro-conservation attitude.

4). Examples: Direct educational messages to opportunities to reduce household hazardous waste (hhw); use mass media to direct attention to opportunities to reduce or to recycle potentially hazardous household hazardous products - let the targeted audience know locations, specific times, etc.

3. Material (Extrinsic) Incentives/Disincentives

1). Characteristics: Materialist rewards are used to encourage conservation and reduce consumption. Consumption may be reduced - but the people may not have pro-conservation attitudes. They do it for another reason other than its "good for the environment". Material incentives or disincentives are used such as money or convenience. Financial rewards are provided or extra cost charged for larger volumes. Use of disincentives such as fines or regulations becomes more frequent as the problem gets worse or a resource crisis deepens.

2). Educational Approaches: Increase convenience associated with conservation and comfort associated with conservation; decrease the convenience and comfort resulting from high level of consumption or waste.

3). Outcome: Impact on behavior is complex, unpredictable, and the effects of punishment may be temporary. A dislike for or avoidance of the source of the punishment may result. Punishment is generally effective only if a positive reinforcement is provided for an alternative behavior. The positive effects of financial incentives may be small and short-lived. The variable schedules such as lottery, or irregular schedules show more promise in that they may contribute to longer periods of behavior change.

Some research suggests that once the incentives are taken away the behavior is likely to stop (Couch, Garber & Karpus, 1979; Lyben & Bailey, 1979; Pardini & Katzev, 1983-84). Use of raffles and contests in facilitating paper recycling did increase the recycling during the period of the raffles and contests, but when the reinforcement of the raffles and contests were removed, the behavior returned to baseline levels (Witmer, & Geller).

4). Examples: Disincentives: Fines, pay by volume, pay more for potentially hazardous products or pay extra for their disposal.

Incentives: Lottery type rewards, drawings of winners for cash prizes for those who have participated in hhw collection program.

4. Social Incentives/Disincentives

1). Characteristics: They are similar to material incentives/disincentive in motivational role. People change behavior due to reactions of others (norms). People perform behaviors based on what others would approve of. Commitment - especially the public commitment - increases the likelihood that conservation actions will follow. "Public expression of attitudes increases the performance of behaviors consistent with them" (Kieslter, Mathog, Pool & Howenstine, 1971; Pallak, Cook, & Sullivan, 1989). Group decision making is also a social incentive and involves a change in group norm during discussion of the

problem and its resolution.

2). Social recognition: Provide social recognition and approval for conservation actions, seek commitment to others to conserve, have learners participate in group decision making.

3). The outcome is influenced by the degree of public nature of commitment.

4). Examples: People sign some sort of statement or petition supportive of the desired issue position. Public recognition through awards or certificates for participation in hhw collection event, photographs of participants, decal displayed on house or car with message that this household participates in hhw activity or collection. Have participants tell others in group or make public statement of plans to start reducing and recycling. At the end of an educational meeting, have each participant publicly state what she/he plans to do regarding hhw before the next meeting. Have small community groups meet and make group-decisions about their recycling/reduction activity.

Example: The boy scouts went around a neighborhood and got people to sign a certificate that the household supported or recycled products.

Example: In a larger audience - ask people to stand if they intend to reduce the volume of potentially hazardous household waste. Ask people as they come through the hhw collection line to sign a resolution document that they plan to reduce. Everyone signs the same document so that they can see others have signed - publish names in paper if granted permission to do.

Example: Salimando reports that as more and more households on a block recycle, it suddenly becomes embarrassing to not recycle. One researcher reported in a study that almost all the recycling boxes were out in the neighborhood. A car backs quickly out of the garage, begins to take off to work, returns, runs in to get their recycling box, sets it out on the curb, and then continues to work. The researcher wondered what could have been so important to recycle and looked into the box - there was nothing. But the individual evidently wanted to comply with group norms.

5. Providing Models of Conservation Behavior

1). Involves dynamics of adopting beliefs and practices of admired individuals, or opinion leader in community, - the behavior of significant others is copied. Prestigious figures serve as role models for conservation behavior.

2). Information about/from opinion leaders practices is provided, or participants are exposed to that person's philosophy, practices, etc. in education.

3). Opinion leader seen as source.

4). Examples: Conduct demonstration plot by opinion leaders or plan media about admired people who are reducing, recycling hhw waste. Have local neighborhood tours of example households that reduce hhw, recycle and store products safely.

Research has shown that in some instances in recycling, block leaders can have a significant effect on recycling (Nielsen and Ellington's (1983).

6. Facilitating Implementation of Intentions

1). Characteristics: People may already have inclinations toward conservation or reduction, but are not displaying behavior due to lack of knowledge of appropriate actions or difficulty in carrying out the actions. They may lack opportunity.

2). Educational Approaches: Minimize the inhibiting effects. Provide information about what actions can be taken by those known to have conservation intentions.

3). Opportunities for action/behavior to occur influence the outcome.

4). Example: Information provided about hhw reduction, recycling, using up, safe storage and disposal, location of nearest oil and/or paint recycling, alternatives to hhw collections such as reduction, using up, etc.

7. Providing Feedback on Efforts

1). Characteristics: Provide feedback on effectiveness of efforts - can be self feedback or by others. Feedback may result in improvement. The purpose is to help maintain behavior.

2). Feedback about results of actions

3). Nature and relevance of feedback may influence outcome.

4). Example: Savings resulting, how close to goal set, participants in hhw collections reduce the amount of hhw to going to landfill by x pounds.

Summary of Seven Methods

Try another method of reaching the same audience or different audiences - you may bring about behavior change in the new audience or enrich the experience of existing audience and bring about more behavior change.

We have looked at seven specific approaches to behavior change, now lets briefly look at a few of the ideas or theories behind them.

Learning Theory Examples

- Classical Conditioning - Pavlov
- Instrumental Conditioning
- Hull's Learning Theory - Hull
- Wolpe's Conditioning Theory - Wolpe
- Operant Conditioning - Skinner
- Two-Factor Learning Theory - Mowrer
- Cognitive Learning Theory - Tolman
- Social Learning Theory - Bandura
- Cognitive-Field Theory
- Cognitive Dissonance - Festinger
- Balance - Heider

Behavior Change Theory Examples

- Personal and Situational Constraints, Normative Beliefs and Behavior Change
- Cognitive Dissonance

Conclusion

1. The tremendous variability of people and environments makes it difficult to be sure what measures will be effective in creating change.

2. Practical considerations such as preferences of administration, funding and organizational constraints will influence the behavior-change techniques chosen by educators and project directors.

3. The various features of the situation can affect the performance or nonperformance of a given behavior. Situational variables can impact on a specific behavior independent of whatever stable attitudes or dispositions people bring to the situation. People's characteristic traits or attitudes may influence the behavior in some situations but not in others.

POLICY IS MADE AT HOME: THE HOME WASTE SURVEY

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The Home Waste Survey is a technique designed to create changes in behavior leading to source reduction of wastes at the residential level. It involves sending trained Surveyors into residences to provide personalized workshops, concluding with specific suggested steps for action. The Waste Survey was created in response to recycling's failure to keep pace with increased residential waste production and the literature's indication that individualized in-home programs are more effective in causing behavioral change than mass media campaigns (Cornwall and Duerr, 1986; Esposito, 1988; Wirka, 1990).

The primary focus of this research is data gathered during a pilot project involving 100 Waste Surveys, 50 each in two differing Minnesota neighborhoods. These are the Phillips neighborhood of Minneapolis, an ethnically-mixed, low-income area, and the City of Moorhead, an ethnically-homogeneous and fairly prosperous semi-rural community.

The Survey is a clearly-defined — although rather complex — series of activities developed by Eco Solutions, a 501(c)(3) non-profit group. The Survey focuses on source reduction of wastes, including hazardous wastes, but also includes water and energy conservation. The technique is based on the assumption that provision of face-to-face in-home education, with its lifestyle-specific, personal selling, and hands-on aspects, will produce greater behavior change than general educational materials or mass media exhortations.

The process actually begins when a person is recruited to participate in the project. The Survey itself lasts one to two hours, depending on the resident's interest level, and includes:

*preliminary education on source reduction and on the Waste Survey process;

*a tour of the home, including determination of what waste is produced there and how it is currently handled;

*an explanation of ways to reduce waste production, dispose of hazardous wastes properly, recycle, and compost, as well as information on the financial benefits of source reduction and the effects of waste on the environment;

*encouragement of the resident's existing efforts to reduce solid and hazardous waste production;

*compilation of specific written steps for action that are appropriate to the resident's current position and lifestyle; and

*provision of written information on source reduction and vendors of waste-reducing products.

The household is recontacted two to three weeks later to gain answers to follow-up questions, collect data on Survey results, and encourage further action. Forms developed by Eco Solutions are used for the sign-up, Survey, suggestion, and follow-up processes.

The primary hypothesis of this research is that the Waste Survey causes changes in behavior that will lead to source reduction, despite the differences in the two neighborhoods. The secondary hypothesis is that other variables explain the changes in behavior. Nine variables are considered, including gender of participants, recycling level, neighborhood, and home ownership.

The primary hypothesis was tested using responses to Survey follow-up questions about the suggested changes in waste handling behavior. Raw scores revealed that 57% of the suggested steps were reported

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to have been done or started three weeks after Survey performance (See Tables I and II). The responses were also weighted according to a scale designed to measure the amount of waste reduction resulting from each household's reported post-Survey efforts.

The raw scores, the weighted scores, and the weighted scores divided by the possible number of steps that could have been accomplished were then tested statistically. Each was cross-tabulated with neighborhood, size of residence, number of units in the building, home ownership, gender of Survey participants, and extent of recycling.

The only relationships that reached statistical significance were those between weighted scores and neighborhood and between weighted scores divided by possible steps and neighborhood. Both relationships were weak.

Multiple regression was also performed using the above three scoring variations. The previous six variables were used, plus additional variables representing possible steps implemented and variations in gender and recycling. Only two variables reached the .05 significance level: possible steps that could have been implemented and neighborhood. The model in which both of these reached significance had weighted scores as a dependent variable and reached an R-square value of .24.

These results indicate that the Waste Survey is an effective technique, despite differences in the two neighborhoods. In both sets of statistical analysis, neighborhood became significant only when the steps accomplished were weighted. The reasons for differences by neighborhood are not clear and may be explained by a number of factors other than physical location. The regression model does indicate that factors other than those measured are at work.

However, the regression model also indicates that none of the variables measured other than neighborhood is more important than the Survey process. This leads to rejection of the secondary hypothesis so far as the other variables measured by the research are concerned and strengthens the finding that the technique is effective.

The literature on environmental behavior-change does not provide categorical answers to the questions remaining from this project. One possible reason for the differences between the two neighborhoods that was not measured is socioeconomic status, but some studies suggest that personality traits, such as being curious and desiring to avoid personal harm, are better indicators of ecological concern than socioeconomic factors. While some literature shows a strong intrinsic motivation to make environment-related behavior changes, other studies indicate a need for extrinsic motivators (EPA, 1989, citing Kinnear, Conn, DeYoung and Kaplan, Larson and Massetti-Miller, and Becker). This requires further study.

Policy recommendations that result from this research include:

<u>The Waste Survey should be used in other locations.</u>

Research methods and analysis should be improved in future efforts, including standardization of the time spent in each household, closer tracking of historical factors, measurement of additional demographic variables, and long-term follow-up for Survey households.

Use and improvement of variables that are weighted to measure actual waste reduced are encouraged over use of nominal measurement of the absence or presence of behaviors.

<u>Further research on residential source reduction should build on earlier findings supported by this effort.</u>

Previous findings that indicated that providing clear consumer information and letting individuals control outcomes are important in motivating environment-related behavior change are supported here.

According to this and earlier research, the public does not differentiate recycling from source reduction. This indicates a need to more carefully distinguish between recycling and reduction when designing waste policy, and probably a need to study and promote source reduction through avenues that are clearly

separate from recycling activities.

Opportunities for future research are suggested by the results of this project.

An unexpected finding is the lack of a statistical relationship between a household's level of recycling activity and its adoption of source reduction behavior. If supported by further research, this may be one of the project's more significant findings, as these two activities are traditionally treated as if they are similar in terms of motivation, behavioral components, and program design. The two techniques may require different approaches to succeed.

There is a need to define the differences between who has an environmental "interest" and who has environmentally positive "behavior." This information would be useful in targeting all waste-related behavior-changing efforts.

TABLE I

SUGGESTIONS OFFERED DURING HOME WASTE SURVEYS

CATEGORIES OF SUGGESTIONS	MOORHEAD	PHILLIPS NHBHOOD.	TOTAL
Paper Reduction	68	58	126 (21%)
Improve Recycling/ Close the Loop	59	53	112 (19%)
Packaging Reduction	54	53	107 (18%)
Hazardous Materials Reduction	37	48	85 (14%)
Energy Conservation	41	31	72 (12%)
Water Conservation	22	29	51 (9%)
Gardening or Composting	10	10	20 (3%)
Multi-Use Items Over Single-Use Items	7	10	17 (3%)
Transportation	1	1	2 (<1%)

TABLE II

TEN MOST COMMON SUGGESTIONS

MINNEAPOLIS

Move to Low-Toxicity Cleaners (25)
Reduce Direct Mail (24)
Recycle All Paper (23)
Toilet Water Conservation (20)
Use Cloth Over Paper in Kitchen (17)
Switch to Compact Flourescent Light Bulbs (15)
Reuse Containers/Bags (10)
Purchase Recycled Paper Products (10)
Use Second Sides of Paper (8)
Replace Single-Use Products with Permanent Products (8)

MOORHEAD
Reduce Direct Mail (26)
Purchase Food in Bulk (25)
Purchase Permanent Coffee Filter (21)
Recycle All Cardboard and Paper (21)
Purchase Recycled Paper Products (18)
Toilet Water Conservation (17)
Low-Toxicity, Concentrated Detergent in Recyclable Container (16)
Purchase in Larger, Recyclable Containers (9)
Seal Windows (8)
Minimize Aerosols (8)

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MEASURING THE EFFECTIVENESS OF A PUBLIC EDUCATION PROGRAM

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In order to meet increasingly stringent discharge limits for toxic pollutants that are not readily removed by conventional wastewater treatment methods, the City and County of San Francisco (City) has developed the Water Pollution Prevention Program (WPPP). The WPPP is a proactive effort consisting of several source reduction strategies aimed at reducing the amount of toxic pollutants discharged into the City's combined sewerage system (a combined system collects both street runoff and sanitary wastewater for treatment prior to discharge). The WPPP's source reduction strategies combines both increased enforcement for industries and small businesses and public educational and technical outreach for residents and small businesses.

In order to achieve an overall reduction in the current pollutant loading to the sewerage system, the objectives of the source reduction strategies were as follows:

1. Identifying the pollutants of concern;

2. Quantifying the sources of the pollutants of concern (residential, commercial and industrial);

3. Developing source reduction strategies to address the sources of the pollutants of concern;

4. Implementing source reduction strategies; and

5. Developing means to evaluate source reduction strategies.

Pollutants of Concern

In order to determine the constituents of concern specific to San Francisco, the constituents were based on the following criteria:

1. Constituents exceeding discharge permit limits;

2. Constituents potentially contributing to general receiving water problems;

3. Constituents in compliance but near permit limits;

4. Constituents contributing to bioaccumulation, and/or biomagnification; and

5. Constituents contributing to existing and potential sediment toxicity problems (some of these constituents may also bioaccumulate and/or biomagnify).

As a result, the City determined that, regardless of discharge point, its eight constituents of concern are:

1. Metals, primarily:
   Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Silver (Ag), Zinc (Zn), Cadmium (Cd)

2. Cyanide

3. Polynuclear Aromatic Hydrocarbons (PAHs)

Pollutant Sources

An evaluation of the contributions of the targeted constituents to the influent loading from four principal sources was performed. The four sources included the following:

1. Water supply;
2. Residential;
3. Industrial; and
4. Commercial/other.

As shown in the Table 1, it is estimated that the residential loadings into the sewerage system appear to account for between 6 and 50 percent of the loadings for the 6 targeted metals and cyanide found in the influent.

TABLE 1
ESTIMATED SEWPCP LOADING FROM RESIDENTIAL SOURCES

Parameter	Total Residential Loadings (a) (ppd)	Net Residential Loadings (b) (ppd)	Net Percentage of Influent Loadings (%)
Copper	16.1	7.45	12
Lead	5.63	0.23	26
Mercury	0.23	0.23	44
Nickel	4.57	4.17	50
Silver	0.49	0.46	6
Zinc	69.06	63.1	35
Cyanide	2.2	2.2	19

(a) Assumes an average residential flow rate of 25.5 mgd.
(b) Net loadings exclude the estimated contribution from the water supply to the total residential loadings.

Assessing the metal contributions from residential sources provided a means to identify the significant sources of problem pollutants on which to focus the source reduction strategies.

In order to assess the specific residential products containing the problem pollutants, the WPPP conducted a test of commonly used household products (shampoo, creme rinse, bath soap and toilet tissue) for 9 conventional heavy metals. The study indicated that these types of products do not contribute significant amounts of the City's problem pollutants to the wastewater. [1] As a result of the study, the WPPP has begun to target the products that contain the pollutants of concern, such as paints, photographic wastes, used motor oil, solvents and other automotive products.

1 The significance of product contributed heavy metals for other cities and municipalities may vary and will depend on the characteristics of the individual Cities' metals wastestreams and also their specific wastewater treatment processes.

By sampling a select group of businesses, the WPPP was able to qualify the pollutants discharged by specific types of businesses. The City is currently targeting automotive service facilities, dentists, hospitals, laboratories, printers, photoprocessors and commercial gardeners for educational and technical assistance.

Source Reduction Strategies

As part of the WPPP, a Public Education Program has been established which is comprised of educational and technical outreach activities that focus on the products and disposal practices which pose the greatest threat to the City's sewerage system.

To assist the WPPP with educational outreach programs, a Public Education Plan was developed. The Plan consists of strategies and program activities for educating both residents and small businesses regarding the importance of protecting public health and the environment from the improper use, storage and disposal of hazardous products. The plan includes programs activities such as newsletters, brochures, fact sheets, utility bill inserts, point of purchase displays, posters, storm drain stencilling and small business workshops. The Plan also includes lists of distribution channels, such as T.V., radio, newspaper, environmental group and community group contacts.

Implementing Source Reduction Strategies

To better direct public education and outreach measures, a Public Awareness survey was conducted in three languages over eight diverse geographical regions of the City. The survey assessed residents use of toxic materials, perceptions of health risks, normal disposal practices, support and willingness to pay for new disposal services and educational programs and the sources of information on environmental issues. The results from the survey suggests that awareness of the consequences of improper disposal tends to reduce its occurrence.

The survey also provided guidance on which media to use to reach certain demographic groups in educational outreach programs. In terms of where respondents received news and information on environmental issues, there was meaningful variation according to social class, race/ethnicity and environmental activism. Respondents who reported higher income and education levels are more likely to read newspapers for information on environmental issues; those reporting lower levels of income and education rely more upon television. The environmental activists interviewed in our survey clearly rely on neither of these, preferring the information channels provided by their environmental organizations and activities. This suggests that both print and broadcast media should be used selectively, perhaps in joint efforts with environmental groups, to promote citywide awareness of environmental problems. This survey will be repeated to assess the impacts of outreach programs on attitudes and behaviors relative to the baseline results.

The WPPP implements public education programs through a variety of community outreach efforts which target specific products. Some of the programs include: recycle used motor oil campaigns, healthy house tours, street fairs, speakers bureaus, workshops and school curricula.

Means to Evaluate Source Reduction Strategies

To evaluate the City's public education outreach efforts, we have developed several tools to help measure the effectiveness of the public education programs that are implemented.

For example, if the WPPP conducts a campaign on the proper disposal of household hazardous waste at the permanent collection facility or used motor oil at the various City locations, the following is used to evaluate the effectiveness of the outreach:

1. Phone calls or written requests for information on the facility or used oil collection locations; and

2. Monitors the participation rates at collection centers (Household Hazardous Waste Collection Facility and used oil collection outlets).

If there is a significant response or increased participation at the collection centers, it appears the outreach program was successful and additional outreach efforts will incorporate similar strategies. However, if there is little response or turnout, the methodology will be revised.

When the WPPP attempts to assess the effectiveness of the entire Public Education Program, we use a different set of tools, such as:

1. Comparisons of the bi-annual public awareness phone survey results;

2. Review the number of illegal dumping and abandoned waste reportings;

3. Compliance and sampling results from small businesses;

4. Analysis of the water pollution control plants influent and effluent quality; and

5. Review of data collected from the City-Wide Collection System (sewer) Monitoring Program.

Although these measures have been developed, the City is aware that measuring behavioral change is difficult and no one tool can truly reflect the successes and failures of public education outreach. However, by implementing several monitoring tools at the same time, it can help to determine the outreach programs that actually encourage behavioral change and the ones that do not.

Conclusion

Prior to implementing a public education program, regardless of the media (air, land or water) a strategy should be developed that focuses on the products that pose the greatest threat. For example, in San Francisco residents contribute some of the City's pollutants of concern. Used motor oil and paint products contain these pollutants, thus, one of the City's major residential outreach campaign targets proper storage and disposal of used motor oil and paint products.

In closing, as part of any public education program, a means to evaluate the effectiveness of the program should be developed. Although behavioral change is sometimes hard to measure, it is extremely important to assess a program's ability to reach the general public and promulgate behavioral change. San Francisco has opted to conduct annual surveys, monitor catch basins and review participation rates to evaluate the effectiveness of the public outreach programs and will continue to modify the outreach strategies based upon the results of these measures.

HOUSEHOLD HAZARDOUS WASTE MANAGEMENT

SEVENTH NATIONAL CONFERENCE

CONSUMER PRODUCT SAFETY COMMISSION (CPSC)

WASHINGTON, DC 20207

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Chuck Jacobson

Chronic Hazard Labeling Guidelines

I. CPSC - The Agency

An independent federal regulatory agency established in 1973 to:

(1) protect the public against unreasonable risks of injury associated with consumer products;

(2) assist consumers in evaluating the comparative safety of consumer products;

(3) develop uniform safety standards for consumer products and to minimize conflicting State and local regulations;

(4) promote research and investigation into the causes and prevention of product related deaths, illnesses, and injuries.

II. Laws Administered by CPSC:

Consumer Product Safety Act (CPSA), 15 U.S.C. 2051

Federal Hazardous Substances Act (FHSA), 15 U.S.C. 1261

The FHSA was amended 11/18/88 by the Labeling of Hazardous Art Materials Act (LHAMA) (P.L. 100-695) which requires the development of chronic hazard guidelines. LHAMA became effective 11/18/90.

Flammable Fabrics Act (FFA), 15 U.S.C. 1191

Poison Prevention Packaging Act (PPPA), 15 U.S.C. 1471

Refrigerator Safety Act (RSA), 15 U.S.C. 1211

All the regulations for the laws administered by CPSC are in Title 16 of the Code of Federal Regulations (CFR).

require all producers or repackagers, including importers, of art materials to:

1. Submit all art material formulations to a board certified toxicologist to determine whether an art material has the potential for producing chronic adverse health effects. This review must be repeated at least every 5 years thereafter.

2. Describe in writing and submit to the CPSC the criteria used to determine whether art materials have the potential for producing chronic adverse health effects.

3. Restrict, through marketing or labeling or both, the use of products which have the potential for producing chronic adverse health effects, to adults or children above grade 6.

4. Include, preferably on the label, a conformance statement on all art materials such as "Conforms to ASTM D 4236" or a similar statement.

VII. Chronic Toxicity Guidelines.

The Labeling of Hazardous Art Materials amendments required the Commission to issue guidelines which specify criteria for determining when any customary or reasonably foreseeable use of an art material can result in a chronic hazard.

Chronic hazard guidelines were proposed in the Federal Register April 17, 1991. A public hearing was held on this proposal October 17, 1991. The guidelines were finalized in the Federal Register October 9, 1992 and are now part of 16 CFR 1500. While these guidelines were prepared as a

hazardous products, both hazardous chemicals and food, drug, or cosmetic products, by children under the age of five years. The following chemicals commonly found in and around households are subject to PPPA standards:

1. Sodium and/or Potassium Hydroxides at levels of 10% in dry forms or 2% or more in other forms.

2. Turpentine at levels of 10% or more.

3. Methyl Alcohol (methanol) at levels of 4% or more.

4. Sulfuric Acid at levels of 10% or more.

5. Ethylene Glycol at 10% or more.

6. Petroleum distillates, toluene or xylene at levels of 10% or more with a viscosity of less than 100 Saybolt Universal Seconds at 100 degrees F., in products which are kindling or lighting fuels or paint solvents.

7. Glue removers containing more than 500 mg of acetonitrile per container.

VI. Labeling of Hazardous Art Materials Act (LHAMA) P.L. 100 695.

LHAMA was signed into law November 18, 1988, amending the FHSA by requiring that the labeling requirements of ASTM D-4236, a voluntary standard, be deemed to be a regulation issued by CPSC under Section 3(b) of the FHSA. This amendment became effective November 18, 1990.

The requirements imposed by LHAMA are in addition to those already existing under the FHSA. The amendments will

III. Products subject to regulation by CPSC.

The term "consumer product" includes any article for sale to or use by a consumer with the exception of articles regulated by other federal agencies, such as tobacco products, motor vehicles for highway use, pesticides, firearms and ammunition, aircraft, boats, foods, drugs, and cosmetics. The CPSC does have limited authority over foods, drugs, and cosmetics for special packaging under the Poison Prevention Packaging Act.

IV. Chemical Labeling Required Under the Federal Hazardous Substances Act (FHSA).

This law was passed in 1960 to cover household products presenting the hazards of toxicity, flammability, corrosiveness, irritation, sensitization, and pressure.

In addition to labeling the law also provides that products can be banned from interstate commerce if cautionary labeling is inadequate to protect the public health. The FHSA also regulates toys and other articles intended for use by children which are hazardous.

The existing law and regulations has always required cautionary labeling for both acute and chronic toxicity. However, in 1988 the FHSA was amended by the Labeling of Hazardous Art Materials Act which specifically addresses chronic hazard labeling for art materials and adds additional other requirements for the producers of art materials.

V. Packaging Requirements Under the Poison Prevention Packaging Act (15 U.S.C. 1471)

The child resistant packaging standards which have been promulgated are intended to temporarily restrict access to

result of the art material amendments, they can be used for the evaluation of the potential hazards of any consumer product.

VIII. Source Reduction and Waste Management.

The safety of the consumer and their family in attempting to utilize home preparations in place of commercially available products.

Avoid improper mixing of chemicals. Chlorine bleach, ammonia, and some cleaning chemical can produce very toxic gases when improperly mixed. If the product does not have specific instructions for mixing, don't mix it with other chemical products.

Don't purchase more than you need for your foreseeable use.

Provide proper storage for hazardous waste products, keep them out of the reach of children as you would any other hazardous material.

+ Scientific Certification Systems

Green Cross Certification Program

Stanley Rhodes

+ Facts About Green Cross +

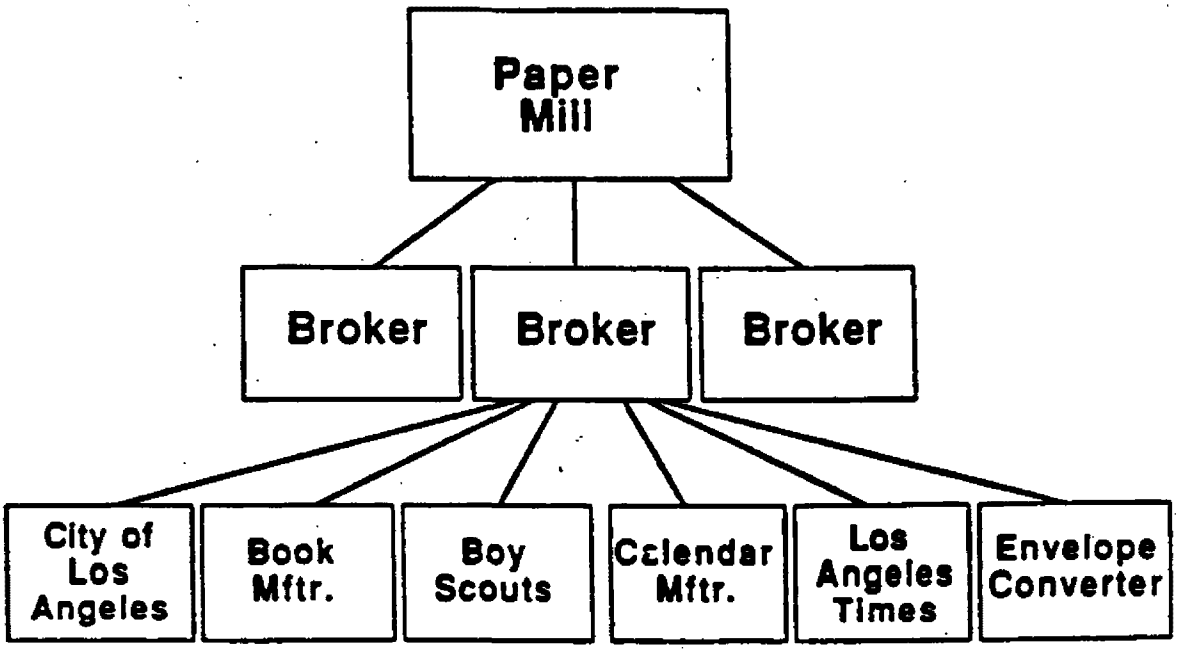
- Neutral Third Party Certification
- Not-for-Profit
- Experienced in the Field of Certification
- National in Scope
- Non-Exclusive
- Independent Scientific Standards Board

Verification of Current Environmental Marketing Claims

Potential Claims in Recycling Arena

Recyclable • Recycled Content • Recycling Rates

Auditing of Sources of Recycled Material Inputs



Audit Process:

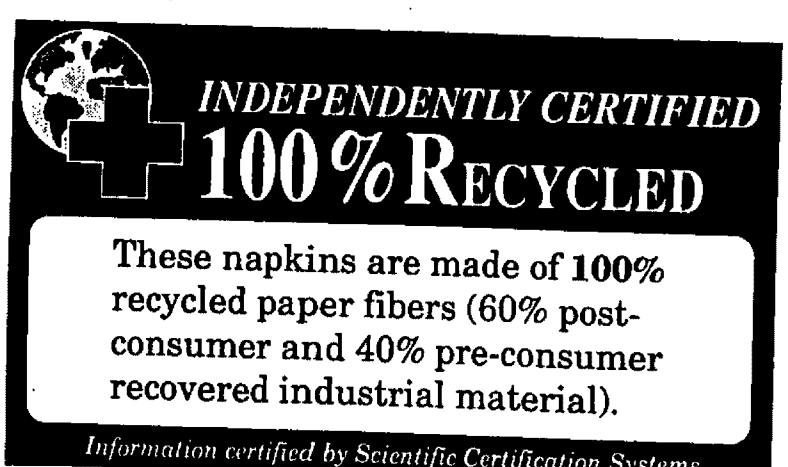
- Evidence of sources and their volumes
- Accounts payable records
- Plant receiving records
- Telephone calls
- Letters

State-of-the-Art Recycled Content

Examples:

Paper towels, napkins, tissue	*100%*
Paper grocery bags	*50%*
Plastic grocery bags	*30%*
Glass food/bev. containers (clear)	*42%*

State-of-the-art is determined by product category.



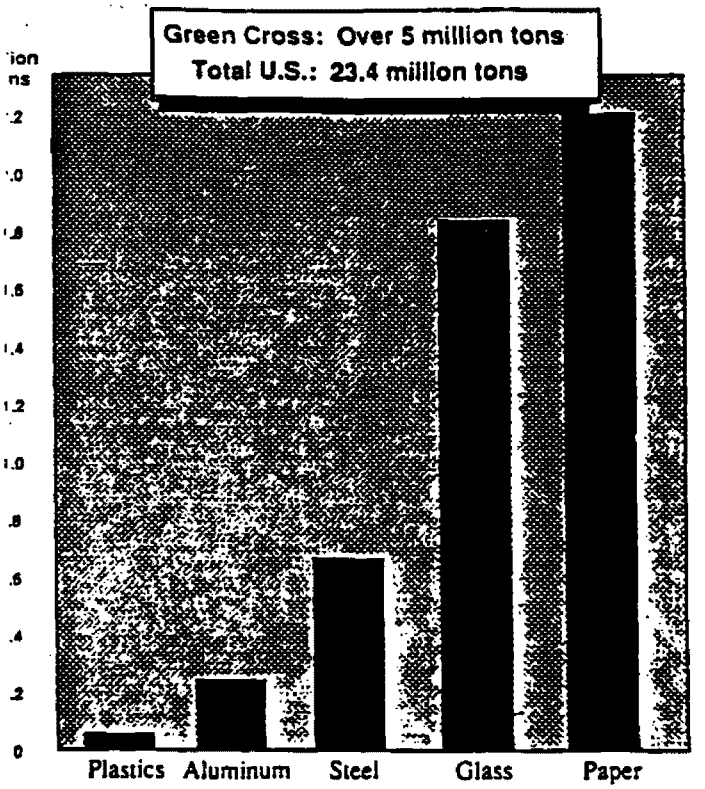
Biodegradable Cleaning Products

Soaps
Cleansers
Detergents

Verification Process

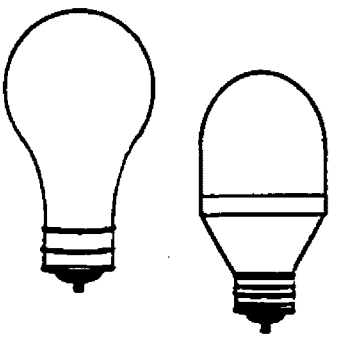
1. Signed Disclosure Statements from Manufactureres
2. Feasibility Review of Disclosed Information
3. On-site Inspections (evaluate technical capacity, operations, etc.)
4. Audits (e.g., purchase invoices)
5. Testing (chemical, material, etc.)
6. Compare Findings To Data Base
7. Quarterly updates

Recycled Tonnage Under Green Cross System



State-of-the-art Energy Efficiency

(Determined by product category)

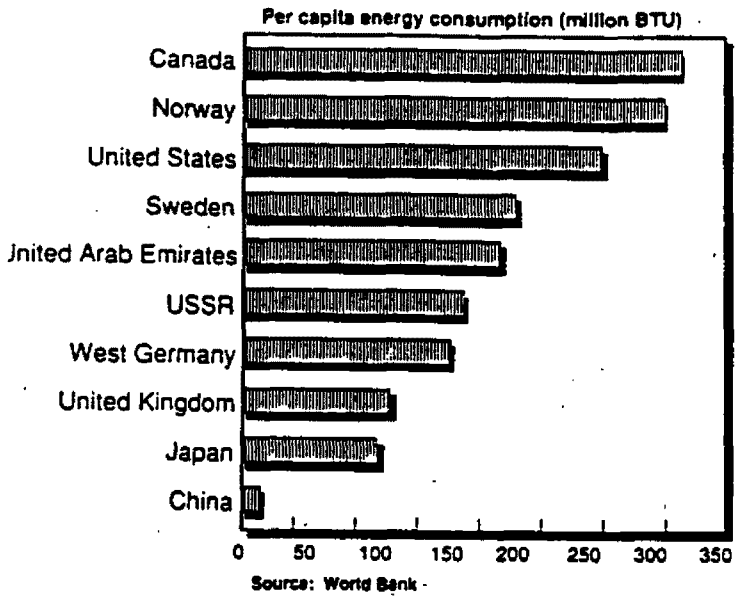


Incandescent bulbs

Compact fluorescent bulbs

Measured as energy savings over rated lamp life at 8¢/KWH

Energy Use



- **Japan**
  2.7 times more energy efficient than U.S.
- **West Germany**
  1.7 times more energy efficient than U.S.

Help Reduce Waste

Every year, 100 billion food and beverage containers are used in the U.S. Most of these end up in the landfill, but a growing percentage are being recycled.

National Recycling Rates (1991)

Independently certified by Scientific Certification Systems

Aluminum	Steel	Glass	Paperboard	PET	Aseptic
50%	34%	20%	15%	5%	<1%

Help us raise these rates even higher, by recycling your food and beverage containers.

To learn more about your recycling options, read this brochure.

Recycling in Los Angeles

Help reduce waste. Recycle this container.

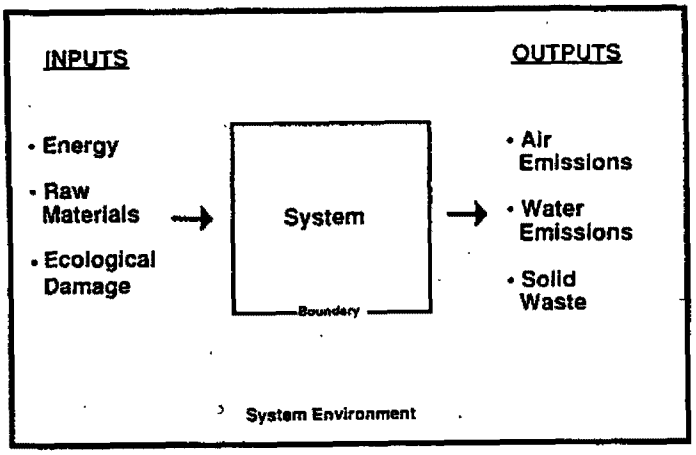
This community service message is co-sponsored by . . .

Green Cross Life Cycle Certification

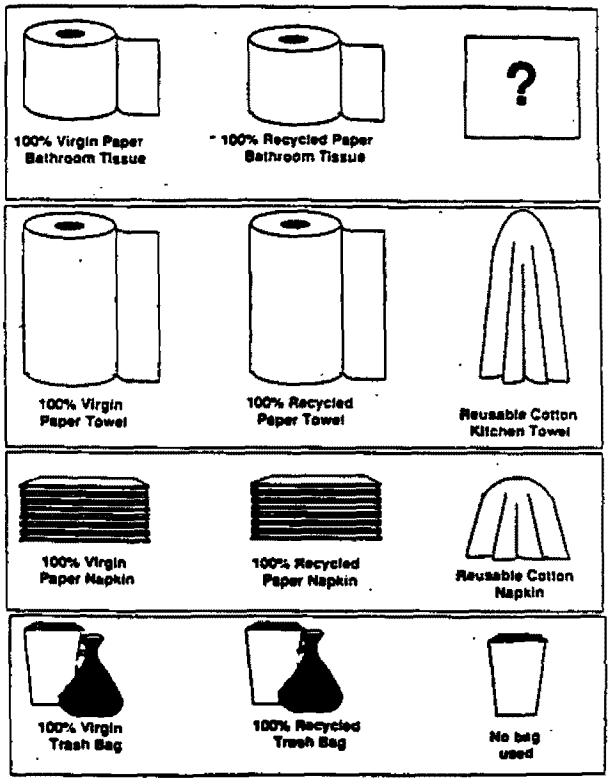
Historical Development of Eco-Labels Environmentla Burdens

1. *Raw Materials Consumption*
2. *Energy Consumption*
3. *Emissions into the Air*
4. *Emissions into Water*
5. *Solid Waste Generation*
6. *Ecological Damage*

Life Cycle Inventory (LCI)



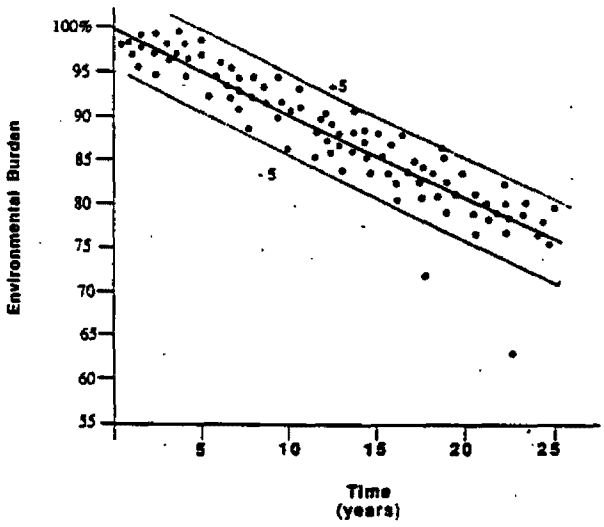
Comparison of Products



Green Cross Technical Foundations and Support

- *Interdisciplinary Scientific Staff*
- *Boustead LCA Model*
- *SNC Lavalin — Engineering Support*
- *Good Housekeeping Institute — Development of Product Efficacy Protocols*
- *National Food Laboratory — Food Analysis*

Industrial Processes: Performance Improvement Over Time



Scientific Certification Systems
Life Cycle Inventory Steps

Define Project

1a. Identify scope of project — i.e. product(s) to be evaluated.
1b. Define system(s).
1c. Define project objectives.
1d. Write Proposal
1e. Identify project manager and client technical teams

Prepare Flow Diagrams

2a. Collect existing flow diagrams/schematics from client engineer
2b. Prepare flow diagrams for each component of each system being examined, including all potential inputs and outputs

Prepare Inventory Data Sheets

3a. Generate inventory data sheets reflecting each component identified in flow diagrams.
3b. Determine what documentation will be required for initial documentation review (e.g., invoices for materials purchases)
3c. Determine which site(s) should be physically inspected

Site Inspection(s) (2-3 visits per site)

4a. Review inventory sheets
4b. Assist in completion of inventory sheets where additional data is needed
4c. Examine technical processes to ensure full consideration of factors
4d. Confirm flow diagrams and make modifications as required
4e. Conduct preliminary review of relevant documentation (e.g., invoices, accounts receivable), including discussions with client technical team

Data Management

5a. Prepare data input sheets — Reduction of Raw Data
5b. Input data
5c. Complete initial calculations
5d. Conduct internal SCS technical team review of calculations
5e. Revise input sheets as needed based on review
5f. Input new data as needed
5g. Complete final calculations
5h. Final SCS technical team review

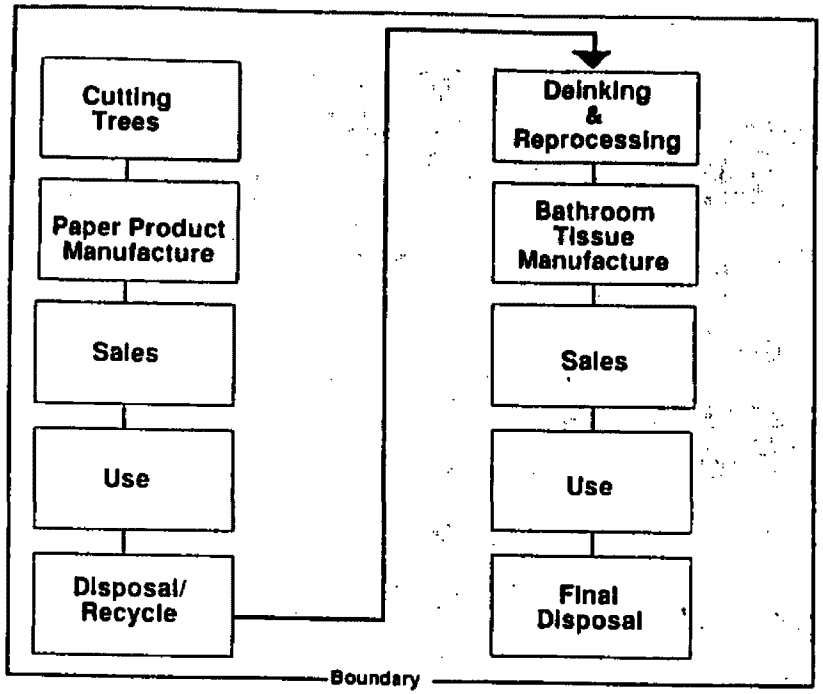
Presentation of Findings to Client

6a. Submit detailed LCI Report, covering project scope, purpose methodology and assumptions, and summarizing findings
6b. Review findings with client

Certification

7a. Full audit of records, invoices, and support documentation
7b. Sampling and testing to confirm emissions data
7c. Final inspection
7d. Issuance of Environmental Report Card and corresponding Fact Sheet
7e. Development of Quarterly Update Certification Plan
7f. Quarterly Monitoring

A Paper System



Bathroom Tissue Categories

Virgin

- Unbleached
- Bleached

Recycled

- Unbleached
- Bleached
- Rebleached

Degree of Concern About Destruction of Forests*

Very concerned	71%
Somewhat concerned	24%
Not very concerned	3%
Not at all concerned	2%
Don't know	1%
Very or somewhat concerned	95%

* Source: Good Housekeeping Institute Report, Consumer Research Department, August, 1990

Deforestation Concerns

The three major factors contributing to the loss of forests are:

- **Population Pressures**
- **Conversion to Agricultural Land Use**
- **Short-sighted Logging Operations**

This loss of forests, in turn, is largely responsible for the destruction of habitat and extinction of plant and animal species around the world.

Deforestation Concerns

Tropical Forests

- Tropical forests are disappearing at the rate of 100 acres per minute.
- This trend is due primarily to mining, slash and burn agriculture, logging, hydroelectric projects, clearing\for plantations, and cattle ranching.
- Tropical rainforests now cover only 2% of the Earth's surface, yet are home to more than one-half of the world's living species.
- If this trend continues, most of the remaining rainforests will disappear in less than a single person's lifetime.
- By early next century, we could lose a million or more species of plants, animals, and other organisms – the greatest mass extinction in geologic history, including the loss of the dinosaurs.

Temperate Forests

- Over a 300 year period (1630 to 1930), about 35% of all temperate forest lands were cleared.
- In the U.S. alone, 60,000 acres of ancient forests are being cut per year.
- Most severely affected are the national forests of the\Pacific Northwest, from which 5.5 billion board-feet of timber were harvested in 1987, and Alaska's Tongass National Forest, where as much as 50%of the most productive forest land has been logged since 1950.
- Tree planting and the reforestation of agricultural land has increased forest cover in the United States to nearly 3 million square kilometers:
  - — The period of regrowth can be up to 100 years or more.
  - — Replanting has not replaced the native habitat lost when the virgin forest was harvested.
- The loss of habitat has threatened many native plant and animal species. In the U.S. alone, 581 different species are now federally designated as threatened or endangered.

Definition of Terms

Life Cycle Inventory (LCI)

An objective data-based process of quantifying energy and raw material requirements, air emissions, waterborne effluents, solid wastes and other environmental releases throughout the life-cycle of a product, process or activity.

Life Cycle Analysis (Impact Analysis)

A technical, quantitative and/or qualitative process to characterize and assess the effects of the environmental loadings identified in the inventory component. The assessment should address both ecological and human health considerations, as well as such other effects as habitat modification and noise pollution.

Life Cycle Assessment (LCA)

An objective process to evaluate the environmental burdens associated with a product, process or activity by identifying and quantifying energy and materials used and wastes released to the environment, to assess the impact of those energy and materials uses and releases on the environment, and to evaluate and implement opportunities to affect environmental improvements.

Long Term Program Goals

- **Build an independent environmental data base that is specific to the vendors supplying products to retailers, institutional buyers, and government procurement agencies.**
- **Support buyer efforts to optimize their environmental choices with coherent, comprehensive environmental information.**
- **Help policy makers in their efforts to set down policy on the most sophisticated basis possible.**
- **Build a broad consensus on what constitutes a significant environmental claim or set of claims.**
- **Educate consumers about the full range of environmental factors associated various product and packaging choices.**

Remarks of James B. Dougherty
Vice President and General Counsel
Green Seal, Inc.

Eighth Annual HHW Conference
Minneapolis, MN
December 10, 1992

- **Green Seal** is both a:

Symbol: Green Seal is a symbol of environmentally preferable products. Seen on a product it means the product has been tested and meets Green Seal's rigorous environmental standards for that particular type of product; and a

Concept: We believe that the power of the marketplace can be harnessed to give us a cleaner world. Green Seal is dedicated to improving the quality of our environment by identifying and promoting products and services that can succeed in the marketplace while causing significantly less harm to our environment.

- We are not alone: 22 Countries have or are developing a Green Seal-type program:
  Blue Angel in Germany
  Canadian Environmental Choice
  European Community
  All of these programs use a process similar to Green Seal's.

- Green Seal is a response to people's desire to buy products that cause less harm to our planet. Study after study have reported that 4/5 people want to buy "green products."

- But consumer confusion remains a problem. Last year, 13% of new products were labeled "green." A 1991 Gallup Poll found that the Green Seal program would have more of an impact on consumer purchasing decisions than company claims or even government guidelines.

- Why should consumers trust Green Seal?
  - Non-profit, tax exempt 501(c)(3) organization
  - Member of ANSI; we employ time-tested public standard setting process. All of our standards are subject to public comment before being issued

Green Seal • 1250 23rd Street NW, Suite 275 • Washington DC 20037-1101 • Telephone (202) 331 7337 • Fax (202) 331 7533

- Balanced leadership: business, environment & consumer interests
- Strict Code of Ethics prohibiting conflicts of interest

- Other organizations that have teamed up with Green Seal:
  - Strategic alliance withUnderwriters Laboratories.
  - Clean Product Center of the University of Tennessee

The Green Seal Process:

- Category Selection
- Standard Setting
- Environmental impact evaluation.
- Standard setting and public review
- Product Evaluation
  - Product Testing by UL or another qualified lab.
- Certification
- Compliance Monitoring
  - Quarterly unannounced inspections and testing

- **Status of program**
  - First seals to be awarded in February: 5 brands of tissue product.
  - 14 products undergoing review
  - Issued standards covering 31 product categories
  - Standards under development in ten other categories, including:

Batteries - current draft would establish toxicity limits for Arsenic, Silver, Chromium, Lead, and Cadmium. Would also require compliance with TCLP. Lead-acid, nickel-cadmium, and silver-oxide batteries would have to returnable via a collection/recycled system maintained by the manufacturer, and well labeled;

Paints - current draft standard would prohibit the use of several dozen toxic substances, such as lead. Standard would also limit volatile organic compounds (20% for high-gloss, 10% for medium, 5% for flat finish). Compliance with performance requirements (e.g., opacity, scrubbability, etc.) also required.

Engine Oil Standard (GS-3), published 2/92, requires that base stock contain at least 25% recycled re-refined oil. Base stock must meet limits for several toxic contaminants. No sulfuric acid sludge may be generated during manufacture.

All Green Seal standards require compliance with CONEG-style packaging requirements.

Should All Constituents of Hazardous Products be Listed on the Label?

Philip Dickey
Household Toxics Project Director, Washington Toxics Coalition
Seattle, WA

Introduction

The product label is the consumer's main source of information about the products they are about to buy. It performs many important functions, including identifying the product on the store shelf, explaining how to use it, and warning about safety hazards. The label also contains information on ingredients...sometimes.

Anyone who buys a package of cookies can read the label to find out what ingredients are in the cookies before buying them. Yet the bulk of the contents of a roach spray in the next aisle of the store are not disclosed. The reason for this discrepancy lies in the fact that the two products are regulated by different federal agencies with different rules for product labeling.

In this talk, I would like to discuss some aspects of the question as to whether or not complete ingredients lists should be required on products. There are many topics of interest having to do with product labels, but I will try to confine my remarks to the question of ingredients lists.

Current Listing of Ingredients

At the present time, consumer products which we might consider are regulated by one of three federal agencies. These agencies have different requirements for ingredient disclosure.

1. Pesticides

Consider first pesticides, which are regulated by the Environmental Protection Agency (EPA) under FIFRA. Some typical household pesticides are lawn and garden insecticides and herbicides, indoor insect sprays, rat poisons, mothballs, and wood preservatives. They also include disinfectants and disinfecting cleaners, including chlorine bleach.

EPA's ingredient labeling requires a listing of all active ingredients, with their common and chemical names, along with the percentage present in the formulation. Consider for example the label shown in Figure 1. Active ingredients are those which perform the specific pesticidal function. All other ingredients are termed "inert." The total percentage of "inert" ingredients is listed on the label, but the identity of the specific chemicals is not usually disclosed. Of the some 1800 "inert" ingredients currently used in pesticide formulations, only the approximately 60 "inert" ingredients considered of "toxicological concern" must be disclosed. Most "inert" ingredients are considered to be of unknown toxicity. An example of a pesticide with a disclosed inert ingredient is shown in Figure 2.

Figure 1. A Typical Ingredients List for a Pesticide

Active Ingredient
*Chlorpyrifos [0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl) phosphororothioate].....0.50%
Inert Ingredients.....99.50%
*DURSBAN™—Reg. TM of Dow Chemical Company for Chlorpyrifos Insecticide

Figure 2. A Pesticide Label in which an "Inert" Ingredient is Identified

Active Ingredients
*Chlorpyrifos [0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl) phosphororothioate].....0.5000%
Xylene range aromatic solvent 0.3000%
d-trans Allethrin (allyl homolog of Cinerin 1).....0.0500%
Related compounds 0.0036%
Petroleum Distillates 4.0000%
Inert Ingredients**.....95.1164%
*Dursban™—Reg. TM of the Dow Chemical Company for Chlorpyrifos Insecticide
** Includes petroleum distillates

2. Food, Drugs, and Personal Care Products

Products which are put in or on the body are regulated by the Food and Drug Administration. As most of you are probably aware, some aspects of food labeling have been receiving alot of attention lately, but listing of ingredients is not one of them. Currently these products must list all ingredients. Sometimes, particularly on personal care products, the list can be pretty long. Figure 3 shows the ingredients list on the box for a hair color product.

Figure 3. Label for a Hair Color

COLORANT
CONTAINS WATER • OLEIC ACID • ETHANOLAMINE • ISOPROPYL ALCOHOL • LINOLEAMIDE DEA • OLEAMIDE DEA • PEG-2 COCAMINE • TEA-LAURYL SULFATE • POTASSIUM COCO-HYDROLYZED COLLAGEN • FRAGRANCE • LANETH-5 • SODIUM SULFITE • PPG-40 BUTYL ETHER • ERYTHORBIC ACID • TETRASODIUM EDTA • P-PHENYLENEDIAMINE • P-AMINOPHENOL • RESORCINOL • 2-METHYLRESORCINOL • 2-CHLORO-P-PHENYLENEDIAMINE SULFATE • 4-AMINO-2-HYDROXYTOLUENE

CREAM DEVELOPER
CONTAINS WATER • HYDROGEN PEROXIDE • CETEARYL ALCOHOL • CETEARETH-20 • MINERAL OIL • SODIUM LAURYL SULFATE • METHYLPARABEN • SODIUM PHOSPHATE • PHOSPHORIC ACID

REVLON'S CONDITIONING SHAMPOO
CONTAINS WATER • TRIDECETH-7 CARBOXYLIC ACID • COCOAMPHODIPROPIONATE • LAURAMIDE DEA • GLYCOL STEARATE • FRAGRANCE • POLYQUATERNIUM-10 • GUAR HYDROXYPROPYLTRIMONIUM CHLORIDE • PANTHENOL • CITRIC ACID • DISODIUM EDTA • METHYLCHLOROISOTHIAZOLINONE • METHYLISOTHIAZOLINONE • METHYLPARABEN • PROPYLPARABEN

CAUTION: THIS PRODUCT CONTAINS INGREDIENTS WHICH MAY CAUSE SKIN IRRITATION ON CERTAIN INDIVIDUALS AND A PRELIMINARY TEST ACCORDING TO ACCOMPANYING DIRECTIONS SHOULD FIRST BE MADE. THIS PRODUCT MUST NOT BE USED FOR DYEING EYELASHES OR EYEBROWS TO DO SO MAY CAUSE BLINDNESS

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MADE IN U.S.A.
©REVLON, INC., N.Y., NY 10022 8695-42

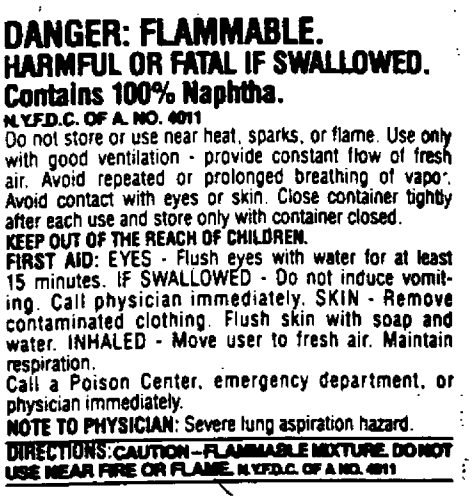
3. Other Consumer Products

Products not covered by EPA or FDA generally fall under the purview of the Consumer Products Safety Commission. These products include most household cleaners, adhesives, paints, and automotive products, to name a few.

The labeling requirements for these products are the most difficult to understand and result in widely varying numbers of ingredients being listed. The law states that if a product is considered "hazardous" (or "extremely hazardous") by CPSC, it must bear "the common or usual name or the chemical name ... of the hazardous substance or of each component which contributes substantially to its hazard, unless the Commission by regulation permits or requires the use of a recognized generic name." In other words, if a product is considered hazardous, it must list the constituents responsible for the hazard.

The simplest way for a consumer to determine if a product regulated by CPSC is hazardous is to look for one of the signal words CAUTION, WARNING, or DANGER: If these words are present, at least one ingredient should be listed.
The label for a spot remover, shown in Figure 4, indicates that the product is both flammable and harmful if swallowed. This particular product contains only one ingredient, naphtha, which is responsible for both hazards.

Figure 4. Product Label for a Spot Remover



The drain cleaner shown in Figure 5 is a multi-ingredient product. It is both corrosive and chemically reactive. The listed ingredients sodium hydroxide and sodium hypochlorite are responsible for those hazards.

Most laundry detergents are eye irritants because they contain both surfactants and alkaline salts. The three products shown in figure 6 present similar irritation hazards, but the extent of the ingredients disclosed is quite different. The product on the right lists only one ingredient.

Finally, products not considered hazardous according to CPSC do not need to list any ingredients at all. Examples include most window cleaners, dishwashing liquids, and some all-purpose cleaners, such as Murphy's Oil Soap.

Figure 5. Product Label for a Drain Cleaner

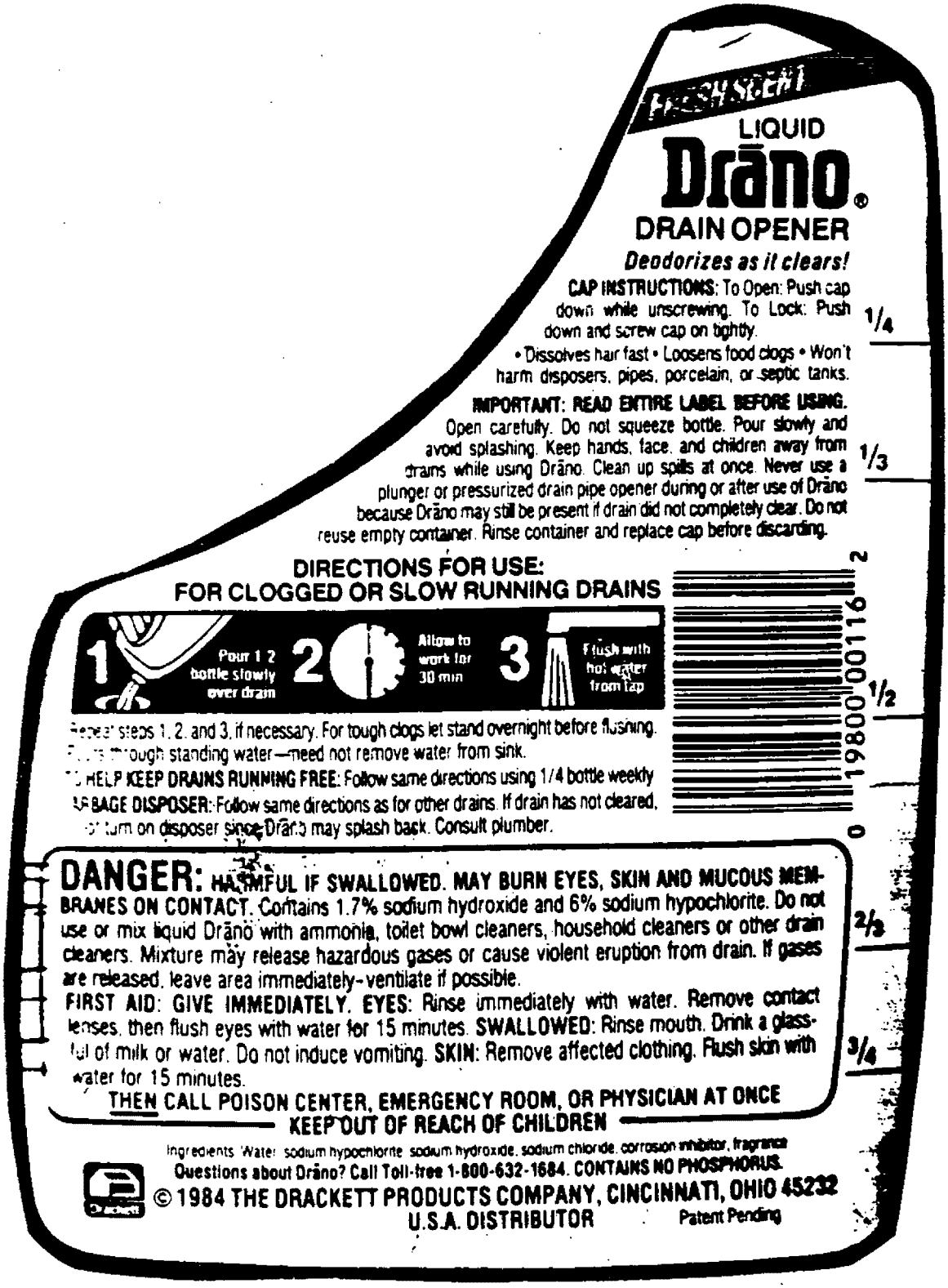


Figure 6. Ingredients Lists for Laundry Detergents

OTHER CLEANING USES

Dash can clean washable surfaces such as tile floors and walls. Just add ¼-½ cup of Dash to each gallon of water. In addition, Dash can be used on delicate items, such as hosiery and lingerie, which are washed by hand. Best results are achieved with warm water, gentle action, and a thorough rinsing.

INGREDIENTS: Cleaning agents (anionic surfactants), water softeners (either complex sodium phosphates or aluminosilicates, sodium carbonate), processing aids (sodium sulfate), washer protection agents (sodium silicates), fabric whitener, soil suspending agent, colorants and perfume.

The surfactants in Dash are biodegradable.

PHOSPHORUS CONTENT

If the code stamped into the bottom of this box begins with "O", this Lemon Dash formula contains less than 0.5% phosphorus by weight, which is equivalent to 0.5 grams per 1 cup use level. If the code begins with "L", this Lemon Dash formula averages 3.5% phosphorus in the form of phosphates, which is equivalent to 3.7 grams per 1 cup use level. If the code begins with "P", this Lemon Dash formula averages 4.6% phosphorus which is equivalent to 4.4 grams per 1 cup use level.

HELPFUL HINTS

STAINS

To help remove stains, make a paste using about a teaspoon of COLD POWER and a small amount of water. Place the paste on the stained area and rub. Wash the item as usual.

BLEACHING

If you use chlorine bleach, add it four to six minutes after wash cycle begins. This gives COLD POWER's whitening and brightening system a better chance to function and allows the bleach to do its job, too. For safe and effective cleaning, you may wish to use AXION® BLEACH ALTERNATIVE in place of chlorine bleach.

PRE-SOAKING

Soak washloads for at least 1 hour using 1/3 cup of COLD POWER per gallon of water. For best results, add 2-3 tablespoons of AXION® BLEACH ALTERNATIVE per gallon of warm water and soak overnight. Then wash in COLD POWER as you normally would.

CAUTION:
Contains carbonate, silicate, and linear alkylbenzene sulfonate. Avoid contact with eyes and mucous membranes. Do not take internally. KEEP OUT OF REACH OF CHILDREN.

FIRST AID:
In eyes flush 10-15 minutes with water. If irritation persists, contact a physician. **Internal**—give large amount of milk or water. Contact a physician.

BIODEGRADABLE CLEANING AGENTS:
The cleaning agents in COLD POWER are biodegradable. This means that these ingredients are broken down into simpler compounds by natural biological action. This capability helps to eliminate suds and foaming problems in our lakes and streams.

SEE BACK PANEL FOR USAGE AND WASHING INSTRUCTIONS

Woolite® Gentle cycle® powder

Specially made for the gentle cycle. Dissolves quickly. Cleans effectively and safely.

CAUTION: Contains Alkyl Aryl Sodium Sulfonate. In case of eye contact, flush with water. Call Physician.

KEEP OUT OF REACH OF CHILDREN

Woolite® Gentle cycle® powder

CONTAINS NO PHOSPHATES

The cleaning agents in Woolite® Gentle cycle® powder are biodegradable which allows them to be broken down into simpler compounds by natural biological action. This capability helps eliminate suds and foaming problems in our lakes and streams.

Problems with the Status Quo

The current labeling system, with its different requirements for different types of products, presents some problems for the consumer, for public interest groups, and for local governments.

1. Consumers have a basic right to know what chemicals they are being exposed to.

Anyone can read the ingredients on a package of cookies before buying them, but all of the ingredients in a pesticide or a claening product are not disclosed. The listing of ingredients on food and drug products is presumably based upon the feeling that consumers have a right to know what they put in their mouths or on their skin. Why should that same right not extend to much more hazardous products that consumers may breathe or absorb through their skin when they spray pesticides, paint walls, or clean their house? These routes of exposure are just as important as ingestion. The issue can be particularly important for chemically sensitive individuals, who can react violently to many chemicals and need to be aware of products that may cause them harm.

2. Differences between federal requirements for listing ingredients on household products are confusing for the consumer.

The differences between the labeling systems used by the three federal agencies make it difficult for consumers to compare products in the store. The average consumer is not aware of who regulates product labels, so they cannot take these differences into account. Products regulated by two different agencies are sometimes side by side on the shelf, and the consumer may be making a choice between them. Consider, for example, a choice between a chlorine bleach and a powdered bleach. Or between a cleaner which is registered as a disinfectant, like Pine-Sol, and one which is not. The products regulated by EPA will list fewer ingredients and will lump the rest under "inert" ingredients.

3. Incomplete ingredients lists make it difficult for consumers to practice source reduction by selectively buying the least harmful products.

The listing of ingredients on CPSC regulated products is primarily driven by health hazards. Ingredients which pose mainly an environmental risk may not be listed. Consider the spot remover called "Just 'n Time." No ingredients are listed on the label. The product is claimed to be "non-hazardous when used as directed." When I obtained a Material Safety Data Sheet for the product, I learned that it contains up to 30% 1,1,1-trichloroethane (TCA). TCA is an ozone depleting chemical which will be phased out under both the Clean Air Act and the Montreal Accords. However, a consumer who wishes to do their part to reduce the use of ozone depleting substances now is hampered from doing so because many products do not list ozone depleting chemicals. Similarly, TCA is a common inert ingredient in pesticide formulations. I recently learned that a pyrethrin-based insecticide spray which is often considered a less-hazardous alternative to some kinds of insecticides contains TCA as the primary solvent. Not only is it difficult for consumers to find the safest product, it is equally difficult for public interest groups, authors of books, and even local government authorities to find these products.

4. The term "inert" on pesticide labels is misleading.

The word "inert" has many different meanings. According to the dictionary it means: "without active chemical or other properties, incapable of reacting." I have spoken to many individuals about pesticides, and I always ask them what the term "inert" ingredients means. I have rarely encountered anyone outside of the technical arena who understood what this term means. Most consumers interpret it as meaning something like "harmless." Given the relatively high percentage of "inert" ingredients in many home pesticides, the result of this nomenclature is that (a) the identity of the bulk of most hazardous pesticides is kept secret from the purchaser and (b) the potential hazards posed by these ingredients are cloaked with a benign sounding term which often is not justified.

5. Some products list ingredients, some list ingredient functions, some list trade names.

Many products go beyond what is required by law and list all or most ingredients. Unfortunately, since the naming of these extra ingredients is not required by law, their listing does not conform to any particular standard. As a result, some products merely list ingredient functions such as "anti-redeposition agent" or "quality control agent." These "secret agents" are sometimes described in a way that is not particularly enlightening to the consumer. Other products use trade names which have meaning only to the companies themselves, such as "Chlorinol" and "Halophor.". These "ingredients" are put on the label as advertising, to make the product sound powerful or capable. The problem is that the consumer succumbs to this marketing pressure without receiving any information. There are no restrictions to prevent a manufacturer from naming a chemical anything they want to, thus making a hazardous chemical sound innocuous or even healthful. Which sounds more dangerous: quaternium 15, Dowicil Q, or 1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadanamtane chloride? They are all the same thing.

6. Labels and MSDS sheets frequently do not list the same ingredients.

Because of differences in the regulations governing product labels and Material Safety Data Sheets, the two can give different ingredient information on the same product. Take Lysol Direct Multi-Purpose Cleaner. This product is regulated by EPA as a pesticide, so its label follows the EPA format. The ingredients listed on the label are the following:

Alkyl (67% C12, 24% C14, 7% C16, 1% C8-C10-C18) Dimethyl benzyl ammonium chlorides	0.08%
Alkyl (50% C14, 40% C12, 10% C16) Dimethyl benzyl ammonium chlorides	0.02%
Inert Ingredients*	99.20%

*Includes detergents and other grease cutting agents.

The Material Safety Data Sheet for this product lists only one ingredient:

Diethylene Glycol Monobutyl Ether	5.99%

Are we talking about the same product here? Yes, we are, but the quaternary ammonium chlorides listed on the label do not have to be listed on the MSDS because they make up less than 1% each of the product. The glycol ether listed on the MSDS does not have to be listed on the label because it is an "inert" ingredient. The detergents aren't listed anywhere.

The arguments for requiring a listing of constituents on hazardous products can be summarized as follows:

- Consumers have a right to know.
- A uniform system would make all ingredient labeling consistent across different product types.
- It would enhance motivated citizens' efforts to practice source reduction.
- It would get rid of the misleading term "inert" ingredients in pesticides.
- It would standardize chemical identification, eliminating trade names and vague descriptions.
- It would eliminate some discrepancies between ingredients listed on labels and MSDSs

Arguments Against Mandatory Labeling

Having outlined what I view as the problems caused by the current system of product ingredient identification, I will now try to enumerate some of the possible arguments against listing all ingredients on product labels.

1. Listing all ingredients will frighten consumers.

Most consumers are not knowledgeble about chemicals or toxicology. Manufacturers may argue that listing the scientific names of ingredients will not be helpful because consumers will not know what they mean. In fact, seeing complex chemical names may frighten away consumers who have used a particular product for years.

The same argument could be made about the ingredients in food or cosmetic products, yet the ingredients are listed. Consumers who do not understand chemical names can ignore them if they wish. Some consumers may be frightened away from some products, and perhaps they ought to be frightened away from some products. In the long term, the listing of chemical ingredients can be educationsl.

2. Listing ingredients requires manufacturers to reveal trade secrets.

By listing all ingredients in a product, a manufacturer may be forced to reveal trade secrets. Extensive, expensive research may have gone into developing the products. If the ingredients are revealed, competitors could then use that information to reproduce the formulas without an equivalent amount of time and effort. This could stifle creativity and remove incentives to developing new products.

In some cases, revealing ingredients may mean that trade secrets must be revealed. However, merely knowing the identity of ingredients does not necessarily mean that the entire process is revealed and that a competitor can immediately begin copying a product. In practice, companies can often chemically analyze competitors' products and deduce the formulas. The extent to which revealing ingredients would be a hardship probably varies widely among product groups. The manufacturers most likely to be hurt may be small companies with only a few products and without the resources to analyze competitors' products. There still remains the option of taking out a patent on a formula to protect it.

3. Listing ingredients means that a new label must be designed every time a formula is changed.

Product formulas for some types of products change frequently. If the ingredients must be listed, then each time a formula changes so that an ingredient is added or deleted, a new label must be designed. This adds expense and may result in the waste of pre-printed containers or labels. Careful planning of printing runs and container orders would be required to minimize such problems.

4. Consumers don't read the labels anyway.

Some surveys have shown that relatively small numbers of consumers read product labels. If ingredient lists are longer, consumers may be even less likely to read them. On the other hand, when a consumer is considering buying a new product or changing brands, they may be much more likely read labels. The presence of advertising information on labels must indicate that someone thinks consumers will read them.

5. There isn't enough room on the label.

For some products in particularly small containers or those with a large number of ingredients, there may not be enough room to list all ingredients without a significant decrease in print size. In those special cases, some creative solutions may be necessary. Often such products are attached to a cardboard card that may have enough room to hold the additional information. In some cases, additional shelf labeling may be required.

How Ingredients Lists Might Look

Let's look then at some possible formats for increased ingredient information. Consider an imaginary product with the following ingredients: sodium dodecylbenzene sulfonate, sodium lauryl sulfate, triethanolamine, ethanol, 2-butoxy ethanol, methyl paraben, and water. Under current CPSC regulations, this product could be labeled as follows:

> **CAUTION**: eye irritant. Contains surfactants.

One way to list the ingredients would be simply to list the chemical names in order of decreasing percentage by weight or volume:

> **Ingredients**: water, sodium dodecylbenzene sulfonate, sodium lauryl sulfate, ethanol, 2-butoxy ethanol, triethanolamine, and methyl paraben.

Those who argue that chemical names are meaningless to the average consumer may prefer to list chemical functions rather than chemical names, thus:

> **Ingredients**: water, surfactants, grease cutters, buffering agent, preservative.

The most informative way to list the ingredients would be to combine the two approaches. Obviously this would require almost twice as much space on the label.

> **Ingredients**: water, surfactants (sodium dodecylbenzene sulfonate, sodium lauryl sulfate), grease cutters (ethanol, 2-butoxy ethanol), buffering agent (triethanolamine), preservative (methyl paraben).

The addition of quantitative data requires still more space.

> Ingredients:
>
> Surfactants
> sodium dodecylbenzene sulfonate.....10%
> sodium lauryl sulfate.....5%
> Grease Cutters
> ethanol.....15%
> 2-butoxy ethanol.....3%
> Buffering Agent
> triethanolamine.....10%
> Preservative
> methyl paraben.....0.2%
> Other
> water.....56.8%

As another example, consider a spray insecticide. Under current EPA regulations it would be labeled as follows:

Active Ingredients
Tetramethrin [(1-Cyclohexene-1,2-dicarboximido)methyl 2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate].....0.05%
Sumithrin 3-Phenoxybenzyl d-cis and trans 2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate.....0.096%
Other isomers.....0.04%

Inert Ingredients*.....99.850%
*Contains methylene chloride

A complete listing of the ingredients in the same basic format might look like this:

Insecticidal Ingredients
- Tetramethrin [(1-Cyclohexene-1,2-dicarboximido)methyl 2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate] 0.050%
- Sumithrin 3-Phenoxybenzyl d-cis and trans 2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate 0.096%
- Other isomers 0.004%

Solvents
- 1,1,1-trichloroethane 40.00%
- Methylene chloride 20.00%

Propellant
- Isobutane 29.85%

Conclusion

The subject of constituent labeling needs to be discussed. There are important issues here relating to consumer protection, consistency of standards, and source reduction that need to be aired. A conflict with the desire for confidentiality is inevitable and makes the problem more difficult. It is critical that the various federal agencies involved in regulating product labels work together to ensure a consistent system across product types. It is equally critical that more complete ingredients listing not be viewed as an excuse to avoid pursuing better health and environmental safety warnings.

THERMAL TREATMENT OF HAZARDOUS WASTE

by Paul E. Fredette, Ph.D. and Robert Coffey

The Thermal Treatment of Hazardous Waste is a very important part of the hazardous waste industry. It is frequently referred to as incineration or burning but there is much more to it than you might expect. In reality, it is a sophisticated process used to destroy or demanufacture chemicals and their byproducts.

Combustion actually consists of numerous complex chemical reactions. To achieve destruction, these reactions must go to completion which is a function of time, temperature, and turbulence; the three "Ts". It often takes as much energy to demanufacture a material as it took to form it.

To illustrate this point, consider the differences between this **thermal process** and a **boiler.** A boiler is a heat exchanger designed to extract heat as quickly and efficiently as possible and to reuse the energy for other purposes.

By contrast, thermal treatment is designed to maximize the heat/energy environment to achieve 100% complete combustion, necessary for molecular breakdown and destruction. Since this is a function of time, temperature and turbulence, special emphasis is placed on the design to optimize these characteristics.

Figure 1 demonstrates the temperature ranges typical of such treatment and the following figures will graphically depict other design considerations.

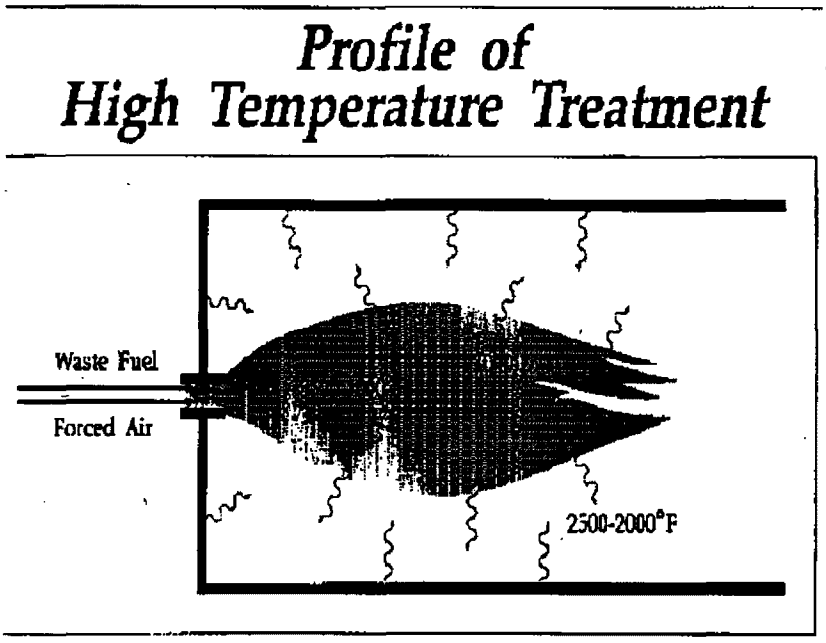


Figure 1

There are basically four types of systems used in the industry as reviewed below:

In the **liquid injection furnace**, shown in Figure 2, .liquid is injected into a thermal reactor vessel. This is a long horizontal or vertical chamber where the combustion process takes place. In practice, the liquid is atomized with forced air for maximum surface area. In addition, forced air enters through peripheral air ducts to create a spiral or vortex action for maximum dispersion and turbulence..

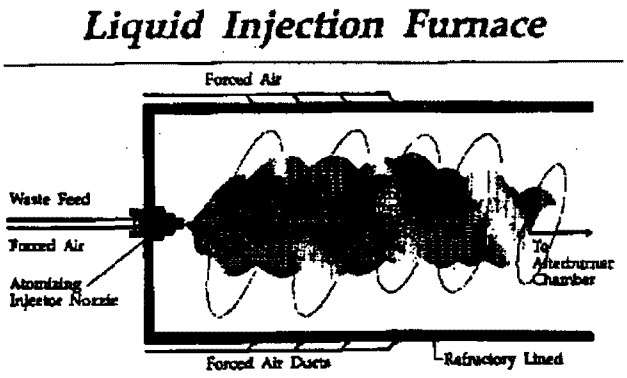


Figure 2

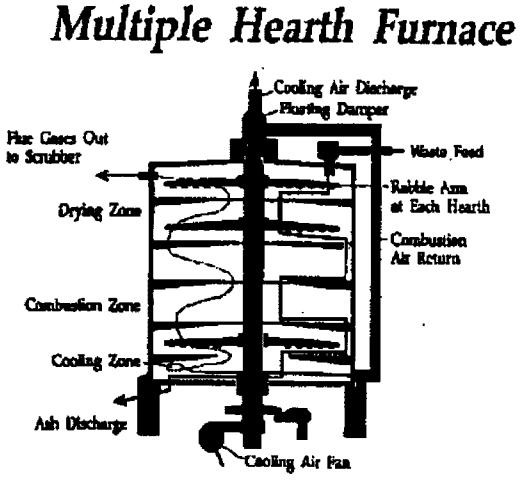


Figure 3

The **multiple hearth furnace**, as shown in Figure 3, primarily handles liquids and sludges. It can be modified to process solids.

The **fluidized bed** is limited to homogeneous materials; gas, liquids, solids. This new technology is shown in Figure 4.

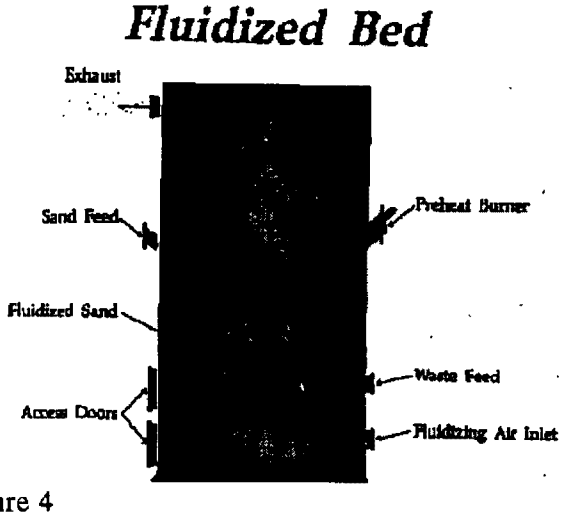
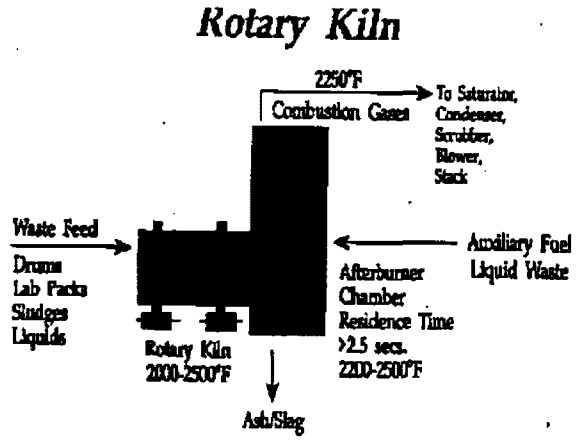


Figure 4

The majority of commercial systems utilize a **rotary kiln** as shown in Figure 5 for the following reasons:



- **flexibility** — handles gases, liquids, solids, sludges, drums, packages
- **maximum residence time** for solids to allow complete destruction
- **rotating action** provides constant exposure of new surfaces to assure destruction
- **after burner** provides additional residence time and temperature for combustion by-products generated in the kiln
- **overall exposure time** in kiln and afterburner: > 2.5 **seconds**

Figure 5

A typical **rotary kiln treatment train** including the operational components to complete the gas cleanup process is shown in Figure 6.

- Acid gas removal by neutralization
- Particulate removal (Calvert scrubber)

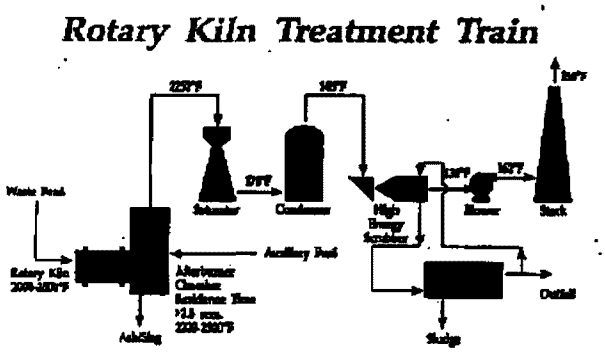


Figure 6

The primary chemical reaction is where a hydrocarbon waste fuel reacts with oxygen to form water in the form of steam and carbon dioxide.

HCH (Hydrocarbons) + O_2 (Oxygen) → H_2O (Steam) + CO_2 (Carbon Dioxide)

Examples: Solvent Based Paints, Paint Thinners, Nail Polish Remover, Lighter Fluid

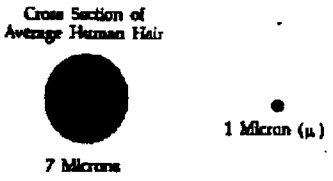
Chlorinated hydrocarbons react with oxygen to form water, carbon dioxide and hydrogen chloride gas. The HCl gas is then neutralized in the scrubber to form water and sodium chloride (NaCl) or common salt.

HClH (Chlorinated Hydrocarbons) + $O_2 \rightarrow H_2O$ + HCl (Hydrogen Chloride)

HCl + NaOH (Caustic Soda in Scrubber) → H_2O + NaCl (Salt)

Examples: Paint Remover, Carburetor Cleaner, Dry Cleaning Fluid, Freon, Pharmaceuticals, Pesticides, Aerosols

Particulate Matter Is Removed by High Energy Scrubbers



Particle Size Removal is in the Sub-Micron Range

The final gas clean up stage is the particulate removal. A high energy scrubber removes particulate matter less than 1 micron in diameter. Note the comparison to a human hair shown in Figure 7.

Figure 7

Finally, all facilities are required to continuously monitor the stack for some or all of the following parameters to assure operation within permit limits for:

Continuous Sampling for	*Periodic Sampling for*
• Oxygen*	• PCBs
• Carbon monoxide/dioxide	• Toxic Metals
• Nitrous oxides	• Particulate Matter
• Sulfur oxides	• POHC
• Total hydrocarbon content	• HCl/Chlorine

* Oxygen is continually controlled at 6 to 8% excess in the stack gases. This is necessary to assure complete combustion.

The entire process; thermal treatment, gas neutralization and particulate removal system must meet Destruction and Removal Efficiency (DRE) minimum standards demonstrated via extensive stack testing prior to receiving a permit:

• RCRA — Hazardous Waste	99.99%
• TSCA — PCBs	99.9999%

Regulations have been developing over a number of years. Heavy industrialization in the '50s and '60s led to:

• U.S. Environmental Protection Agency (EPA)	1970
• Clean Water Act	1972
• State environmental regulations, led by California	1972

However, hazardous waste regulations are relatively new. Industrial pollution in the '70s (Love Canal, et al) led to:

- Resource conservation and Recovery Act (RCRA) 1976
- Toxic Substances Control Act (TSCA) 1976
- Comprehensive Environmental Response and Compensation Liability Act (CERCLA) or "Superfund" 1980
- Hazardous and Solid Waste Amendment (HSWA) 1984

As a result, RCRA regulations are rigorously enforced; non-compliance in our industry is met with serious action.

- Fines of $25,000 per day per violation
- Criminal charges against violators
- Consent decree imposing operational restrictions
- Loss of permit
- Closure

What does all of this mean to a thermal treatment facility? Figure 8 shows that each stage of the operation is regulated by one or more federal or state agencies.

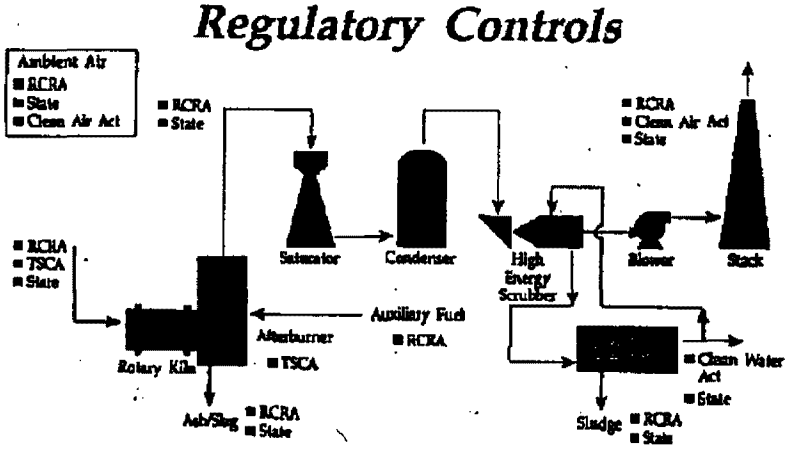
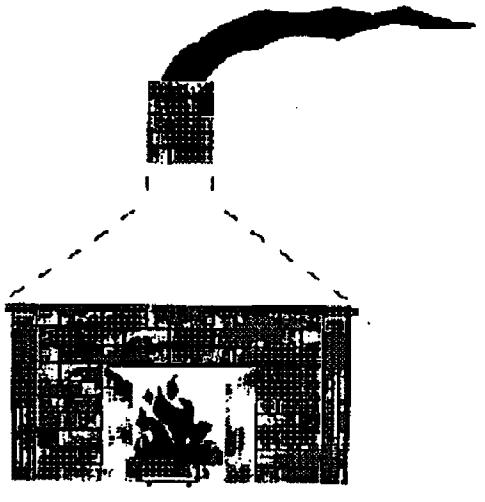


Figure 8



To put the meaning of these controls into perspective, it is useful to make a comparison with a very accepted practice — fireplaces! We all enjoy sitting by a warm fire, but residential fireplaces produce considerable air pollution. Based on an EPA study of flue gases the following pollutants are released each day.*

- Carbon monoxide 6,100 lbs.
- Nitrous oxides 90 lbs.
- Particulate 1,080 lbs.
- Total hydrocarbons 9,560 lbs.
- Polycyclic organic material 1,300 lbs.

* Assumes 5,000 households burning an average of 20 lbs. of firewood.

Next is a comparison of thermal treatment with some of our accepted living styles —driving and fireplaces.

Comparison of Daily Emissions (Lbs./Day)			
City of 60,000 Population			
Emission	**Vehicles (20,000)**	**Fireplaces (5,000)**	**Thermal Treatment Unit (150000 Tons/Yr)**
Carbon Monoxide	10,345	6,100	72
Nitrous Oxides	11,352	90	600
Particulate	1,730	1,080	72
Hydrocarbons	773*	9,560	24
* Plus 299 Lbs. of Rubber from Tire Wear - the Equivalent of 12 Tires!			

Another look at the relative emissions for each pound of fuel from automobiles, fireplaces and a thermal treatment unit further demonstrates the effect of process controls and regulations.

Comparison of Lbs. Emitted per Lbs. Consumed			
Emission	**Vehicles (Lb/Lb Gas)**	**Fireplace (Lb/Lb Wood)**	**Thermal Treatment (Lb/Lb Feed)**
Carbon Monoxide	0.042	0.0610	0.0000876
Nitrous Oxides	0.045	0.0009	0.00073
Particulate	0.007	0.0108	0.0000876
Hydrocarbons	0.003	0.0956	0.0000292

For Household Hazardous Waste and CESQG programs, segregation is very important to assure that only non-recyclable material is thermally destroyed. All recyclable materials are sent to appropriate third party outlets.

- **Paint** Habitat for Humanity, "exchange table", graffiti control
- **Used Oil** Re-refiners, recyclers
- **Antifreeze** Re-refiners
- **Batteries** Smelters, reclaimers

Non-recyclables are classified into compatible groups, e.g. poisons, acids, bases, etc.

Extensive documentation is required by EPA, DOT and state agencies wherever receiving TSDs are located.

- Drum inventory sheets contain detailed descriptions of the drum contents.
- Hazardous waste manifests provide the paper/record trail from the generator to the disposer.

Quality control is performed on arrival.

- All documentation is carefully checked
- All drums are inspected and bar coded prior to feeding into the rotary kiln
- Any analytical requirements are completed per Waste Acceptance Procedure specified in the permit

In summary, the thermal treatment process is:

- Chemical oxidation through high temperature reactions
- Chemical neutralization of acid gases through scrubbing
- Physical removal of particulate matter through scrubbing
- High tech with fail-safe controls
- Very heavily regulated

The benefits of the process are:

- Hazardous waste is destroyed
- Landfill space is conserved
- Long term liability to generators is essentially nil
- Environment is protected

The "Fuels Option" for HHW Disposal

Joe Foley, Director Sales Support, CWM, Inc.

As part of a comprehensive Household Hazardous Waste collection program, you may be presented with an option to divert a portion of the material to "fuels". This presentation is designed to answer some basic questions on fuels.

- What is a Hazardous Waste Derived Fuel?
- How is it produced?
- How is it consumed?
- What are the best candidates among HHW for this option?
- How can this option be best applied?

Hazardous Waste Derived Fuels (WDF)

Hazardous Waste Derived Fuel is a generic description for a high btu fuel product produced from hazardous waste and burned in a regulated industrial furnace. Within the EPA waste treatment hierarchy, the fuels option is considered "Energy Recovery" which, although not favored as true recycling, is more favored than incineration. WDF is used as a direct replacement for fossil fuel at 28 cement kilns across the US and supplies up to 50% of the energy needs at these facilities.

In 1992 over one million tons of WDF will be consumed of which only a small % will come from Household Hazardous Waste Collection. The overwhelming majority will come approximately 15,000 industrial customers that use and generate liquid wastes that have energy value.

Producing Waste Derived Fuels

Most high btu materials ultimately consumed as WDF pass through a commercial fuel blending facility which, is permitted by the EPA, for the storage of these hazardous materials. Full service fuel blenders are able to receive hazardous waste materials in a variety of forms but principally bulk tanker loads of liquids and 55 gallon drums. Received materials are sampled and screened for their btu value and other constituents, then blended with other materials to produce a bulk tanker load, usually 4,000 gallons of a WDF that falls within a pre-set specification.

The role of the blender is to take a wide array of waste materials that vary greatly in composition and turn them into a homogeneous fuel that can then be burned safely and with predictable results.

Consuming WDF in Cement Kilns

The vast majority of WDF is consumed by 28 cement kilns permitted to burn these wastes. During 1992 these facilities have come under a new set of regulations to ensure the efficient destruction of the waste, that emissions do not pose a danger to the environment and the products produced are safe. Attached are two graphics that depict in detail both the compliance issues relating to cement kiln destruction and the high temperature nature of cement kilns.

WASTE DERIVED FUELS

COMPONENT	FUTURE TREND	ECONOMICS
Heat Value >5,000 BTU/lb	↓	>BTU = < Cost
Chlorine Content <10%	↓	>Cl = > Cost
Metals - Various limits on volatile metals (Mercury, Lead, Zinc)	↓	Not usually a factor
Viscosity - Pumpable liquids and sludges	↑	<Solids = <Cost

The materials most usually bear RCRA waste codes of D001 ignitable or fall into the family of listed solvent F001-F005.

HOUSEHOLD WASTE CANDIDATES FOR FUEL BLENDING

Our experience indicates that approximately 25% of collected materials are candidates for managing as Waste Derived Fuels.

Oil Based Paints	Solvents
Varnish	Acetone
Shellac	Furniture Stripper
	Paint Thinner
Brake Fluids	Paint Remover
Transmission Fluid	Turpentine
Gasoline	Engine Cleaner
Camping Fuel	
Kerosene	

Implementing the Fuels Option at the Collection Site

In order to achieve the best economics in applying the fuels option to your collection program be sure your service contractor employs these two steps:

1. Review all flammable liquids as candidates, but eliminate solvents and paint removers that have high chlorine levels. (Chlorine content increases cost).

2. When "pouring-up" from consumer containers to 55 gallon drums employ a screening device to capture any solids and divert to incineration. (Solids content increase costs).

Conclusion

The fuels option alone is not an answer to the total management of Household Hazardous Waste. For the wide range of waste materials received - Recycling, Waste Exchange Incineration, Treatment and Secure Disposal are all contributing components to a complete program. The fuels option can bring strong benefits to your program in two important ways:

1. Reducing the cost of safely managing highly energetic wastes

2. Diverting for energy recovery waste material that can substitute for fossil fuel

Landfill Options: Landfill Technology

Loren D. Alexander, CWM, Inc.

Introduction

Landfill disposal remains a necessary waste management option. Certain metal bearing wastes, treatment residues and pollution control sludges have no other practical alternative for safe, legal management. Two forms of permitted landfill space are recognized by EPA as acceptable: Subtitle D for "solid waste" and non-regulated residential trash and garbage and Subtitle C for industrial "hazardous wastes". This paper explores the differences between these two landfill types. The intent is to help buyers of landfill services to understand the options so sound waste management decisions can be made.

Key points that will be addressed are:

- Historical issues involving landfills.
- Impact of regulations on landfills.
- Differences between Subtitle C and Subtitle D landfills.
- Options for Household Hazardous Waste disposal decision making.

Historical Issues

In 1976, Congress passed the Resource Conservation and Recovery Act (RCRA) which was the most comprehensive law ever developed in the U.S. focused on the management of waste materials. RCRA mandated the Environmental Protection Agency (EPA) to develop a specific set of regulations to administer and control the objectives of the law. In 1980, EPA finalized and published these regulations which reside in 40 CFR 260-270. Before 1980, regulations were unavailable or ineffective at controlling the disposal of solid and hazardous wastes into landfills.

The landfills constructed pre-1980 often had no consistent construction guidelines. Use of a single compacted clay liner was typical. Co-disposal of solid wastes (trash and garbage) and hazardous waste (solvents, sludges) occurred routinely. Liquids were allowed to be placed in landfills. Controls to monitor the generation and migration of leachate were limited in scope or non-existent.

The chemical and biological processes in the landfills were unrecognized and uncontrolled. Later investigations of these processes have shown that co-disposal can create potentially harmful environmental conditions. For example, the decomposition of organic material from consumer garbage can alter the acidity levels (pH) in the landfill. Food wastes and other organic materials like wood, paper and petroleum products form organic acids over time. Changing pH conditions causes metal solubility fluxuations and poses threats to leachate. Methane gas formation results in potentially ignitable pockets within the landfill.

These now recognized and evaluated phenomena are key reasons why many of the sites that have become liabilities for cleanup are old landfills. Liability for the costs of cleanup of environmental cleanup and restorations were largely ignored by government and industry using these historical waste management practices.

Regulatory Impact

In 1980 and the years following, laws, amendments and regulations have driven measures to end the environmental harm from previous practices. Impact on the use of landfills as a method of waste management has been enormous.

RCRA brought new definitions of solid and hazardous wastes. Generators of wastes were given cradle-to-grave liability for how their wastes were managed. Waste reduction, waste minimization and recycling were established as priorities.

Landfills were categorized as Subtitle C or Subtitle D (a reference to the section in ~~40 CFR~~ where specific requirements are given). Landfills now have tight specifications on design and construction. Subtitle C (hazardous waste) were given stringent minimum technology standards including redundant safety features in liners, leachate collection and groundwater monitoring. In order to receive hazardous wastes, landfills were required to file detailed and complex permitting documents covering waste acceptance controls, operations and closure. New rules banned liquids from all landfills.

One of the most complex subsequent regulations affecting the Subtitle C landfill is the so-called Landban Regulations. While too broad to cover here, the intent of landbans was to restrict wastes targeted for landfill to treatment residuals. The landbans were phased-in starting with the Solvents, Dioxins and California List bans and carrying through the First-third, Second-third and Third-third laws on specific EPA waste code categories. Complexity of these regulations live on at present with the Debris Rule and Soil treatment standards under development.

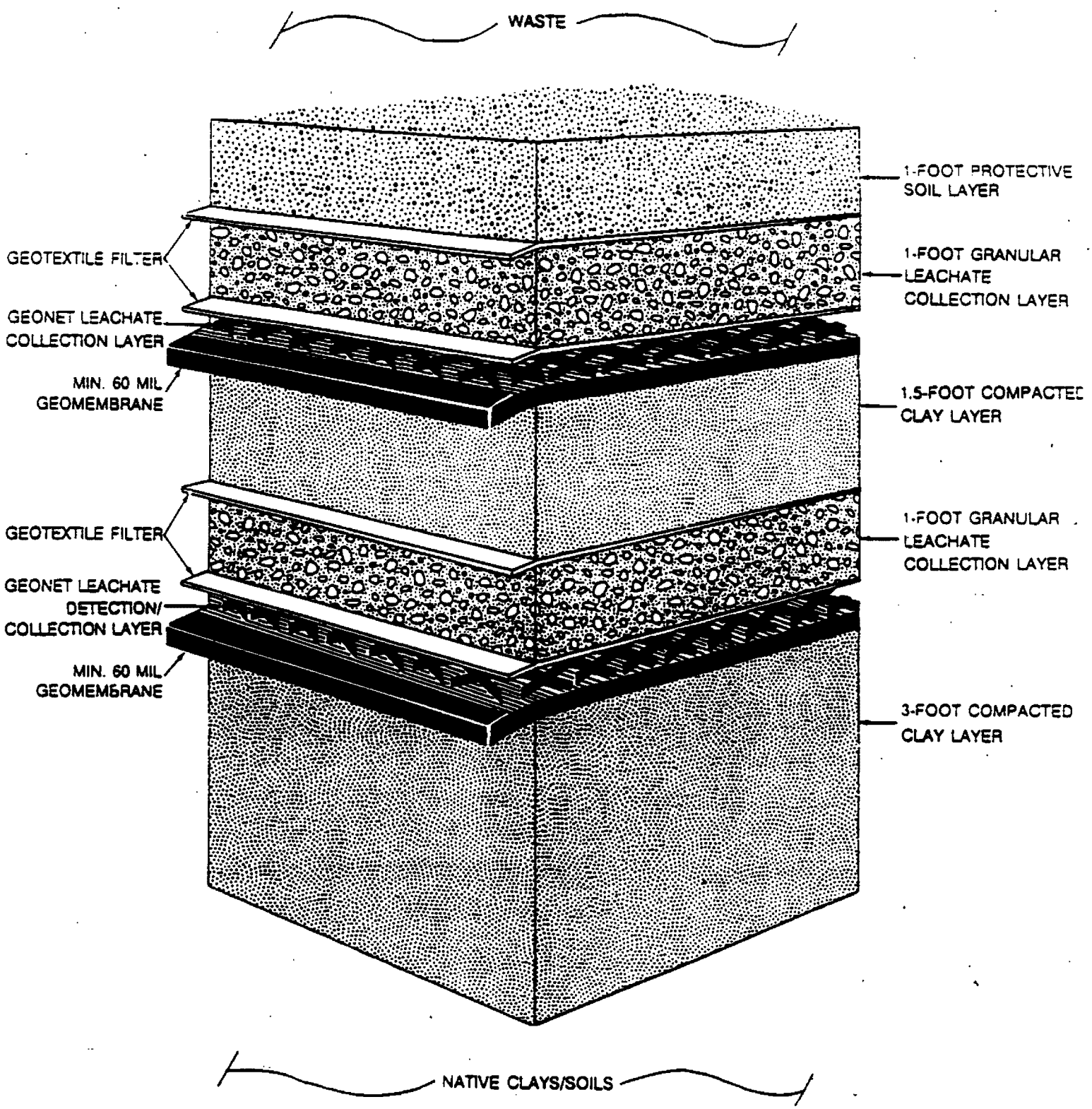
Strict liability for the generation and disposal of wastes was handed to industry through RCRA and historical and future problems were targeted in the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA aka Superfund). The jist of this regulatory imposed liability is that generators of wastes must be cognizant of the risks involved with decisions to manage wastes

Subtitle D and Subtitle C Landfill Differences

The following table provides a detailed look at key differences between solid waste and hazardous waste landfills.

ITEM	SUBTITLE D	SUBTITLE C
Waste Types	"Solid Waste" only both residential and industrial.	Solid and Hazardous wastes.
Construction	Many older units still operate with no synthetic liner. New landfills must have a synthetic liner.	Active and newly constructed units must have double synthetic liners and double leachate collection systems.
Waste acceptance procedures	Vary in levels of complexity. Most sites receiving industrial waste require TCLP.	Rigorous pre-acceptance profiling and analytical requirements as well as analysis upon receipt at the facility.
Operations	Limited operational personnel mainly in active areas of landfill and maintenance of equipment.	Large administrative, technical and laboratory staffs with complex waste characterization responsibilities.
Environmental Controls	Older units upgraded with groundwater observation wells. New landfills must have leachate collection and groundwater monitoring.	Redundant safety controls in monitoring waste compatibility with double liners, double leachate collection, groundwater monitoring, strict operations.
Availability	Widely available. Over 5,000 in the U.S.	Only 22 in the U.S.
Pricing	Less expensive	More expensive

FIGURE 1.



NOT TO SCALE

CHEMICAL WASTE MANAGEMENT, INC.

DOUBLE LINER SYSTEM

82-155
5/4/90

Since all active Subtitle D landfills are not constructed to the same specifications, buyers of these services should be aware of the cost/risk trade-offs. Also, it is important to carefully evaluate the strength of landfill companies, contractual protections and operating practices at any Subtitle D or C landfill expected to be used. Figure 1 shows a cross section of a Subtitle C units redundant safety features. Figure 1 shows the careful design and construction features built into a Subtitle C landfill liner system.

Operations for Household Hazardous Waste

Typically 90-95% of the wastes collected from a household hazardous waste cleanup effort can be recycled, reused or destroyed. However, the remaining 5-10% of metal laden wastes or those with lower toxicity need the practical management option of landfilling.

Household hazardous waste can be landfilled directly into a Subtitle C hazardous waste unit because the landban provisions of the regulations do not apply to residential wastes. One notable exception is that no liquids are allowed in the landfill. Frequently managed wastes into Subtitle C from this activity is metal bearing paints (i.e. lead), solders, acids and bases. Latex paint can be reused as a blended primer paint or other non-critical coating applications. Oil based paints should be blended for fuel.

Certain wastes can be targeted for Subtitle D disposal such as fertilizers, dried latex paint, waxes and detergents. It is advisable to weight the risks of disposal against the CERCLA liability when evaluating individual disposal sites and the type of waste to be managed.

Summary

Landfill remains an important option for disposal of 5-10% of waste received in Household Hazardous waste collections. Primarily wastes with metals and solidified materials are targeted for this management method.

Liability issues need careful evaluation when choosing landfill service. Significant differences exist between the construction and operation of Subtitle D and Subtitle C facilities. Subtitle D is often close to all locations with over 5,000 units in the U.S. while Subtitle C landfills number only 22 in the U.S. However, depending on the type of waste to be managed, the best options can vary from a cost/risk evaluation.

For most Household Hazardous wastes the recycling, reuse and destruction methods of managing wastes are the most practical, albeit more expensive, means available.

REMARKS OF HUBERT HUMPHREY III
Attorney General

to the

National Household Hazardous
Waste Conference
December 11, 1992

Good morning.

I am pleased to be here today with people from across the country who are dedicated to solving our nation's environmental problems.

Your work in improving the management of household hazardous waste is important because of the environmental consequences of mismanagement.

But, your work is probably even more important as an educational tool.

Dealing with household hazardous waste brings waste management problems to our own doorsteps.

It forces each of us to examine our own activities to see what we can do to minimize environmental problems.

It is this self examination

-- and, hopefully, the attitude changes and the new purchasing decisions that follow

-- that is the key to environmental progress.

This culture change is critical because

this country

and this planet

are at a crucial point in their environmental history.

Our lakes, rivers, wetlands, groundwater, air and soil are tremendous assets,

They are the bank account upon which we draw for:

- food
- drinking water
- economic development
- recreation
- and the simple pleasures of viewing the wonders of nature.

For decades, though, we have been borrowing from this natural resources bank.

- Mercury-tainted fish
- solvent and pesticide contaminated groundwater
- disappearing wetlands
- abandon hazardous waste sites
- depleted ozone
- and the potential for dramatic climate change

are among the environmental debts we are passing on to our children and their children.

We cannot continue to defer to future generations the environmental costs of the way we live.

The debt will simply overwhelm them.

It is beginning to overwhelm us.

We must act now to find new, long-term solutions to our environmental problems.

The first thing that is needed is a clear objective.

We have a myriad of environmental programs in this country, but no clear environmental objective.

We have no man-on-the-moon by the end of the decade goal around which we can rally as a country.

We need a "**Common Vision**" for our environmental future.

Let me suggest one.

By early next century, we should reduce pollution sufficiently that no additional environmental debt is being passed on to future generations.

The United Nation's World Commission on Environment and Development refers to this equilibrium as Sustainable Development.

In the Commission's words:

> "Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future."

The idea is really a simple one.

We must not create more pollution than the environment can readily assimilate.

The models are already available for us to follow.

The Dutch Government has embraced the concept of sustainable development.

To meet the objective in making their economy sustainable, the Dutch plan to reduce pollutant loading by 70-90 percent by the year 2010.

Norway, Sweden, Austria, New Zealand and Canada have adopted similar national environmental plans.

A long-term environmental plan is important for many reasons.

- It helps governments to design more flexible regulatory programs.
- It allows environmentalists to better measure environmental progress.
- It provides businesses a more stable planning horizon and encourages innovation.

As consumers of a large percentage of the world's resources, the United States must follow the lead of other countries by moving to an environmentally-sustainable economy.

There are several things we must do to achieve this objective.

First, we must get truly serious about environmental education.

The environment is our home, yet many of us don't even know how it works.

We need to educate our grade school students to respect the environment.

Our high school students to understand how the environment works.

Our engineering students to work within the context of the environment.

Our business students to understand how to manage companies in ways that are compatible with the environment.

And, ourselves to better understand the effects of our daily activities on the environment. Your work is particularly important in this regard.

Second, we need to find better ways of working together.

We will not be able to achieve a sustainable economy unless those on the development side of the equation are working towards the same goal as those on the protection side.

Business' stake in environmental protection is rapidly growing.

A recent editorial in Scientific American noted that those countries with the toughest environmental standards also have the most dynamic and successful companies in the environmental technology field.

In addition, the rapid increase in consumer demand for "environmentally friendly" products has stimulated a dramatic increase in corporate interest in the environment.

Finally, public demand for better environmental compliance by companies has grown rapidly as a result of disclosures of the release of toxic chemicals required under community right-to-know statutes.

All of the forces have led to businesses being more interested in environmental issues.

As a result, cooperative efforts to protect the environment have increased rapidly.

If we are to achieve an environmentally-sustainable economy, businesses must become an active participant in the effort.

Businesses must lead instead of being pushed.

Many businesses have already taken up this challenge.

Large organizations, such as 3M, have adopted elaborate environmental management programs which are designed to move the companies well beyond simple compliance with environmental laws.

And, some trade associations are beginning to help their membership develop strong pollution prevention programs.

We in government must support these initiatives and help spread them to other industries.

Cooperative environmental efforts are still in their infancy.

As businesses become more sensitive to environmental issues,

As environmental organizations become more comfortable working with business,

And, as we develop clearer national environmental goals,

I believe we will see these cooperative efforts continue to expand.

Increased voluntary compliance is critical in dealing with the huge range of environmental problems we face.

Supporting those businesses that are leaders in their efforts to better protect the environment is an important part of government's obligation.

Part of the support for the leaders in protecting the environment is ensuring that a reasonable fair playing field exists.

Laggards should not be able to gain a competitive advantage by not following environmental laws.

This requires an aggressive and effective enforcement program.

But, this is not easy in the context of rapidly-expanding regulatory programs.

For example, there are 80-100,000 facilities in Minnesota subject to environmental regulation.

In 1985, that number was probably under 20,000.

New programs regulating:

- small quantity hazardous waste generators;
- underground storage tanks;
- problem solid waste such as tires, appliances and batteries
- infectious medical waste;

and the new community right-to-know laws have created a geometric increase in the enforcement workload.

Enforcement resources simply haven't kept pace.

For example, a 1990 Minnesota Legislative Auditor's report noted that a dry cleaning facility might be inspected for hazardous waste compliance once in every 100 to 300 years given current staffing levels.

We must continue to look for better ways to enforce our environmental laws.

And, we must continue to find ways to differentiate between the leaders and the laggards in our enforcement programs to increase the incentives for compliance.

We as a country are beginning to understand the limits of our environment.

We are learning that everything we do has a consequence.

And, that the consequence of neglect over the last several decades is an almost unconscionable debt that will be borne by our children and their children.

It is time for us to begin living on our environmental cash flow, not our environmental credit cards.

As with our own budgets, this will require some hard choices.

We may not be able to afford everything we would like to have.

But, the reward, over time, is an economy that will be environmentally sustainable not just for a few decades but for centuries to come.

This is my vision of our environmental future.

I hope it becomes our "COMMON VISION" of the future.

HOW TO'S: HEALTH AND SAFETY CONCERNS

JUDY ORTTUNG, SUPERVISING ENVIRONMENTAL HEALTH SPECIALIST
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San Bernardino, California

This paper will focus on two separate areas of health and safety concerns:

- protection for employees who routinely handle household hazardous waste and

- general planning and site orientation to prevent accidents.

Basic concerns for employees who routinely handle household hazardous waste include concerns about exposure to chemicals, whether by inhalation, absorption, ingestion or injection. Such exposures could lead to either acute or chronic effects. Additionally, there are concerns that employees may unwittingly mix incompatible chemicals which may cause a cloud of toxic gas, fire or explosion.

REGULATIONS. At the federal level, because HHW is RCRA-exempt, I do not believe that the OSHA Hazwoper Regulations apply. However, I do believe the OSHA chemical right-to-know laws probably do apply. Each state is unique in how these laws are interpreted and enforced, so each program should check with their own state agency to determine the regulations that apply to your program. In general, the OSHA requirements are based on the amount of contact with chemicals. Whether or not compliance with the regulations is required, they do provide an organized and comprehensive approach to planning for safety and health considerations. I strongly recommend reviewing these requirements and using them as a basic framework for developing your program's health and safety protocol.

A basic requirement for a safety program is that it be written. The written program should include

- a medical surveillance program,
- procedures for materials handling,
- training, and
- emergency procedures, including decontamination.

It is important that management set a priority on safety and that each employee be aware of that importance. One way to ensure employee awareness is to include safety as a part of the employee's work performance evaluation. The following discussion describes each of the basic requirements listed above.

WRITTEN HEALTH AND SAFETY PROGRAM. It is essential that the health and safety program be written, that each employee be

given their own copy of the program, and that each employee be fully trained to carry out each of the policies and procedures identified in the program. In developing a written health and safety program, you should identify all potential health and safety hazards, evaluate each hazard identified, and either eliminate the hazard or control it. The written program should include individual sections for each of the topics discussed below as well as provision for regular safety meetings for employees.

Successful safety programs are those that are on-going, systematic, relevant, include practice drills, hands on experience, and both written directions and strong verbal communications. Successful programs include frequent meetings, opportunities to discuss problems, and when available, relevant videos.

MEDICAL SURVEILLANCE PROGRAM. Under OSHA, a medical surveillance program is required for all employees who are

- exposed to chemicals above the PELs (Permissible Exposure Levels) for more than 30 days per year
- wear respirators for more than 30 days per year
- are injured due to overexposure to chemicals
- or are members of an emergency response Hazardous Materials Team.

The medical exams should be performed prior to beginning the job to provide a baseline, either annually or biannually depending on specific levels of exposure, and when the employee leaves a job to provide an exit level. These exams should be performed under the supervision of a licensed physician, without cost to the employee, without loss of pay to the employee, and at a reasonable time and place. The examination should include both a medical and work history with emphasis on symptoms. It should be related to the handling of hazardous substances and be related to the fitness for performing assigned duties. The results of any medical exams or diagnostic tests should be made available to each employee on request. In San Bernardino County, the exam and medical history is performed by the County Occupational Health physician, on County time at a County facility.

There are some "sticky" questions related to screening for fitness to accomplish the necessary tasks. For example, if there are extensive prior medical problems, do you want that person handling chemicals? However how do you screen prior to employment? One possibility is carefully crafted questions during an interview. In San Bernardino County, employment is

conditioned on a medical examination prior to hire. If the occupational health department knows and understands the work assignment prior to the medical exam, it can help you to properly screen potential employees.

MATERIALS HANDLING PROCEDURES. It is important to detail in writing the procedures to be followed for handling each type of waste that may be brought to the site. This should include procedures both for those that you advertise you will accept and those that you will not accept. (Despite your best publicity efforts, these unwanted materials will show up anyway. You must have a contingency plan to deal with them.) The procedures should be described in detail, and reviewed with employees to be sure that they understand both the procedure and the rationale behind it. Develop a checklist of procedures covered and after a training session, have both the supervisor and the employee sign the checklist showing that the procedures were covered and that the employee understands what is required.

TRAINING PROGRAM. There are explicit training requirements written into several federal programs, including OSHA, RCRA, and DOT (Department of Transportation). Whether or not these requirements apply to your program, they offer a comprehensive plan for training and it wouldn't hurt to follow them. The underlying requirement for each of these separate programs is that the training programs be detailed in writing, and that a written record of the classes taken (dates, trainer or institution, topics covered, hours spent, etc.) be maintained. In California we have not seen a formal training program for HHW. As a result we use a standard 40 hour Hazwoper class for employees working at our central facility, and have developed our own training program for the satellite facilities. I should note that hazcatting and bulking of wastes other than oil and antifreeze are done only at our central facility. Employees at the satellite facilities do not open containers except for waste oil and antifreeze.

EMERGENCY RESPONSE. It is important to develop a contingency plan for the possibility of a spill, fire or explosion, even if it is only to evacuate and call 911. This plan should include:

- where employees are to meet if evacuation is necessary
- who is in charge
- activities to be undertaken during and after the emergency (don't forget any reporting requirements your state agencies may have)
- a plan for decontamination, and

- instructions for the public.

If you are counting on other agencies for assistance (fire department, bomb squad, hospital) it is also important to work with them in developing your contingency plan. Don't wait until there is an actual emergency, or it may be too late.

Safety Considerations for Establishing Site (Permanent or one-day)

PLANNING. Consideration of safety concerns during planning is important. When selecting a site, consider

- access, is the ingress and egress from the site safe, or will vehicles be forced to cross heavy traffic?

- space for lines of vehicles, is there enough room for waiting vehicles off the street),

- Is there water on site?

- Is the site paved?

Think about worst case scenarios and identify necessary materials and procedures. Plan to have those materials on hand. Think about routine tasks, as well, and arrange the site layout so as to minimize waste handling. Have dumpsters located where actually needed. Have enough dumpsters so workers are not required to carry packaging wastes any distances. Have adequate carts, drum dollies, and fork lifts if necessary to minimize carrying. Locate an area away from the waste handling for a break area. Be sure to have enough water or soft drinks available. Plan to have your staff or volunteers remove waste from vehicles in order to discourage the public from leaving their vehicles.

EDUCATE AND PREPARE THE PUBLIC. Publicity about your event or collection program should include information about safe packaging, labeling, container size and wastes accepted or excluded. Remind the public that containers should be sound and sealed, or else they should be overpacked in another container. Incompatible materials should not be transported in close proximity. It is best if containers with liquids are packed in boxes containing kitty litter or some other absorbent materials. Remind the public, also, that each container should be properly labeled. If the label is missing, or if the contents do not match the label, ask that the container be marked as to its contents prior to transporting it. Advertise in advance the types of waste that

you will accept or exclude. If you are excluding any waste, offer an alternative or assistance.

PREPARE YOUR STAFF. Train your staff or volunteers to check all containers before moving anything. Is the container leaking? Is the box or bag strong enough to hold the contents? If not, the staff should be prepared to deal with these contingencies, before removing it from the vehicle.

Despite your best efforts, things do happen. Anticipate all eventualities and develop a written contingency plan for someone bringing in explosives, radioactive or infectious waste. Develop a contingency for a vehicle accident, a spill, or a fire.
Contact other agencies for assistance in advance, and let them know of your plans.

The time spent planning will pay off in accidents avoided and knowledgeable professionals performing during crisis.

MANAGING COSTS AT HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTERS

MARTHA BECK
INGHAM COUNTY HEALTH DEPARTMENT
LANSING, MICHIGAN

INTRODUCTION

Anyone that has ever looked at establishing a household hazardous waste (hhw) collection program or currently operates a program will agree that they are expensive to establish, operate and maintain. However, whether your budget is small or unlimited, your collection program permanent, temporary or one day, there are a number of areas in which costs can be controlled and/or reduced. The following discussion will outline some of these methods for managing costs in household hazardous waste collection programs.

FUNDING

Grants

Grants are an excellent source of funding for hhw programs. They vary in award size and can come from any number of agencies. A few of the drawbacks to grants are:

*matching funds often required, sometimes at substantial levels. This may be prohibitive to communities/agencies with minimal financial resources.

*may require commitment to continue the program beyond the completion of the grant.

*grant restrictions may preclude certain activities, such as monies can be applied to disposal only or construction only. Other grants may be product specific, such as a state Department of Agriculture may offer monies for only pesticide collection and disposal.

*may not be available from year-to-year, which could make long term planning difficult. Single occurrence collections also create disposal problems as studies indicate that more hhw is thrown in the trash immediately following a collection due to the increased awareness.

Donations/ Corporate Sponsorships

Corporate sponsorships can provide funding to cover the major budget items of a hhw collection program or may only provide monies to augment existing funding. Often the contributions will come from a variety of businesses and can create a patchwork of substantial funding. Large and small corporations are often willing to financially support these types of programs in exchange for recognition of the contribution. Generally, this acknowledgment is made during the education and publicity portion of the hhw program, ie: mention sponsorship during public service announcements, on educational flyers, etc.

Donations from citizens at the time of material drop-off will not raise substantial funds, but can

augment the budget of any program. The Ingham County Health Department hhw program operates on an appointment basis, with a reminder letter sent after each appointment scheduling. In the letter, the cost per household for the collection is stated and each household is asked to consider making a donation. The donation is completely voluntary and after several years of this approach, it has been determined that the average donation is $10 per household. Reminding citizens of the cost and suggesting a donation allows them to come prepared (prior to this reminder, most folks either did not have cash available or did not appreciate the lack of warning and were unwilling to donate).

Tipping Fees/ Fee on Municipal Services

For those localities fortunate (or not so fortunate, depending on your perspective) to have a landfill and the State or local ability to assess a tipping fee, this can generate enough revenue to fund a permanent, long-term hhw program. The politics of this approach might be difficult, but well worth the effort.

Fees on municipal services, such as trash collection, water/wastewater treatment, etc. could be charged annually or monthly.
Generally, a flat rate per household and a special rate for multi-unit buildings will function well in medium to large cities to support a permanent program. As these services are not provided in rural areas, other sources of funding must be pursued.

User fee (advance disposal fee)

This entails placing a small fee on products which potentially could end up at a hhw collection site. The fee would be collected by the retailers in a manner similar to the deposits some states collect on bottles and cans. The amount of the fee is dependent on your program budget and the types and volume of material sold in the area the hhw service will cover. The user fee could be established on a state-wide, regional or local basis with the authority coming from a variety of regulations.

In mid-Michigan, a regional approach (three neighboring counties) is being explored utilizing the county public health code to provide authority. A regional program would eliminate the retailer concern that consumers would prefer to shop in areas without the fee and would cross county lines to do so. Discussion of a user fee is underway and involves the cooperation of the regional Chamber of Commerce, local retailers and the three county political bodies. It is hoped that some agreement will be reached in late 1993.

EDUCATION

Staff/ volunteers

There are numerous groups and individuals that can provide talks or distribute educational material. Work study students and interns provide inexpensive, often very enthusiastic assistance. Groups such as senior citizens organizations, League of Women Voters, Sierra Club, Girl/ Boy Scouts often have committees devoted to environmental issues and are able to provide time/

energy to create brochures, teach classes, respond to phone inquiries, etc.

Train the trainer

This process of training individuals to teach classes or give presentations is a favorite of the Cooperative Extension Service. Training individuals to talk about chemicals in home products, hhw, or alternative cleaners with the commitment to teach a specified number of hours can provide significant community outreach.

Distribute information where use is the greatest

Placing the information in high traffic areas such as malls or schools is a simple way to get information to the greatest number of people in the shortest time. Booths at malls can be staffed by volunteers or left unattended with a phone number to call.

Use information currently available

Don't reinvent the wheel. Utilize publications developed by EPA or state and local organizations. Many publications are free and can be copied with or without modifications. Permission should be obtained from the authors and credits placed on the reproductions.

PUBLICITY

Public Service announcements

PSA's are free access to the airwaves...use them! Most stations prefer a variety of short announcements from which they can choose. Check with charitable organizations such as the American Lung Association for ideas on length, format and content. The PSA usage will vary with the station, but most will attempt to air it at least once within the time frame requested.

Newspaper articles/ editorials

It is important to establish a relationship with the reporters prior to requesting their assistance in publicizing an event via an article. Provide educational information to bring them up to speed and remember, cup of coffee can go a long way. Editorials and articles after the day of collection may bring a flurry of calls from households that missed the event. Be prepared to respond, perhaps with the date of the next collection.

Bill inserts

For the cost of printing, a large number of households can be reached with bill inserts, providing a utility, municipality or other organizations with mass mailing capabilities is willing to include the inserts with their billings.

Grocery/ municipal trash bag inserts are an excellent way to spread the word, however, the stores and municipalities may prepare enough bags for an entire year, so if a one day event is planned,

this may not be an appropriate method. Generic hhw disposal information could be provided rather that specific dates and locations.

Door to Door

As with the distribution of educational material, publicity information can be distributed by organizations such as the Scouts or environmental organizations with enough volunteers to canvass the affected neighborhoods.

COLLECTIONS

TYPES OF COLLECTIONS

Product specific

With limited funding, a product specific collection might be the best approach. Focusing on paint and paint related products or pesticides would address the two large volume items brought to collection events.

Funding from specific sources might require collection of certain items, such as monies from the Department of Agriculture for pesticide collections. This could be restrictive, but could also be used to augment an existing collection program.

Limit types of products

Limiting the types of products which will be accepted at collection centers provides another mechanism for maintaining a budget. Not taking readily recyclable products such as waste oil and antifreeze, items disposable in the regular trash such as (solidified) latex paint or items for which a separate collection can be developed such as household batteries can go a long way towards reducing disposal costs.

If it is desirable to collect these items, but still remain within the budget, companies such as waste oil haulers or paint companies may donate their disposal costs.

LABOR

Volunteers

Volunteers work well for activities such as answering the phone, directing traffic, providing talks, etc., but due to liability concerns, are generally not utilized in the material handling area. For most collection events (primarily one day collections, not facilities with daily hours), individuals from other organizations, such as the Fire Department or State Department of Natural Resources, with material handling training can provide assistance with product sorting and packing.

Contract

In many situations, contracting with an firm specializing in hhw can minimize liability concerns, provide equipment, staff, educational material, etc. and keep costs down. Of course, any combination of cost saving methods can be required in the contractual agreement.

EQUIPMENT

Borrow

Equipment can be borrowed for single day events from neighboring communities with hhw collection programs, State Department of Natural Resources (or whatever your equivalent may be) or local fire department. The Lansing LEPC/ Fire Department assists at each Ingham County hhw collection event by identifying unknowns using their haz-cat kit, thereby saving considerable dollars. Of course, a permanent facility will want to invest in their own equipment.

Grants/ donations

Some grants are geared to establish permanent or on-going programs and may fund equipment purchases, but not disposal costs. Businesses, individuals, corporations or service/ environmental organizations may prefer to donate equipment such as personal protective equipment (PPE), dumpster use, spill control items, barrels, etc., rather than monies.

Contact

Once again, the hhw contractor can provide all of the required equipment, however, the source of the equipment (ie: donated) can be negotiated in the contract. Some contractors may prefer not to utilized anything but their own equipment for liability reasons.

PRODUCTS

Consolidation

As paint makes up the highest percentage of waste at most collection events, consolidating paint can be the greatest cost saver available. If the consolidation cannot be done on-site, a local company with space and appropriate environmental and employee protection (secondary containment, ventilation, etc.) can be utilized, but requires interim transportation of the waste.

Swaps

A certain percentage of material brought to hhw collection events is still in a useable form. Providing an on-site "swap shop" where folks can take what they need is popular at permanent sites. An alternative for temporary collections is to work with organizations such as greenhouses/ nurseries, women's/ homeless shelters, theater groups, vocational schools, etc., to pick up the products at the conclusion of the collection. Most of these groups will provide lists of items they can utilize.

Reuse

A number of collection programs have established paint recycling programs where the paint is sent to a paint manufacturer for reformulation. The paint is generally a neutral color and not as high a quality as new paint and therefor often used in graffiti covering projects or similar programs.

Recycling

The number of items which can be recycled is limited. Aerosol cans can be emptied and the metal recycled and cardboard boxes can be crushed and recycled, saving dumpster space.

CONCLUSION

Although many of the cost management suggestions may seem small or inconsequential, the sum total of the savings may allow for extra, larger or improved hhw collection program. Many of these suggestions will take time to track down and organize, but the end result can be a great program at a reduced cost.

Conference on Household Hazardous Waste Management
Donna Portner, Minnesota Pollution Control Agency
Thursday, December 10, 1992
Workshop 5-A--How To's

Personnel and Training

Personnel Requirements

The Minnesota Pollution Control Agency (MPCA) operates HHW management programs with groups of counties. The counties are responsible for hiring staff for their programs. Program staff are involved in HHW collection activities, in the education program, or both.

Through its contracts with counties, the MPCA specifies minimum requirements for county staff hired to operate the programs. When hiring, counties are asked to adhere to these requirements when possible. However, the MPCA is flexible with the specifications.

County staff hired for collection activities may do any or all of the following at event collections, permanent facilities, mobile facilities or product exchanges: accept, sort, bulk, package, store or transport HHW. They may also be responsible for recordkeeping and financial responsibilities. Minimum requirements for collection activity staff are:

1. A bachelor's degree in Biological Sciences, Chemistry, Engineering, Geography, Geology, Hydrology, Hydrogeology, Physics, Public or Environmental Health, Toxicology, Soil Science, Environmental Studies, Ecology, or an equivalent field or two years of professional level experience in waste management;

2. Must be capable of performing the program's chosen collection activities (event collections, permanent facilities, mobile facilities, or product exchanges);

3. Must be available to work sufficient hours to ensure that collection activities are conducted in compliance with the contract;

4. Must enroll in the MPCA's medical monitoring program; and

5. Must successfully complete the MPCA's training program.

Collection staff, once hired, must enroll in the MPCA's medical monitoring program if they either work with hazardous materials or wear a respirator on at least thirty separate days per year (or combination of both), even at just one hour per day. The MPCA's program is conducted through the Ramsey Clinic Occupational Health Services in St. Paul, but it is possible for staff to receive their medical monitoring examinations at other clinics which can provide the proper services.

In medical monitoring, a qualified physician periodically screens staff to identify or establish medical effects which result from exposure to occupational hazards. If they detect exposure, the county must modify the staff person's activities.

Medical monitoring consists of physical examinations and certification to wear a respirator. The employee must receive an initial examination before he or she begins working with hazardous materials. The initial examination establishes a baseline medical record for future comparison.

After the initial examination, examinations are required every year or every two years, depending on the number of calendar days that each staff person is exposed to hazardous substances or wears a respirator, regardless of the number of hours of exposure per day. Staff exposed to hazardous substances or who wear a respirator thirty or more days per year must receive an annual medical monitoring examination. Alternatively, staff who are exposed to hazardous substances or wear a respirator thirty days or less per year must receive an examination at least once every two years. As days of exposure or respirator wear increase or decrease, the frequency of examinations is adjusted.

Every collection program needs back-up staff. Back-up staff, like the regular staff, must receive the initial medical monitoring examination for baseline data. How frequently back-up staff must receive examinations is determined the same as for regular staff. If back-up staff are not called upon to handle hazardous waste or to wear a respirator, they need not receive medical monitoring examinations beyond the initial examination.

The medical monitoring program also requires that collection staff be recertified annually to wear a respirator. Annual recertification consists of completing a questionnaire and submitting it to the Occupational Health Clinic for evaluation. The physicians then determine if the employee is healthy enough to wear a respirator, based on the questionnaire and the employee's previous health records. In addition, the staff person must be fit-tested annually on both a half-face and full-face respirator.

Education program staff, like collection staff, must also keep certain records and track education program finances. According to the contract, minimum requirements for education program staff are:

1. Should have successfully completed at least two years of college or have at least two years of experience conducting HHW education, waste reduction, public education, or educational activities;

3. Must be capable of performing the education program activities;

2. Must be available to work sufficient hours per month to fulfill the contract obligations; and

4. Must complete the MPCA's training program.

Training

The MPCA trains program staff for both tangible and intangible reasons. The most obvious tangible reason is that the Occupational Safety and Health Administration (OSHA) requires workers to be trained so that they can do their jobs in a safe and healthful manner. Money is also a tangible reason to train workers. Safety and health training helps avoid, or at least minimize, Workers' Compensation claims caused by injury or exposure to hazardous materials on the job. Training has produced an excellent safety record in this program. Training also helps create self-sufficient staff, making the program more cost- and time-efficient and independent.

Environmental protection and team building are intangible reasons for the MPCA to train program workers, making it a very valuable service to counties in the program. It's tough, if not impossible, to place monetary value on environmental protection. Training has resulted in an excellent record in this area. It also builds confidence in workers and creates or enhances a working relationship between county and MPCA staff.

Collection staff can vary from the program managers themselves to solid waste facility operators. Education program staff can be any of the following: program managers, educators, university extension agents, county solid waste officers or volunteers.

The MPCA both conducts training itself and contracts out some training. MPCA staff train program staff on how to properly conduct collection activities, education program activities and citizen telephone advice. It contracts out 24-Hour Safety and Health Training and First Aid/CPR training.

MPCA staff trains county staff in most aspects of collecting HHW. Collecting HHW involves accepting, sorting, bulking, storing and packaging wastes through a variety of activities. Collection training includes identification of a hazardous waste; collection procedures; acceptable wastes, including guidelines to identify commercial and agricultural wastes; hazardous materials handling and categorization; packaging and storage requirements; and safety procedures. This training is now done individually, usually at the collection facility.

The MPCA is discussing developing a modular, repeatable method of facility operator training to replace the one-on-one method now used. Although training sessions will be held, ideally these training modules can be distributed on videotape to accommodate staff who enter the program between sessions. MPCA staff are also planning an eight-hour refresher safety and health training.

Education program training defines the roles of the MPCA and each county in developing the education plans. It trains staff to identify wastes that are acceptable through the program. Waste reduction through reuse and recycling, alternatives to HHW, safe home treatment methods, and hazardous materials handling are also stressed in this training.

Numerous training sessions on how to use the MPCA's telephone advice guidance manual have been held over the years. The manual is only available to trained individuals.

Two types of training are contracted by the MPCA: 24-hour safety and health training to fulfill OSHA requirements and First Aid/CPR training. Anyone who collects waste must receive the 24-hour safety and health training. The main topics include identification of hazardous materials, respiratory protection, identification of explosives, decontamination, use of protective clothing, occupational health and toxicology, and fire training.

Collection staff must become certified in First Aid and CPR within the first six months of employment. The MPCA also contracts out this training. Initial certification consists of four hours of standard first aid training and four hours of adult CPR. Staff must retain CPR certification every year of employment after initial certification. In addition, staff must receive four hours of First Aid training every three years after initial certification. A 6-year schedule is:

Years 1 and 4: Standard First Aid (4 hours) and CPR (4 hours)
Years 2,3,5,6: Adult CPR (4 hours)

Integrating Household Hazardous Waste Programs into Various Media Offices

Leslie C. Goldsmith
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Managers in HHW programs face a variety of challenges as they work toward successful, efficient management of HHW. The complexity of the issues and institutions involved in HHW management can be truly daunting.

In order to operate a HHW program successfully, the HHW program manager must possess a thorough understanding of environmental management as it is practiced at all levels of government. To accomplish this, it is vital for the HHW manager to establish relationships with a variety of advisors within many disciplines and organizations.

Traditional environmental programs have addressed specific environmental media, such as air, surface water or groundwater. Due to rigid program structures and goals, the focus of a program was not to necessarily to eliminate the pollutant, but to remove it from the program medium. Examples of this are groundwater cleanups that remove pollutants from the groundwater by purging them into the air, or air pollution control devices that collect particulates to be buried in landfills.

A growing regulatory and policy focus on pollution prevention and multimedia assessment is changing this philosophy, but there is still a great deal of isolation in the traditional media programs. These institutional barriers to integrated waste management are often hard to overcome. They are decreasing, but are still common.

Historically, hazardous waste programs have been driven by the need to keep hazardous waste out of landfills. With increasing variety and integration of waste management systems, landfills are no longer the sole concern in many areas. As the operator of a HHW program, one is often at the crossroads of all of the media programs. Depending on the technology and policy in your solid waste and wastewater management programs, the HHW program may directly impact releases to air, surface water or the land.

Increasing cost constraints are forcing HHW program managers to operate programs targeted at materials that pose the greatest hazard. To be successful at this, a HHW program manager needs to develop an understanding of the solid waste and wastewater technologies employed in their service area.

The environmental and safety problems posed by HHW vary, depending significantly on the type of facility that is receiving the waste. For example, solvent-based products are less of a problem at incinerators than they are at landfills; the situation is often reversed for materials containing heavy metals, particularly mercury.

In many states operating or contemplating HHW programs, the fate of HHW is not rigidly regulated. This provides the operator of a HHW program with the opportunity to implement a wide variety of creative recycling, management and treatment strategies. There may be opportunities to redirect waste among existing solid waste and wastewater facilities. By establishing relationships with these operators, it may be possible to encourage them to explore these alternatives with you. While working on the goal of overall pollutant reduction, the program manager must remain constantly aware of all of the systems and operators impacted by their decisions.

Communication is the most important tool in integrated HHW management. It is important that the HHW manager communicate with all potentially affected facilities before dispensing HHW management advice. For example, in communities with a sewer system, the local waste water treatment system operator should be consulted before implementing any advice involving the sewering of HHW. Additionally, the prevalence of septic systems must be well understood before providing advice on sewering.

Another barrier to integration is the way that environmental responsibilities are allocated among and within different levels of government. At the local level, positions are frequently broad and general in their responsibilities; many cities and counties have a position that is addressed simply as "the environmental person." As one moves upward through regional, state or federal structures, positions generally become medium-specific and narrowly focused.

In conclusion, a HHW program manager needs to place a conscious emphasis on broad knowledge and varied relationships to achieve the greatest benefit for their community.

Lake Superior Basin Hazardous Waste Assessment and Awareness Initiative

Ned T. Brooks
Minnesota Pollution Control Agency

The MPCA obtained a grant from the EPA to implement the Lake Superior Basin Hazardous Waste Assessment and Awareness Initiative. The goals of the Initiative were to identify very small quantity hazardous waste generators (VSQGs) and the wastes they produce and raise their awareness of proper waste management. The Lake Superior Basin in Minnesota covers about 6,000 square miles and includes the cities of Duluth, Hibbing, Virginia, Cloquet, Two Harbors and Grand Marais along the north shore of the lake and into the Iron Range. The estimated population of this area is 160,000.

ASSESSMENT PHASE

From March through July, 1992, MPCA staff conducted 877 on-site assessments of all businesses in the Minnesota portion of the Lake Superior Basin that did not have a hazardous waste generator license but were deemed likely to produce waste. The goal of this phase was to identify all generators of hazardous waste the types and amounts of waste they produce and their management practices. Each assessment consisted of a "front office only" visit and not a comprehensive audit.

The assesment process identified 444 businesses and institutions, mostly very small quantity generators (conditionally exempt), that had previously been unaware of their responsibilities as generators and had not registered with the State or the EPA. An additional 167 generators had EPA ID #s but were not registered with the State. The 611 generators identified through the project represent 54% of the known 1,141 VSQGs in the Lake Superior Basin.

The most common VSQGs identified include vehicle repair, printing/photagraphy, auto body, medical/dental and government.

On the average, each VSQG visited during the assessment project generated 1,280 pounds (about 130 gallons) of hazardous waste in 1991 (not including used oil or lead-acid batteries). Excluding antifreeze, oil filters and all other types of batteries each newly identified generator produced about 900 pounds (about 90 gallons) of hazardous waste in 1991. The top five types of waste produced include photo processing chemicals, partswasher solvents, paints and thinners, sludges and toxic metals.

360 or 35% of the 611 newly identified generators were found to be mismanaging their waste in some way including over accumulation, evaporation, disposal in solid waste stream or down the drain, burning or disposal on the ground. In Total about 40 tons of hazardous waste was mismanaged by this group of generators in 1991. Excluding mismanagement of oil filters the nuber of generators practicing improper management drops to 212.

Summary:

877 Assessments Conducted

611 Newly Identified Generators (54% of Total Known)

(444 Not registered with MPCA, No ID#)
(167 Not Registered with MPCA, Had ID #s)

530 Known VSQGs Before Assessments (46% of Total Known)

1,141 Total Known VSQGs After Assessments

1,280 Lbs. or 130 Gals. Average Waste Amount in '91 (not incl used oil)

360 generators mismanaging 40 tons of hazardous waste

AWARENESS PHASE

In mid-July, 1992, the MPCA also initiated an intensive, three month long campaign to raise awareness among hazardous waste generators and the general public. The campaign featured radio and newspaper advertising direct mailings and informational meetings for VSQGs. The Newpaper and radio ads featured spotligts of three small business owners and their attitudes about managing hazardous waste. The MPCA produced a newsletter and a brochure targeted at the small business hazardous waste generators in the basin. The MPCA is also experimenting with additional targeted reduction and compliance assistance outreach to the generators involving trade groups, chambers of commerce and local officials.

For more information and a copy of the project report contact Darren Saari at 218-723-2356.

1993 INITIATIVE

The MPCA, with funding from the EPA, intends to continue and expand certain components of this initiative in 1993. This will include additional targeted outreach, workshops for specific industry groups, compliance assistance site visits and pollution prevention demonstration projects. For more information contact Ned Brooks at 612-297-8498.

Collection Program Case Studies: Anchorage

Bill Kryger and Tom Poliquin

(as presented in the "Third Annual Report on the Operatiuon of the Anchorage Hazardous Waste Collection Facility)

I INTRODUCTION:

A true measure of the success of a program is whether it can be operated and maintained to accomplish the goals set for it. This report documents the results of the past three full years of operation of the Anchorage Hazardous Waste Collection Program.

The Anchorage Hazardous Waste Collection Program is comprised of the three following entities. The Eagle River Facility (ERF) located at the Ancorage Regional Landfill (ARL), the Central Transfer Station facility and the Pick Up Service. All program facilities are owned by the Municipality of Anchorage and are currently operated by Northwest EnviroService, Inc.

The program was designed in an effort to offer an environmentally sound disposal method for the hazardous wastes that might otherwise be disposed of in Anchorage sewers, the Anchorage Regional Landfill (ARL) or indiscriminately dumped on public and private property. The program's operating costs are borne by user fees generated by the Anchorage Waste Water Utility and the Solid Waste Disposal Utility. Additional disposal fees are charged to Conditionally Exempt Small Quantity Generators (CESQG) based upon the type of wastes and quantities received. Households are charged $5 for each visit to the ARL which can include a delivery up to 40 pounds of hazardous waste at the facility.

The ERF is located at the ARL on Hiland Road, 13 miles north of Anchorage on the Glenn Highway. There is also a vital satellite collection center at the Anchorage Central Transfer Station (CTS) located at 54th Avenue and Juneau Street near midtown Anchorage.

The operation of both collection centers began February 15th, 1989. In the first year of operation 30,983 items were collected amounting to a weight of 415,425 pounds. During the second year 46,167 items were collected amounting to a weight of 597,472 pounds. During the third year 52,236 items were collected amounting to a weight of 875,616 pounds. This activity has been 1.49 times as many items with 1.44 times more weight in Year II than in the Year I. The third year activity was 1.13 times as many items with 1.47 times more weight in Year III than in Year II resulting in a cumulative total at the end of the Year III of 129,386 items and 1,888,513 pounds.

II ERF DESCRIPTION:

The ERF is a pre-engineered insulated metal building with sealed concrete floors, heating, ventilation and alarm systems. The layout of the facility is shown in Figure 1.

In total, the ERF covers nearly 6,000 square feet with half of the space being primarily for storage of drummed wastes in rooms 101, 102, 103, 114, and 115. Greater weight throughputs were experienced in Year II and Year III by 44% and 47% respectively over Year I. This resulted in the doubling of the shipping frequency in both of these years.

The limits of storage capacity in Year III were maximized while maintaining consistent manpower levels. Operational schedule changes and/or additional personnel will most likely be required to meet continued increasing volume activity after beginning Year IV.

The "heart" of the ERF continues to be the "Consolidation Room" (Room 104). The consolidation room houses a maximum of 32 drums in various stages of consolidation. Approximately one half of these drums are for the purpose of creating "Lab Packs" of various hazard class groups. The other half are for consolidation of a variety of liquid wastes. By closely following established operating procedures, the ventilation in the consolidation room continues to be adequate.

"Oxidizers" and "Water Reactives" are stored away from other chemicals in a pair of explosion vented closets adjacent to room 101. These two closets are the only rooms in the entire facility that are devoid of sprinkler coverage and protection.

The "Laboratory", adjacent to the office, continues to be extremely useful for rapid testing of unknowns and preparing samples for further testing at commercial laboratories. Tests performed include the following.

1- PH
2- Flash Point
3- Specific Gravity
4- Halogen Contamination
5- Cyanide Contamination
6- Chemical Compatibility
7- Miscibility

Data management is provided by a computer system specifically developed for this project. Data management begins with a serial number being assigned to each incoming item. The physical and chemical characteristics of each item is then recorded individually. At any point during this process, the data management program can publish the disposition of any item and the contents of each drum. It is becoming apparent however, that this system will need updating for streamlining and efficiency as the annual quantities continue to increase.

The heating plant is capable of producing 1,000,000 BTU's/hr and can adequately keep the ERF comfortably warm providing that the ambient outside temperature is not less than minus 15 degrees Fahrenheit. On colder days the ventilation rate is reduced.

III STAFFING:

A. Personnel Selection

The full time operational staff at the facility and transfer station consists of five people in addition to a part-time chemist. The staff consists of locally hired persons that are carefully screened. Among the characteristics sought are environmental knowledge, health and safety awareness and a desire to succeed within this trade. Communication skills are also required.

Academic training beyond high school, although not required, is desirable. The chemist position requires a college degree in chemistry as a minimum.

B. Training

All hazardous waste technicians at the facility have completed the following training and hold appropriate certificates.

1- 40 Hour OSHA Hazwoper Training
2- 8 Hour OSHA Hazwoper Annual Refresher
3- First Aid Training Course Approved By American Red Cross
4- CPR Training Course Approved By American Red Cross
5- 8 Hour New Employee Indoctrination
6- 20 Hour Training Course on Household Hazardous Wastes
7- 8 Hour Basic Chemistry on Household Hazardous Wastes
8- 8 Hour Fork Lift Training
9- Weekly Safety Meetings

C. Anticipated Training

Training for Year IV will be concentrated into a series of weekly safety meetings. These meetings are structured and documented to constitute formal training time. Technicians will also routinely attend seminars dealing with regulatory changes within all applicable federal, state and municipal agencies. Hazardous Material supervisory training will continue to be made available to at least two technicians. OSHA 8-Hour Hazwoper refresher courses will be attended by all technicians requiring these annual certificated classes. Technicians will also be required to attend classes and secure a commercial drivers license (CDL) with appropriate endorsements.

IV WASTES RECEIVED:

A. By Hazard Class

All wastes received fit into one of sixteen hazard classes as listed in Table 1. The hazard class characterization is essential for segregation, safe handling, storage and shipping. Each individual item received is either identified by hazard class, or sent to the lab for identification and characterization by a chemist.

Table 2 lists the quantities of wastes received during these past three years of operation. The unusually high fraction of automobile service batteries is a regional characteristic that diminishes some of the other percentages.

The "Other" category is primarily latex paints. Although latex paint is permitted as a landfill item in Alaska, it is stabilized into a solid impermeable form before landfilling in Anchorage. The proprietary process developed by Northwest EnviroService, Inc. has passed all TCLP testing for mercury. Two additional categories, "Waste Oil" and "Latex", will be maintained in year four to help distinguish these individual quantities.

B. By Generator Category

In addition to household hazardous wastes, commercial wastes are accepted from Conditionally Exempt Small Quantity Generators (CESQG) at the ERF hazardous waste collection facility. The Central Transfer Station operation accepts only household hazardous wastes.

CESQG's remain qualified in the exempt category if they generate no more than 220 pounds of hazardous wastes per month and have accumulated no more than 2,200 pounds of these wastes. Several generators become CESQG's after shedding inventories of wastes through commercial channels and incorporating waste minimization efforts. An additional 43% increase in CESQG's utilizing the facility during Year III is apparent. This will continue to increase as the business community realizes that there is an approved outlet for their wastes. Caution must be exercised here however, to maintain the CESQG regulatory exemption and to insure that the waste origin meets the criteria of the exempt generators. A signed form is used to certify that generators qualify as CESQG's and as householders.

Figures 2a, 2b, 2c and 2d are comparisons of the number of generators that are certified as Households, Orphans and CESQG's. An Orphan waste is one that has been abandoned by the generator and are mostly found at the Central Transfer Station since this station was only manned on Saturdays. Please note that there was growth in participation by CESQGS growing from 11% in Year I to 15% in Year II and 16% in Year III.

Figures 3a, 3b, 3c and 3d display the total amounts of wastes collected from these three generator groups during Year I, Year II and Year III. Note that during Year III that the battery category increased by 10% while Households and CESGQs decreased by 4% and 7% respectively.

The average lot size from household/orphans is 106 pounds and from CESQG's is 971.6 pounds. Specifically antifreeze, batteries and motor oil are included in the above quantities but they are not included in the 220 pound per month weight limit to qualify as a CESQG. Most individual CESQG's do not deliver waste each month however repeat CESQG customers continue to rise.

A pick up service continues to be offered to assist with motivation of less mobile householders and CESQG's. A pickup service charge of $10 and $25 is added to disposal fees for householders and CESQG's respectively. It should be noted that the frequency at which CESQG's are currently utilizing this service is rising rapidly. An increase in the service charge for CESQG's should be considered to a more realistic figure to defray the actual costs associated with providing this service. Pickups are scheduled to best fit into the facility operational requirements while keeping with the spirit of fast, efficient service to the general public.

C. Seasonal Variations

A major question in planning the operational schedule is whether to expect a continued collection rate throughout the winter months. Figure 4 displays the monthly number of users which appeared during Years I - II - III. Figure 5 displays the monthly waste quantities collected during Years I - II - III.

From data collected it is clear that post-summer activities continue to increase and that a year round facility will collect much more hazardous wastes than an annual one day or annual one week waste collection event. For example, every May Anchorage holds its annual "Spring Cleanup Free Week". Throughout these eight day periods householders deposit their trash and their hazardous wastes at the CTS and the facility at the ARL. These periods cause obvious increases in the monthly activity.

The amounts of wastes obtained during the May 1991 event represented 7,500 items and approximately 6% to 10% of the total pounds collected during the year.

The slower winter months permit more time being devoted to analysis of unknowns, inventory, shipment, procedural improvements, training, facility and vehicle maintenance. The 478 drum storage capacity of the facility is a key element to absorbing peak generation periods while profiling the inventory for shipment to a treatment or disposal site. Efforts are made to ship the oldest drums first in a timely fashion. In so doing the strain on the limited storage space is minimized.

D. Income Received From Generators

The $5 household visitation fee levied, by the Municipality of Anchorage, to gain access to the CTS or the ARL allow for the deposit of 40 pounds of hazardous wastes as a function of that visit. We have recognized an increase in amounts over this 40 pound hazardous waste "free limit" per visit by some households. These homeowners are charged the same rates as CESQG's for that portion of their hazardous wastes over the free limit. To date they appear to be happy to assume this extra charge for this service. CESQG's are charged per the disposal rate schedule listed in Table 4. Trends during Year III suggest that CESQG's continue to regard this disposal program with more support as the number of new CESQG's increases while others enjoy repetitive service.

Revenue attributed to households and CESQG's, although the combined total contributes to only about 9% of the total operating costs, does serve a function to encourage segregation of the hazardous waste component from the non-hazardous articles. The fees are also consistent with the philosophy of applying user fees for recognized services rendered.

V PHYSICAL AND CHEMICAL METHODS USED:

A. Consolidation Of Wastes

Household and CESQG hazardous wastes come in thousands of forms, containers and compositions. Observation of wastes from Anchorage over the past seven years has revealed a definable number of waste groupings. Some of the waste groups can be consolidated without reactions.

Typical of such a waste grouping is ammonia solutions from blueprint machines. Such solutions arrive at the facility in bottles and thin plastic jugs with and without serviceable caps or closure devices. The ammonia solutions are consolidated at the facility into a DOT approved shipping container. Similarly, formaldehyde, gasoline, antifreeze, and approximately 10 other chemical groups, are also consolidated into DOT approved shipping containers.

Groups of chemical wastes to be consolidated are cleared in advance with the ultimate disposal facility. Clearance is provided in the form of an approved waste profile sheet. The chemical groupings are also reviewed as a part of the documentation of a Health and Safety Plan.

Consolidation of wastes from assorted containers represents the greatest opportunity for volume reduction but also presents potential risks. Management review of adherence to the Operational Plan and the Health and Safety Plan is performed on each drum of consolidated wastes. Frequently 150 to 200 items have been entered in a single drum. Generally 16 drums are involved in the process of liquid consolidation at any given point in time.

B. Segregation Of Wastes

With chemicals for which a consolidation opportunity is not present an opposite process is used, namely segregation. Segregated wastes normally remain in their individual containers and are placed in approved DOT drums along with similar chemicals. This form of packaging is referred to as a "Lab Pack". The chemicals allowed in each lab pack are of the same DOT hazard class. They are also chemically compatible with each other and with the absorbent packing material as well.

There are usually 16 lab packs in a progressive state of being assembled and another 16 drums in which liquids are consolidated at the facility. Management review of the segregation accomplished by each drum lot is performed before each drum is shipped using a computer derived printout.

A typical list is presented in Figure 6. Such lab pack lists are automatically retrieved from the data management program on all items handled at the facility.

C. Waste Analysis And Preparation For Shipment

At times chemicals and mixtures of chemicals are received that cannot be legally or safely shipped. Explosive, shock sensitive and most reactive materials are released to the Anchorage Bomb Squad for disposal.

U.S. Coast Guard regulations require that corrosives and flammables be shipped in separate containers. Wastes are occasionally encountered that exhibit both of these characteristics. When situations like this present themselves the corrosive characteristic is neutralized at the facility prior to shipment. Other wastes occasionally require decanting to separate a flammable component from corrosives.

A chemical laboratory at the facility is used to measure waste characteristics and to test compatibility prior to consolidation. The laboratory is also used for preparation of samples for off site analyses.

VI WASTEWATER TREATMENT

Wastewater from the facility is collected in a 6,000 gallon underground holding tank. Only the toilet is connected to the septic tank and drain field.

Water in the underground holding tank is pumped with a vacuum truck for delivery to the local sewage treatment plant. The waste water is tested, prior to pumping, to determine conformation with sewage discharge limits. Treatment of the wastewater in the tank is required in those events when the wastewater fails to conform to discharge standards.

VII WASTES SHIPPED

A. Destinations

All hazardous wastes collected at the facility are shipped first to Northwest EnviroService Treatment, Storage and Disposal Facility (TSDF) in Seattle, Washington. At this TSDF acids, alkalis, oxidizers and water reactives are treated. Flammable liquids are placed into an energy recovery program. Poison lab packs are transhipped from the TSDF to an EPA approved Class I landfill in either Oregon or Idaho. PCB items are also transhipped to either of these landfills or forwarded on to Coffeyville, Kansas depending on the PCB concentration. The Kansas site has an EPA approved incinerator for destruction of PCB liquids. Aerosol pesticides and halogens have been shipped to either Texas or Arkansas for destruction in EPA approved incinerators.

B. Treatment Methods

There are nearly an infinite number of chemicals received at the facility requiring over a dozen treatment methods. Certificates of treatment are issued by Northwest Enviroservice TSDF after the wastes are received and treated. The treatment methods described on the certificates are designated by a code number. Treatments represented by each number are listed below.

S01	Drum Storage	T06	Liquid Injection Incinerator
T07	Rotary Kiln Incinerator	T21	Chemical Fixation
T22	Chemical Oxidation	T23	Chemical Precipitation
T24	Chemical Reduction	T25	Chlorination
T27	Cyanide Destruction	T28	Degradation
T29	Detoxification	T31	Neutralization
T35	Centrifugation	T36	Clarification
T38	Decanting	T40	Filtration
T41	Flocculation	T44	Sedimentation
T45	Thickening	T46	Ultrafiltration
T63	Solvent Recovery	T64	Stripping
D81	Landfill		

C. Recycle

There are two primary waste streams that are managed for recycling. They include scrap batteries and waste motor oil.

Presently scrap batteries are forwarded to a battery recycler in Anchorage for reclamation at an approved EPA smelter located in Los Angeles, California.

Waste motor oil is currently shipped to an energy recovery facility in Fairbanks.

Attempts to recycle aerosols, antifreeze, sulfuric acid, chlorinated solvents, mercury and silver previously have failed partly due to the small volume and also due to the lack of local interest.

VIII ANNUAL REPORTING TO THE STATE OF ALASKA

The State of Alaska requires reporting of hazardous waste activity similar to that required by the U.S. EPA. The period covered by the attached reports, Figures 7 and 8, is from January 1 to December 31, 1991.

The quantity generated was reported as 922,264 pounds for the calendar year of 1991. The source reduction quantity was listed as 50,557 pounds which was from separation and filtration of rainwater which had been received with the waste oil, the shipment of scrap auto service batteries and the stabilization of latex paints.

Few other waste minimization activities seem to be available. Recycling and waste minimization opportunities will continue to be sought.

IX BUDGET SUMMARY:

Operating costs for Year I, Year II and Year III for the facility are presented in Table 3. The operation of this program, which serves householders and CESQG's, is not a profitable operation when measured by revenue generated from its users. The value of the program obviously requires justification based upon its ability to keep hazardous wastes out of municipal facilities, such as the regional landfill and the waste water treatment plant, and the Municipality as a whole.

TABLE 1 HAZARD CLASS CHOICES FOR DATA LOGGING AND PACKAGING

1-	Flammable Liquid	9-	Non-Flammable Gas
2-	Flammable Solid	10-	ORM-E
3-	Combustible Liquid	11-	ORM-D
4-	Corrosive Material	12-	ORM-C
5-	Poison B	13-	ORM-B
6-	Organic Peroxide	14-	ORM-A
7-	Oxidizer	15-	Non-Hazardous
8-	Flammable Gas	16-	Unknown

TABLE 2 QUANTITIES RECEIVED AT ANCHORAGE FACILITY

	ITEMS			POUNDS		
	YR-I	YR-II	YR-III	YR-I	YR-II	YR-III
Flammables/ Combustibles	16,087	20,778	24,937	202,928	236,802	307,118
Corrosives	5,596	7,404	4,252	27,434	38,875	38,925
Poisons/ORMs	3,468	3,674	3,666	36,509	72,899	85,950
Oxidizers	89	128	79	643	476	179
Reactives	2	3	13	180	2	4
Car Batteries	3,204	5,096	8,900	115,344	181,320	352,000
Others	2,537	9,084	10,389	32,387	67,098	91,440
TOTAL	30,983	46,167	52,236	415,425	597,472	875,616

TABLE 3 OPERATING COSTS

	YEAR I	YEAR II	YEAR III
Training	2,925.00	-----	3,000.00
Marketing	14,315.84	25,895.37	6,000.00
Analytical	17,565.00	14,975.00	8,460.00
Transportation	28,119.00	53,430.00	50,245.00
Drums	37,084.00	49,830.00	55,190.00
Insurance	52,376.00	39,860.00	50,000.00
Disposal	123,681.00	265,867.50	216,871.00
Labor	465,084.00	470,914.20	539,041.00
TOTAL	*$741,149.84	**$920,772.07	***$928,807.00

* Year I total includes the period from 2/14/89 to 2/14/90.
** Year II total includes the period from 2/15/90 to 2/14/91.
*** Year III total includes the period from 2/15/91 to 2/29/92.

TABLE 4

ANCHORAGE HAZARDOUS WASTE COLLECTION FACILITY PRICE SHEET FOR CONDITIONALLY EXEMPT SMALL QUANTITY GENERATORS

TYPICAL CONTENTS	PRICE
PAINT	
Paint	$.50/lb
Varnish	$.50/lb
Sealers	$.50/lb
Adhesives	$.50/lb
Epoxy Resin	$.50/lb
Aerosol Paint	$.50/lb
NON-CHLORINATED SOLVENTS	
Solvents	$.50/lb
Thinners	$.50/lb
Xylene	$.50/lb
Toluene	$.50/lb
Methyl Ethyl Ketone	$.50/lb
Alcohols	$.50/lb
Car Polish	$.50/lb
Furniture Polish	$.50/lb
Copper Napthalene	$.50/lb
Formaldehyde	$.50/lb
CORROSIVE	
Sulfuric Acid	$.50/lb
Hydrochloric Acid	$.50/lb
Nitric Acid	$.50/lb
Acetic Acid	$.50/lb
Alkaline Liquids (Soaps)	$.50/lb
Ammonia	$.50/lb
Oven Cleaners	$.50/lb
GASOLINE	
Gasoline	$.50/lb
Blazo	$.50/lb
White Gas	$.50/lb
JP4	$.50/lb
Gas/Diesel/Mixture	$.50/lb
Gasoline Contaminated Oil	$.50/lb
CHLORINATED SOLVENTS	
Spot Removers	$1.00/lb
Paint Strippers	$1.00/lb
Methylene Chloride	$1.00/lb
Trichloroethane	$1.00/lb
Carbon Tetrachloride	$1.00/lb
Perchloroethylene and Still Bottoms	$1.00/lb
BATTERIES	
Lead Acid	$5.00/ea
Ni-Cad/Silver/Mercury	$0.50/lb
Wet Alkaline	$0.50/lb
Dry Cells	$0.50/lb
PCBs	
PCB Solid	$1.00/lb
PCB Liquid	$1.00/lb

TYPICAL CONTENTS	PRICE
OXIDIZERS	
Organic Peroxide	$1.00/lb
Hydrogen Peroxide	$1.00/lb
Nitrites	$1.00/lb
Nitrates	$1.00/lb
Iodine	$1.00/lb
Bromine	$1.00/lb
Chlorine	$1.00/lb
UNKNOWNS	
Unknown	$1.00/lb
POISONS	
Pesticides	$1.00/lb
Herbicides	$1.00/lb
Insecticides	$1.00/lb
Fertilizers	$1.00/lb
MOTOR OIL	
Motor Oil	$.70/gal
Linseed Oil	$.70/gal
Tung Oil	$.70/gal
Transmission Oil	$.70/gal
Neatsfoot Oil	$.70/gal
Hydraulic Oil	$.70/gal
DIESEL	
Diesel/Dirty Diesel	$.70/gal
Kerosene	$.70/gal
Fuel Oils	$.70/gal
ANTIFREEZE	
Antifreeze	$.70/gal
Ethylene Glycol	$.70/gal
ORM	
Grease	$.25/lb
API Sludge	$.25/lb
Asphaltic Compounds	$.25/lb
Moth Balls	$.25/lb
Oil Contaminated Soil	$.25/lb
NON HAZARDOUS	
Photo Chemicals	$1.00/gal
Latex Paint	$0.05/lb
Car Wax	$0.05/lb
Caulking Compounds	$0.05/lb
Fertilizer	$0.05/lb
ALL OTHERS	
Others	$1.00/lb

LAYOUT OF ANCHORAGE HOUSEHOLD HAZARDOUS WASTE COLLECTION FACILITY

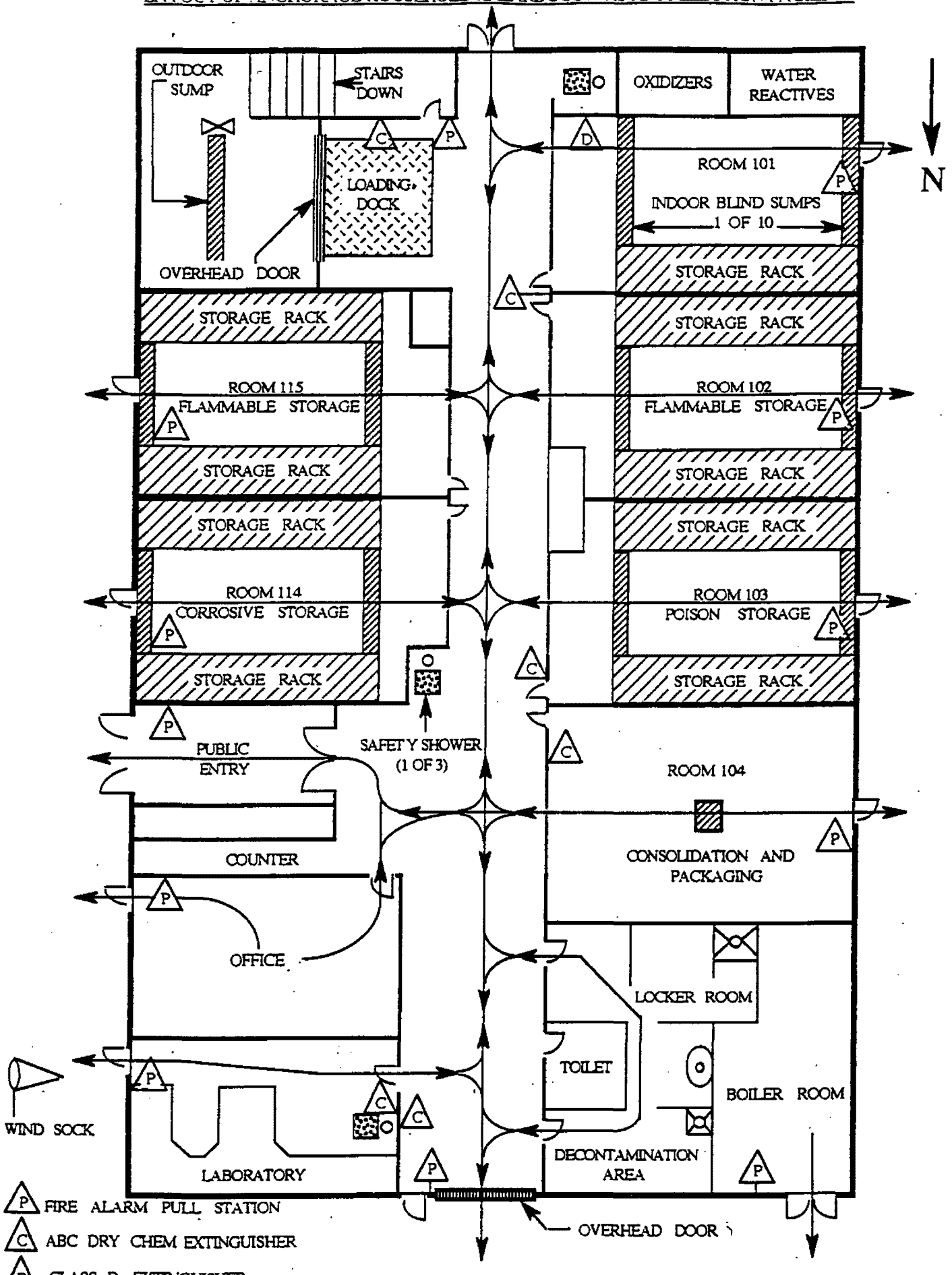

Figure 1

If We Pay, Will They Come?: A 1-Day Collection for Schools & Businesses

Jan Ameen

Recycling Coordinator/Windham Solid Waste District, Vermont

Background

In 1987, the State of Vermont passed solid waste management legislation in the form of Act 78. Regional Solid Waste Management Districts were formed in order to accomplish the integrated waste management goals of Act 78. There are currently ten districts and two planning commissions providing options for recycling, composting, hazardous waste collection, and trash disposal.

The Windham Solid Waste Management District was formed in 1988 and was originally comprised of eight towns in southeastern Vermont. Currently, there are fifteen towns in the District, with a population base of approximately 30,000. As members, each town has access to a District-owned landfill, eighteen recycling drop-offs (igloo system), a 40 ton per day MRF, composting technical assistance and demonstration site, and an annual HHW Day. The District's operating budget for fiscal year 1993 is 2.1 million dollars.

The District's provisional certification for operating the landfill requires sorting every load of trash and removing hazardous waste, especially ESQG waste. If hazardous waste is found, it is removed from the trash and stored until the annual collection is held.

The Idea

The idea to hold a non-residential hazardous waste collection was based upon the belief that there were unused state grants available to the District. Looking at places that fall through the cracks of hazardous waste collection, schools stood out. High school labs are usually notorious for storing highly toxic chemicals. During the school year, children spend almost half their day in school, yet most schools cannot afford to pay the disposal costs for the hazardous waste filling the cabinets.

After an initial plan was designed to contact the schools and obtain inventories of their hazardous waste, the District found out that the grant money didn't really exist. Without a source of funding, the idea was put on hold.

During budget preparations, I discussed the concept of a school collection with the District Finance Manager. We decided to request in the budget monies for a school collection and an ESQG collection. My original request for $ 10,000 for such an event was doubled to $ 20,000. The budget passed with the $ 20,000 intact; $ 10,000 for schools and $ 10,000 for the commercial sector. Monies would be available as of July 1, 1992 and would pay for all costs of the collection.

Why pay for ESQG waste? Many managers believe that business should pay for their own hazardous waste. To some degree, that's true. However, ESQG's in southeastern Vermont are: self-employed, have only a few employees, and/or are not making a profit. There is a fairly large artist community, including painters, sculptors, and photographers whom are unable to afford disposal costs for their very small amount of hazardous waste. Also, a typical scenario for ESQG's is to save their waste until they have a 55-gallon drum, as it's cheaper than small amounts. Yet, when they have a full 55-gallon drum, they might not have the $ 400 plus necessary to have it removed. Finally, another Vermont District organized an ESQG collection but asked the business to pay for the disposal. Although ten businesses registered for the event, only three actually showed and paid. We thought that if we paid, they would come, and getting them to dispose of their waste properly was the utmost goal.

The program was designed so that schools had the first opportunity to register, then ESQG's would be contacted. The District would pay for as many ESQG's as possible with the allocated funds. The money would be distributed on a first come, first served basis (pre-registration was required for ESQG's.) If there were more ESQG's registered than funds could accommodate, those not eligible for funds could choose to pay for the disposal of their waste. This meant that

they could take advantage of the hazardous waste hauler being on site and pay a reduced cost per gallon, as the material was being bulked on site.

Schools

In May, I contacted the superintendents of each public school supervisory union and informed them of the free collection. A follow-up letter was sent to each superintendent requesting that they pass the information on to each school in District-towns. (Some schools in each supervisory union are in non-District towns and were not eligible.) Realizing that this was an incredible offer and not having gotten one response, I again called the superintendents and requested a contact and phone number at each school. This direct route proved much more effective.

Responses from the principals ranged from a defiant "We don't have any hazardous waste in our school" to "We just cleaned out our lab last year and paid $ 6,000 to do it" to "We'll be there!". The "We don't have any" responses were provided with a list of places to look and words to look for that might yield some hazardous waste. The "We'll be there" responses were asked to send a complete inventory of type and quantity of any waste they intended to bring to the collection. The original date was expected to coincide with the District annual HHW Day in August. Realizing the difficulty of getting it all together in two months and keeping in touch with schools over the summer months, the date was moved to late fall. Moving the date meant that some money would be lost to a set-up fee. However, it was decided that running a smooth event and covering all of the bases was more important than saving the set-up fee by holding two collections on the same day.

In September, all of the schools which had not sent in inventories were contacted again. At this time, private schools were added to the list to contact. It's common for public entities to exclude "private" anything. However, the reality that kids shouldn't be exposed to hazardous waste, period, regardless of which school they attend, resulted in the inclusion of private schools. Of the seven schools which participated, three were private. One of the privates' inventory was five pages long, included radioactive materials, and listed chemicals that were from the 1930's. There was enough waste from that school to fill a mini-bus! It they had not been included in our collection, sixty years worth of hazardous waste would possibly have turned into seventy years worth.

The schools' inventories were sent to our contracted hazardous waste hauler, Laidlaw, for a price estimate. Laidlaw also identified items that were not acceptable, such as the radioactive materials, as well as direct ship items, such as reactive metals. The initial estimate was just under $ 10,000 but only included the four schools that had responded to the initial inquiry in May. Yet another mailing was sent to each school principal. Three additional schools replied, all with small quantities of waste, primarily paints and cleaners. It was decided to go over the $ 10,000 allocated for schools in order to accommodate these additional schools with very small quantities.

After seeing some of the inventories, I realized that there was some rather hazardous materials going to be transported. In Vermont, ESQG's can transport their waste to a collection site so I didn't need to be concerned with DOT regulations. However, it was unclear who exactly would be packing the chemicals in the vehicle. For that reason, each school received a memo on transportation safety. Included in the memo was a list of unacceptable items (radioactive), and a scheduled time for their school. A school was scheduled every fifteen minutes, with the closest towns first and alternating large and small quantities of waste. For the most part this worked well, except for one school that was thirty minutes early "just in case...". Another school took the safety issue rather seriously and hired a local firefighter, complete with suit, air tank, and a few extinguishers, to follow his vehicle on the twenty mile ride!

ESQG's

The most difficult aspect of organizing the ESQG half of the collection (held on the same day as the schools) was identifying them and getting the word out. I decided not to do a huge article in the newspaper as I imagined a hundred households showing up with their mothballs and silver polish. Instead, I used a list of employers in Windham County. With a little "flip of a coin" science, I whittled the list down to approximately 650 businesses. Excluded were medical and veterinary practices, insurance companies, religious entities, various membership organizations, etc. The re-

maining companies received a mailing alerting them to the collection and indicating that pre-registration was required. Unfortunately, the time frame was very tight, giving folks less than two weeks to respond. The direct mail announcement was supplemented with a short radio interview and a brief press release for the newspaper. This was an attempt to reach employers who were missed and self-employed individuals, especially local artists.

Pre-registration is a standard feature of the District's hazardous waste collections. It allows us to preview registrants, types, and quantities of waste being brought into the event. First, the District needed to be very careful so as not to take waste from a regulated generator. To do this, all registrants were checked against a listing of generators from the State's Hazardous Materials Division. This safeguard worked in one instance, when a large generator wanted us to take oil-contaminated soil. He was surprised when I responded that he was ineligible for the event as a regulated generator. He insisted that his company was a small quantity generator until I mentioned that I had an EPA document, obtained from the State through the Freedom of Information Act, listing his permanent EPA I.D. number and his status as a large generator. I didn't hear from him again.

The pre-registration also allowed us to keep a running price quote in order to stay within the $ 20,000 total budget for schools and businesses. The money was allocated on a first come, first served basis. Once it was used, businesses could take advantage of the hauler's presence and pay only for the disposal cost. This was not necessary as all twenty-three businesses that pre-registered had quantities that were paid for by the District.

ESQG's that registered all received safety instructions similar to the schools, as well as a scheduled time. Two businesses were scheduled every five minutes. Again, some folks came 30-45 minutes early, "just in case we filled up"! However, the scheduling worked in preventing a line and allowing the hazardous waste contractor to process (bulk) the material as it came in to the site.

The Day

The schools and ESQG collection day was held on Saturday, November 7, 1992, just over six months after the idea was conceived. The site the District used was a local middle school. Not only was it appropriate to have it at a school, but it was one of the few public locations with asphalt, a requirement for our hazardous waste events. The school is also one block from the local rescue department, in case of a medical emergency. (The Fire Department was notified of the event prior to its occurrence.)

Of the seven schools which registered, five are high-schools and two are grade schools. Some of the most expensive disposal costs were associated with the school waste. All of the "direct ship" waste originated from the schools, including biological waste, reactive metals, and organic peroxides. The schools brought in roughly 800 gallons of hazardous waste.

Every ESQG that had registered, showed up at the collection. As they checked-in, each vehicle received a handbook on ESQG hazardous waste management produced by the State and were informed about technical assistance from the District and the State. Some ESQG participants came with quantities that appeared to exceed the registered amount. One painting company registered for 100 gallons of oil paint and appeared with almost twice that, mostly in one-gallon cans! (The paint had frozen.) At least three registrants brought their waste in 55-gallon drums. The ESQG's brought in roughly 1200 gallons of hazardous waste.

The Future

It is obvious that the program was a success, even though it only served thirty schools and businesses. Monies for another event in 1993 will be requested. Further, the District plans to build a permanent hazardous waste facility, to be operational in October 1994. The permanent facility will accept hazardous waste from both households and exempt small quantity generators.

Also part of the future plan is to expand the educational component of the District's hazardous waste program. This will include printed material for households and ESQG's, as well as workshops for ESQG's on reduction, reuse, management and proper disposal.

RR 6, BOX 9-G
COTTON MILL HILL
BRATTLEBORO, VERMONT 05301

WINDHAM SOLID WASTE MANAGEMENT DISTRICT

STEVEN D. JOHNSON
Executive Director

BRATTLEBORO
BROOKLINE
DOVER
DUMMERSTON
GUILFORD
HALIFAX
JAMAICA
MARLBORO
NEWFANE
PUTNEY
READSBORO
TOWNSHEND
VERNON
WHITINGHAM
WILMINGTON

ALERT!!!

HAZARDOUS WASTE COLLECTION FOR ESQG'S * (exempt small quantity generators) HAS BEEN SCHEDULED FOR SATURDAY, NOVEMBER 7, 1992 AT BRATTLEBORO UNION HIGH SCHOOL.

*ESQG'S GENERATE LESS THAN 220 POUNDS OF HAZARDOUS WASTE PER MONTH OR 2.2 POUNDS OF ACUTELY HAZARDOUS WASTE PER MONTH. YOU MUST MEET THESE CRITERIA TO PARTICIPATE ON 11/7.

UP TO $10,000 IN DISPOSAL COSTS PAID FOR BY THE WINDHAM SOLID WASTE DISTRICT. ONLY ESGQ's IN DISTRICT TOWNS ARE ELIGIBLE.

PRE-REGISTRATION IS ABSOLUTELY REQUIRED. $$ WILL BE ALLOCATED ON A 1ST COME, 1ST SERVED BASIS. WHEN $$ IS EXHAUSTED, ESQG'S CAN CHOOSE TO PAY REDUCED DISPOSAL COST DIRECTLY.

YOU MUST PRE-REGISTER NO LATER THAN MONDAY, NOVEMBER 1, 1992. USE ENCLOSED FORM.

CONTACT: JAN AT WSWMD, 257-0272

WINDHAM SOLID WASTE MANAGEMENT DISTRICT

STEVEN D. JOHNSON
Executive Director

RR 6, BOX 9-G
COTTON MILL HILL
BRATTLEBORO, VERMONT 05301
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TOWNSHEND
VERNON
WHITINGHAM
WILMINGTON

PRE-REGISTRATION FORM FOR ESQG* HAZARDOUS WASTE COLLECTION SATURDAY, NOVEMBER 7, 1992 BUHS, FAIRGROUND RD, BRATTLEBORO

*** ESQG'S GENERATE LESS THAN 220 POUNDS OF HAZARDOUS WASTE PER MONTH OR 2.2 POUNDS OF ACUTELY HAZARDOUS WASTE PER MONTH. ONLY ESQG'S WILL BE ACCEPTED ON NOVEMBER 7.**

WHAT CAN YOU BRING? Any container labeled "caustic, danger, toxic, corrosive, poison, flammable, warning, caution". This includes: automotive products **(not used oil)**, photochemicals, oil-based paint **(not latex)**, thinners, preservatives, pesticides **(not 2,4,5 T, Silvex, Pentachloraphenol)**, cleaners, degreasers, sealants. For a more complete list contact the District.

WHAT IS NOT ACCEPTABLE? Empty containers, used motor oil, latex paint, Silvex, "2,4,5, T", Pentachloraphenol, radioactive material, ammunition.

You must pre-register to participate. Funds will be allocated on a 1st come, 1st served basis. All others may choose to pay the reduced disposal cost. Return form by Monday, November 1st to : WSWMD, RR 6, Box 9-G, Brattleboro,VT 05301.

CONTACT _____
COMPANY _____
ADDRESS _____
TOWN _____ PHONE _____
TYPES & QUANTITIES OF WASTE _____
_____
_____
_____

BE PART OF THE SOLUTION REDUCE, REUSE, RECYCLE

WINDHAM SOLID WASTE MANAGEMENT DISTRICT

STEVEN D. JOHNSON
Executive Director

RR 6, BOX 9-G
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HALIFAX
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NEWFANE
PUTNEY
READSBORO
TOWNSHEND
VERNON
WHITINGHAM
WILMINGTON

MEMORANDUM

To: Participants in hazwaste collection on 11/7
From: Jan Ameen, JA Recycling Coordinator
Date: November 5, 1992
Re: Transportation safety, scheduled time

I hope most of you recieve this letter prior to Saturday. Just wanted to send some safety tips for packing and transporting your waste.

1) All material should be a tightly sealed container. Leaking containers must be packed into another container. Never mix wastes.

2) Wear rubber gloves while handling the waste, especially it can be absorbed through the skin. Also, pack in a well-ventilated area to reduce inhalation of fumes.

3) NEVER SMOKE WHILE AROUND ANY OF THIS MATERIAL/WASTE.

4) When packing containers in the vehicle, segregate acids from bases and oxidizers from flammables. Oxidizers should be kept completely separate from all other items.

5) If possible, carry a fire extinguisher in the vehicle, in case of an emergency.

You are scheduled to bring your waste to the Brattleboro Union High School at _____ a.m. Please try to arrive at this time to prevent delays. Thanks.

BE PART OF THE SOLUTION REDUCE, REUSE, RECYCLE

The Leeds WasteWagon Project : Interim Results

Sonia Heaven and Elaine Kerrell
Lecturer / Civil and Environmental Engineering Department Southampton University and Associate of SWAP Recycling; Project Officer / Institute of Environmental & Policy Analysis Huddersfield University and Associate of SWAP Recycling PO Box 19 Leeds LS1 6TF UK

Introduction

This paper describes the WasteWagon Project which took place in Leeds, UK from February to September 1992. The aim of the project was to investigate current attitudes to Household Hazardous Waste and to establish parameters for effective HHW collection schemes in the UK.

Background

Disposal of HHW is a subject of growing interest and concern, both nationally and internationally. Schemes to collect HHW are well established in the USA and are becoming increasingly common in a number of European countries - including Germany, France, Denmark, Sweden, Austria, Switzerland, Finland, Iceland and the Netherlands. There are some interesting differences in methods and the motivations behind schemes in Europe, North America and elsewhere. HHW collections in the USA and Canada seem initially to have originated from the public, spurred on by a high level of awareness and concern over household toxics. The earliest collections were actually organised by local groups of volunteers, and while an increasing number of programmes are state-run or state-funded, there is still a relatively high level of volunteer involvement. In Europe and Australia, development of schemes has tended to be from the top down, with initiatives driven primarily by local and central government and by the waste disposal authorities. A major force behind HHW programmes in Australia has been concern on the part of the water authorities about ground and surface water pollution, whether from sewage discharges into Sydney harbour or from landfill leachate into the aquifers which supply Perth. The organisation of schemes tends to reflect these differences, with little or no volunteer input outside the USA and Canada.

The situation in the UK differs from that in both Europe and North America. At present, around 90% of domestic refuse in the UK is disposed of to landfill sites, with less than 10% incinerated - a much lower proportion than in most European countries, where incineration is relatively common. Materials such as DIY and garden chemicals, household cleaners, pharmaceuticals and batteries are generally disposed of to landfill with other domestic refuse, to become dispersed amongst relatively harmless wastes. There are very few HHW collection schemes or educational initiatives. A number of waste disposal authorities operate collection services for chemicals from trade and commercial customers, some of which also provide a service to householders - but these are not actively promoted or advertised. A small number of initiatives have taken place, such as local collections for specific materials like batteries. These have generally been small-scale and, in the case of waste disposal authority schemes, have deliberately been left low-key to avoid creating a demand which cannot be satisfied with current facilities and budgets. As a result the issue of HHW has not really surfaced in the UK to the extent that it has elsewhere.

The situation is beginning to change, however. Increasing awareness of environmental issues is likely to lead to public concern about disposal of HHW and to pressure for collection systems, as has happened elsewhere. In addition, the government has recently set a challenging target for local authorities to recycle 25% of domestic refuse by the end of the century - a massive increase on the current national average of around 3%. As recycling schemes becomes more widespread, the quantity of domestic waste for disposal will be reduced. Hazardous materials are likely to become concentrated in the remaining fraction for landfill, and the old 'dilute and disperse' methods previously advocated by the waste disposal industry may no longer be appropriate. Interest in the problems associated with HHW is therefore growing amongst those responsible for the collection and disposal of these materials.

Special Collections Research Group and the WasteWagon Project

In 1990 the city of Leeds introduced its pioneering SORT recycling scheme, which currently covers 12,000 households and is achieving a reduction of approximately 45% in materials going to landfill. From the outset it was realised that the problem of HHW would need consideration if the service were to expand city-wide, both for the reasons described above and for others. The scheme is based on source separation of refuse into dry recyclables (paper, metals and plastics), into organic kitchen and garden waste, and into a third fraction of residues for landfill. Recyclables are taken to a pilot-scale sorting plant where they are hand-sorted into different streams, while organics go to a central composting site. In order to achieve clean, good quality materials and to reduce the risk to sorters it is clearly essential to keep HHW products out of the recyclable and organic fractions.

Leeds City Council therefore set up a Special Collections Research Group to look at the options for HHW. The Group included representatives from the Department of the Environment, ICI Paints, B&Q Plc (a major retailer selling household decorative products and garden chemicals), BP Oil Ltd, SWAP Recycling (a not-for-profit waste management consultancy), the British Agrochemicals Association, Leeds University, Yorkshire Water, the National Rivers Authority and West Yorkshire Waste Management (the local waste disposal authority). The Group looked at a wide range of issues including current UK legislation, existing methods of dealing with hazardous waste in the Leeds area, and HHW initiatives elsewhere. Leeds is fortunate in lying within the area served by West Yorkshire Waste Management(WYWM), which operates a Chemicals Advisory Service for trade and commercial users. This service has a sliding scale of charges but offers free collection to householders who have dangerous material for disposal. The service is primarily aimed at industrial chemicals rather than the weaker formulations commonly used in domestic products, however, and is not staffed or funded to deal with more than a small number of enquiries from households. The Group also studied schemes in Canada, the USA and Denmark. Information on practical and operational aspects was gathered by Chas Ball, Development Manager at SWAP Recycling who was able to visit these schemes through the award of a 1991 Churchill Fellowship.

As a result of its activities, the Group decided that more information was needed in two main areas. Firstly, little information was available on public attitudes in the UK to HHW - what was the current level of awareness, and how would people respond to the idea of a collection scheme? Secondly, it was felt that more operational information was needed. Results from North America and Europe vary considerably, with early amnesty-type collections in the USA yielding an average of 35kg of materials per participant, compared to figures of 2-4kg from Europe. Clearly, more reliable data are needed on the types and quantities of materials which a scheme might attract, and on the advantages of different systems, in order to plan the most appropriate initiative for the UK.

The WasteWagon Project was set up with the aim of gathering this information. The scheme had two main elements - a pre-trial public opinion survey, and an operational phase which would combine a research project with a pilot HHW collection. The scheme was managed by SWAP Recycling with research and operational funding from ICI Paints, Leeds City Council, B&Q Plc, BP Oil Ltd, Cory Environmental and the Department of the Environment.

The Attitude Survey

Aims and methods

The aims of the pre-trial public opinion survey were

- to establish the 'hoarding' characteristics of typical UK households
- to investigate public attitudes to HHW products
- to determine public reaction to the idea of a HHW collection scheme

The main purpose of establishing hoarding characteristics was to gain some idea of the size and significance of the problem. This involved estimating the quantity and age of HHW materials held in store, and relating this to socio-economic factors where possible. In the investigation of attitudes, it was decided to focus on two areas - the level of concern expressed by the public about these products, and

the methods currently used for disposal by most households. Specific objectives in the third area were to determine which of several possible collection methods would be preferred, and to find how this related to people's experience of other collection initiatives, such as recycling schemes and pharmacists' collections of old medicines.

In order to obtain all the information required, it was clear that fairly detailed and lengthy questions would be needed. It was therefore decided that the most suitable form of survey would be a questionnaire administered by interviewers. The questionnaire asked whether respondents had any of a material, and if so how much; how long they had kept it for; how they last disposed of it; and how much of a problem it was. These questions were repeated for a range of materials. There were then questions on whether the respondent currently recycled materials, whether he or she would make use of a collection scheme for HHW, and if so which of several options would be preferable. Finally there were questions on the respondent's socio-economic details.

It rapidly became clear that the range of materials covered would have to be restricted. It was decided to exclude household cleaning products from the survey, both because of the excessive time requirement and the very large number of different products in use. This omission was less serious than might appear, however. The only directly comparable data available came from a small survey previously carried out in Leeds, which also omitted these materials. Many HHW schemes do not accept household cleaning products because of the large quantities and variable hazard potential. As the planning for the operational phase of the project progressed, it was also decided to omit these products. The survey was therefore concerned with five main groups of HHW

- DIY products
- Garden chemicals
- Medicines
- Car engine oil
- Household batteries

These were subdivided into nine categories which were used throughout the questionnaire:

Paints	Fertilisers	Medicines
Methylated spirits and solvents	Pesticides	Car Engine Oil
Wood treatments and preservatives	Herbicides	Household batteries

As well as responses to the questions described above, interviewers recorded the location, date and day of the interview and car ownership of participants. Occupations were grouped according to the UK Registrar General's classification, with additional categories for housewives, retired persons of unknown occupation, students and the unemployed. For convenience, respondents in the age group 60+ are referred to as senior citizens, although some of these will be in full-time employment.

All householders are likely to generate hazardous materials of some kind at one time or another. The survey had a special interest, however, in those actively involved in DIY and gardening, in those making use of particular disposal routes, and in those who already participated in 'special' collection schemes by recycling. The views of these groups are clearly of particular importance to the success of any HHW initiative. It was therefore decided to carry out the survey at four locations - a Civic Amenity (CA) site for household waste disposal and recycling, a supermarket multi-materials recycling site, and two DIY stores. The survey was conducted between November 1991 and May 1992 at the four sites, with 194 respondents questioned by 9 interviewers.

Results of the Attitude survey — Hoarding habits

The results of the survey clearly showed that households are aware of storing significant quantities of hazardous household material in the home, and that long-term storage (over 1 year) is common. All those questioned kept at least one material, with paint and medicines the most popular (kept by around 90% of households), and garden chemicals least common at around two-thirds of participants. The average number of items per household was 30, with many materials stored for over a year and some for

as long as 25 years. Figures for amounts of individual materials provide a reasonable picture of the hoarding characteristics of the average family, and at least a basis for estimation of quantities held regionally or nationally. The small amount of comparative information available suggests that, if anything, people tend to under-estimate the quantities they hold.

The survey confirmed that there is often a correlation between the quantity of different materials stored - that is, those who keep one material tend to have others too. General information at point-of-sale is therefore likely to be an effective way to disseminate advice on safe disposal.

Table 1 : Number of reported items

Material	Items per household	Items per household*	Total
Paint	6.2	6.8	1195
Meths	2.1	2.8	402.5
Wood	2.3	3.6	445
Fert	1.5	3.0	285
Pest	1.4	3.0	272.5
Herb	1.1	2.9	222.5
Meds	6.8	7.8	1315
Oil	1.7	2.0	332.5
Batts	6.9	9.0	1335
TOTAL	30.0	-	5805

Those who keep car engine oil are likely to be genuine 'Do-it-Yourselfers' who have significant quantities of other materials. Information can be targeted on this group via garages and automotive product retailers. Certain household types are likely to keep more items than others - as expected, more affluent households stored more on average. There were variations for individual products, however. Managerial and Professional households appear to keep more medicines, but those in associated professional or technical occupations had most paint and paint-related products, while storage of garden chemicals was age-related with senior citizens holding more of these products than younger age-groups. These differences mean that initiatives on specific materials - such as amnesties for old pesticides - will need different strategies to allow them to focus on the appropriate groups.

Disposal methods

As expected, many of those with materials to dispose of used the dustbin or CA site, reflecting the lack of other options in the UK at present. In most cases, however, people simply kept material: this was the main 'disposal route' for solvents, wood treatments, fertilisers, pesticides, herbicides and medicines, and was a close second for oil and paints. The survey was slightly ambiguous, in that it did not distinguish between keeping a material until it was used up and keeping it for other reasons. The existence of large quantity of materials in store does present some problems, however. Certain materials - such as oil, batteries and medicines - have no further use once their working life is over, and are presumably stored because householders are unsure of the best disposal method. Changes in our understanding of hazards and in product formulation may mean it is undesirable to keep products which are very old. Some materials will eventually corrode through containers and cause spillage; and every year there is a small number of accidents caused by careless handling and storage of hazardous products in the home. Anecdotal evidence from WYWM's Chemicals Advisory Service (CAS) also suggests that people bring chemicals home from work for a specific purpose, and are later uncertain how to use or dispose of them.

The survey revealed small but significant numbers using disposal methods which are hazardous to health and to the environment. These included disposal on the fire, on the garden, and down the sink or drain. The need for better education and advice is clear: a simple first step would be inclusion of disposal advice with other safety information on the product label. The most serious problems were associated with oil - potentially one of the more hazardous materials. One fifth of those interviewed appeared to dispose of this material in ways that were dangerous or illegal; a further 22% kept it, presumably because they did not know how to dispose of it. This is in spite of the presence of oil recovery points at all CA sites in the area. There is clearly a dangerous lack of knowledge, both of the existence and location of facilities and the importance of correct disposal.

The survey also indicated the existence of groups with potentially serious disposal problems. For

each question there were some categories of respondent who stored more of certain materials, kept them for very long periods, or disposed of them in potentially hazardous ways. The small size of sub-samples made it impossible positively to identify 'at risk' groups who fell into one or more of these categories, but the results suggest there could be a cluster of common factors. This was supported by anecdotal evidence from the interviewers. In particular, disposal methods chosen by women and the elderly were often questionable - and older people are likely to have older and more hazardous product formulations, and to store larger quantities of materials such as garden chemicals. This group is least likely to be reached by DIY store-based or CA site information, and separate initiatives to recover dangerous materials may be necessary.

Very few respondents made use of alternatives, such as giving materials away to others who could use them. As with other types of waste, the best method of dealing with HHW is not to generate it. Possible initiatives in this area include better matching of quantities sold to the customer's requirements - although the current trend is to cut production costs by standardising on a small number of product sizes. Failing that, one of the better disposal routes is to use a product up in accordance with the manufacturer's instructions or to pass it on to someone who can - perhaps through a Paint Exchange or similar scheme. There is clearly scope for vigorous promotion of the idea of passing on unwanted materials, and for investigation into efficient local exchange systems.

Levels of awareness and support for HHW initiatives

In the part of the survey which assessed levels of concern about HHW, men and young people consistently expressed greater concern than women or older age-groups. As might be expected, affluence and education also appeared to be factors with those in professional occupations being particularly aware of problems with these materials. The lower level of concern amongst women is a surprising finding, however, since surveys have generally found women to be more conscious than men of environmental issues. DIY is often seen as a masculine activity in the UK, so it may be that women are less aware of the materials used, less involved in decisions about purchase and disposal, and do not feel ownership of the problem. This contrasts with the situation for most other domestic waste, where it is typically women who make key decisions. It seems that the issue of HHW may require different tactics to raise awareness from those employed in more conventional recycling and waste reduction initiatives.

Results for individual materials showed considerable confusion amongst the public. There was particular doubt over oil, with 30% assigning it the lowest of 5 rankings (defined as 'no problem at all') and 30% the highest ('a definite problem'). Respondents were generally more confident about disposal of batteries and medicines. Awareness of the environmental issues surrounding battery disposal does not yet seem to have reached the UK, while the existence of schemes to collect unwanted medicines may reassure the public that these materials can be safely dealt with.

There was strong support for a HHW collection service, with 78% of respondents saying that they would make use of such a scheme. This high level of support may partly reflect respondents' new awareness, how-ever. HHW is an issue which has so far received rela-tively little attention in the UK, and most members of the public will not be familiar with the term or the arguments surrounding it. The questionnaire itself may have acted as a consciousness-raising process, at the end of which respondents were fired up with new ideas on the subject. It is also notable that only 10% actually took medicines and pharmaceuticals back to the chemist for disposal, whereas 64% said they were aware it was possible to do so. The degree of support should therefore be regarded with some caution, but at least indicates the power of a new idea.

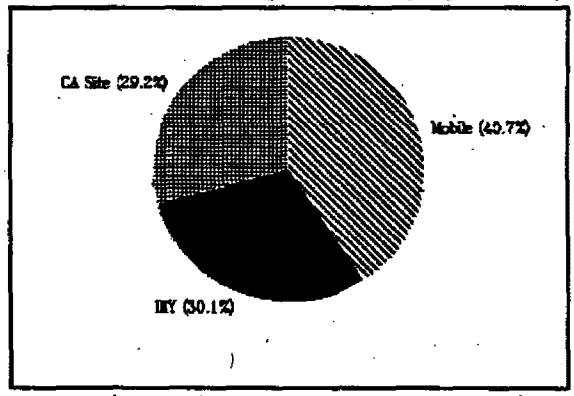

Fig 1 : Collection Preferences

Mobile collection services were generally preferred, although it was presumably difficult for respondents to judge the best method with no prior experience. Those who already recycled materials were particularly supportive, however. The types of service mentioned in the questionnaire - facilities at CA sites, DIY stores or a mobile collection service - would certainly reach a large proportion of the population who use hazardous household products. Women were much less enthusiastic about the CA site option, however, as were senior citizens and non-car-owners. This could have particular implications for schemes which include household cleaning products, since these are typically seen as women's concern. Siting and layout of facilities are likely to be an important issue in any scheme which aims to attract a wide range of participants.

Operation of the Leeds scheme — Materials collected

The first decision on the operational phase of the scheme was whether to adopt an amnesty-style approach and accept all HHW materials. Restricting what is collected reduces the impact of a scheme, but this must be weighed against the obvious safety implications of accepting any hazardous materials which householders may have in store: in North America for example, collection of ammunition and explosives is not uncommon. Explosives were not expected at the Leeds scheme, but as this was the first of its kind in the UK, there was no baseline to work from and contingency had to be made for any eventuality.

It was decided to restrict collections to materials which could be dealt with safely using the resources available - an important consideration for any scheme. Acceptable substances were defined as those within three broad categories: paint and paint-related products, garden chemicals, and automotive products such as used engine oil and antifreeze. Pharmaceuticals were excluded because householders are normally advised to take unwanted medicines back to chemists - although SWAP Recycling is currently undertaking research into the adequacy of this advice. Household cleaners were also excluded, mainly because of the vast array available and the difficulty of categorising them. Also the best advice, at least for recently purchased household cleaners, is to use them up in the purpose they were designed for. Household batteries were excluded as there are presently no recycling facilities in the UK. Because changes to the UK legislation will occur as a result of the EC Batteries Directive 1990, the best advice to authorities considering battery recycling is to wait until the position becomes clearer.

Types of collection

Once the materials to be collected were defined, it was necessary to decide on collection methods. Since the scheme was intended to gather the maximum amount of data, it was decided to test a number of different methods. Collections were based around the WasteWagon - a purpose-built vehicle specially designed for the project, which allowed a variety of locations and collection systems to be trialled. The design was based on a vehicle used for the collection of HHW in Århus, Denmark, with advice from WYWM CAS. The design allowed separate storage and transportation of HHW to a depot provided by the city council and modified for the scheme.

The collection, launched in March 1992, involved both a 'static' and a 'mobile' collection service. Three days of the week were spent at a B&Q DIY store, where collections were made from the store car park. The other four days were dedicated to a schedule of pre-announced stops - initially in the area covered by the SORT Kerbside Recycling Scheme then, between August and the end of the trial, in ten other areas. In this way the scheme was made available to about 90,000 households in and around Leeds.

The WasteWagon collection rounds were accompanied by a publicity campaign. Initially, advertising in local papers and door-to-door leafleting was undertaken. The latter was concentrated on the SORT area and on 40,000 households in the vicinity of the B&Q static site. Later, with expansion of collections into the outlying areas of Leeds, targeted advertising and leafleting was undertaken to encourage local householders to use the service on the most convenient day for them. From the experience of the project a great deal has been learned about targeting publicity.

The scheme was not aiming for high numbers, so did not indulge in high-profile advertising (eg

TV, national media). In the planning stage there was concern that the scheme would be oversubscribed if it was too widely advertised. It was found, however, that sustained local advertising, coupled with other forms of promotion and educational campaigns, was necessary to maintain numbers. The effect of publicity had a sharp decay curve. The relative success of different advertising methods must be investigated as even low-profile advertising is very costly. From participants responses when asked where they had heard about the scheme, the most successful method appeared to be leafleting, closely followed by newspaper advertising. The newspaper most commonly referred to was Leeds Weekly News - a local free paper.

Operation of the scheme and data collection

In order to be accepted, materials had to be in clearly marked, non-leaking containers. Materials which did not comply were refused and a Waste Rejection Notice issued. This gave advice to the householder, depending on the reason for rejection. To comply with the Duty of Care under the Environmental Protection Act 1990, a waste ticket recording the item(s) collected, name of the householder and date of collection was filled out when the material was handed over. In addition, the form included information on the number of households contributing to the batch, how the householder found out about the WasteWagon and whether this collection was the first time the household had used the service. Later in the scheme, the gender and age of the individual and the weather conditions on the day were also recorded.

Before materials were off-loaded and stored at the depot, a detailed Materials Log was completed. This included information on:

- manufacturer
- colour (if relevant, eg paint)
- reusability and estimated age
- hazard category
- type (eg emulsion paint)
- size, weight and type of container (eg plastic)
- special information / advice on the container

This provided a vast amount of information, analysis of which is still in progress. The WasteWagon was essentially a research project, intended as a data gathering exercise. In an operational scheme this level of data collection would not be possible, or even desirable. It was not unproblematic, however. Accuracy of data gathering relied very much on the two operators. As local authority employees, they had never before been involved in a research project which required them to keep detailed and very accurate records. Also, as with any research project, changes were constantly being made to refine the system and to incorporate new ideas as they arose. The success of the project was both a tribute to the operators' enthusiasm, and a valuable demonstration that this type of scheme can be run by ordinary municipal employees with suitable training.

Health and safety and compliance with regulations

Obviously, when operating a scheme designed to collect potentially hazardous materials, safety is of paramount importance. Considerable instruction was given to the operators on safety procedures with the aim of reducing the risk both to themselves and to the public. All personnel attended HAZPAK training courses, which includes training on legislation and codes of practice concerning hazardous substances, on packaging, labelling, loading, securing and segregation of materials, on the use of safety and fire-fighting equipment and on first aid.

Handling of hazardous substances which present a risk to workers and/or the general public is regulated by the Control of Substances Hazardous to Health Regulations 1988 (COSHH). A COSSH assessment involves examination of operations to identify where barriers (eg special protective clothing, remote procedures) are needed to minimise risk. With the help of the Safety and Environment Department, ICI and WYWM, a COSHH assessment was carried out both for the operation of the vehicle and procedures at the depot.

The main recommendations were for provision of protective equipment in the event of a spillage occurring as a result of a dropped container, and spillage clean-up equipment. The WasteWagon had an

extraction fan installed to cater for any accidental evolution of fumes or vapour. It was recommended that this be kept running at all times when the operator was at work. An extraction fan was not required for work at the depot, but the door to the shed or flammables store had to be left fully open whenever an operative was working there. At all other times these were kept locked. A mobile telephone was provided for the operator to call for assistance.

In the planning stage of the project various agencies were contacted for advice. These included the Health and Safety Executive, the Fire Service, the Emergency Planning services and the Police Contingency planning unit. Advice was sought from the Peace and Emergency Planning Unit on contingency plans in the event of a major incident, requiring evacuation of personnel and members of the public. The Police were also briefed about the scheme. One of their main concerns was that material would be left at collection sites outside collection hours. Plans were made to deal with this eventuality, including arranging for staff at the B&Q static site to accept and temporarily store material until it could be collected.

The WasteWagon did not have to be independently licensed as a waste carrier as it was operated by Leeds City Council as a collection authority, and was therefore covered by the city council's authorisation. The storage facility was licensed as a transfer station in accordance with normal waste disposal authority procedures. Requirements in the EPA Part 2, Section 34 (Duty of Care) was fulfilled by the completion of documentation when the waste was collected.

Transfer, storage and disposal

Once collected and recorded, all materials were assigned to one of the following waste categories to allow packing for safe transfer to the depot.

- FLAMMABLE
- CORROSIVE - ACIDS
- CORROSIVE - BASES
- OXIDISING
- TOXIC
- OIL
- OTHER (NON-FLAMMABLE, NON-CORROSIVE, NON-OXIDISING, NON-TOXIC)

A storage container for each waste category was available on the WasteWagon. All substances were kept in their original containers; no bulking or consolidating took place, except for oil which was decanted into a storage tank in the depot. Each hazard category occupied a separate, bunded storage area in the depot. The fundamental principle was to keep incompatible chemicals separate. Two lockable metal cabinets were provided for temporary storage of dubious materials (prior to further checking), and for those destined for incineration.

Material was disposed of according to the following hierarchy of options

RE-USE RECYCLING ENVIRONMENTALLY SAFE DISPOSAL

At the planning stage, it was assumed that most material collected would have to be disposed of either to landfill or by incineration. This was found not to be the case. The bulk of material was either paint or oil, and both of these could be re-used or recycled.

Paint was sorted initially into flammables (solvent-based) and emulsions. It was further categorised according to its quality: good quality for re-use, medium quality for recycling, and poor quality or containing toxic components (eg lead) for safe disposal. A surprising amount - around 10% - was found to be of good enough quality for immediate re-use, and a small-scale Paint Exchange trial was set up with financial support from both UK2000 and ICI Paints, to utilise the material collected by the WasteWagon. Non-reusable paint was either low in quantity, of poor quality, or deemed non-reusable by its mode of application, age or active ingredients (eg lead). Most of this paint was sent for recycling into low-grade paint. Empty plastic containers were used in recycling trials, where they would be washed and then granulated before re-extrusion. Empty steel containers were recycled through the Save-a-Can scheme for ordinary household cans. All the oil collected was recycled through a local company, and earned a small remuneration.

Once the reusable and recyclable material was extracted, the material for disposal remained. With advice from the CAS, this was separated either for disposal to landfill or for incineration. The majority of landfilled materials were containers with large residues of dried paint which was unsuitable for recycling. Other materials were either mildly corrosive or toxic. The placing of substances at the landfill site was carefully supervised by the CAS to ensure that they were not mixed with combustible household waste. Only a small proportion of material had to be incinerated, consisting mostly of garden chemicals and a few reactive materials (eg carbide of calcium). These were personally delivered to the incinerator hopper to ensure that combustion occurred inside the incinerator safely away from household waste awaiting destruction.

Collection results

At the time of presentation of this paper, data gathered by the operational phase of the WasteWagon scheme are still being analysed and these are interim results only. Further information from the scheme will be incorporated in a full report, which will be made available in time for a UK conference on HHW to be held in Spring 1993. Presentation of results here is in general terms only, with detailed discussion to follow in the final report.

During the eight months collection period a total of around 450 people brought material to the scheme. The average weight of material fluctuated over this period, increasing during spring as garden chemicals began to be brought. For the whole of the scheme the average has been 8 kilos. This value is somewhere between typical European figures (eg Århus) with averages of about 2kg and the North American experience where average weights were around 20kg.

An interesting result was the difference between mobile and static collections. During the first phase of the scheme results from the two were comparable. As the impact of publicity wore off, the decline in the static collection was more marked. Indeed, numbers were maintained for the mobile collection even though the statics were declining. As the WasteWagon had been sited for three days every week at the static site, it was thought that a plateau had been reached when further collections would bring diminishing returns. For the mobile round, the WasteWagon had visited the same collection points every week for nearly six months - this is overkill by any estimation.

In the final two months of the scheme, it was decided to try out something closer to an operational model. During this period, although the original static site was maintained, eight other static sites were visited. These visits adopted a more intermittent pattern - visiting in one week only and then moving on to another site. This was found to be far more effective, with significantly greater numbers visiting the static sites in the second phase. Giving too much opportunity to householders is obviously not an effective approach! In an operational scheme, mobile collections should probably be restricted to collecting from the housebound or immobile, possibly en route to static sites, or as part of another form of collection. Once or twice-yearly collections would definitely be preferable; restricting visits is a better use of resources.

The mobile collections in the second phase were less successful because too much was attempted. To minimise promotional costs one leaflet was produced which could be used throughout the two months period. It had to contain all the information about both the new mobile and the new static sites, as well as the existing static site. In practice this was too big a task. It restricted the details which could be given about each site and specific visiting times could not be included. Householders were advised to call a helpline or the WasteWagon on the mobile telephone for further information. Some did so, but many others went to the static sites instead.

Profile of scheme users

In the final stage, when collections were spread to a wider population, data was gathered on the age and gender of users. It would have been valuable to have collected these data throughout, but there was a risk of overloading the operators at the start of the scheme. In the planning stage it was considered that typical scheme users would be recyclers, DIY enthusiasts and classic 'hoarders'. In fact users were

predominantly male and in the age range 40-60 - not necessarily the most enthusiastic group according to the survey. One other small but important group was elderly ladies: the few who did use the scheme brought some of the most unpleasant materials, confirming the survey's suggestion that this group may need special attention.

Although users were not questioned about their motives for coming, it was evident from observations they made that broader environmental considerations were not the main motivation. They came because they had a disposal problem. For many, using the scheme solved an otherwise insoluble problem. This was particularly apparent for those bringing waste oil. Knowledge of existing facilities was quite obviously low, and those bringing oil were offered information on recovery facilities elsewhere. For others, the vehicle siting made it convenient for them to use, rather than taking material elsewhere (eg a CA site).

Conclusions and recommendations

The operational phase of the WasteWagon project collected a vast mass of data on aspects of HHW. It is not possible to present the full conclusions at present, as this data must be analysed, assimilated and compared with the findings of the pre-trial survey. Results will be presented in a full report, which will be available later. However, some interim conclusions are possible.

- The main users of the types of collection tested in the operational phase are likely to be men rather than women, and between the ages of 40-60. This contrasts with the survey findings, which indicated greater support amongst younger age groups and women. In family households, the actual user of the scheme may not be the most motivated person, but simply the one who was sent to do the job. The findings suggest, however, that schemes which wish to draw in a wide range of participants may need to consider other approaches.
- The quantity of material brought at around 8kg per participant was higher than expected. It was thought that quantities would be closer to those found in European schemes than in North America. In fact the average yield was somewhere in between, although a detailed breakdown by users is required for further analysis.
- Environmental considerations appeared to be less important as motivation for users than the solution of a disposal problem. This also ties in with the survey findings: it appears that the general level of awareness in this area is still lower in the UK than elsewhere.
- Static sites visited occasionally after an intensive pre-publicity programme appeared to be the most effective of the options tested, in terms of bulk quantity. However, there are clear benefits from the provision of permanent facilities or regular visits.
- Collection data indicated that there were different patterns for different materials. Optimum solutions might involve a range of initiatives, such as targeting specific materials by means of paint exchanges and enhanced oil recovery facilities, with specialist collection services for more hazardous products or for specific social groups. All of these approaches form an important element in the comprehensive programmes of education and avoidance which are essential if we are to reduce the quantities and problems of HHW.

The WasteWagon project was a fascinating hybrid, operating as it did with Leeds City Council personnel and facilities, managed by SWAP Recycling, with funding from industry and the Department of the Environment. Each organisation had different requirements from the project and different motivations for their involvement. The project was a success not only because it fulfilled all these requirements but because it also showed how a co-operative venture could be achieved.

HOUSEHOLD HAZARDOUS WASTE PUBLICITY CAMPAIGN

Case Study — Alachua County, Florida

by Jill Parker, Senior Environmental Specialist, Alachua County

BACKGROUND

Alachua County is located in north central Florida. There are nine (9) incorporated cities and a population of approximately 185,000. The city of Gainesville is at the heart of the county and is comprised of 48 % of the total population. There is a large unincorporated area of Alachua County in which 43 % of the population live. The community, as a whole, has a very "environmentally active" disposition.

Alachua County's household hazardous waste (HHW) collection program began in 1984 and is organized through Alachua County's Office of Environmental Protection (OEP). The program is a component of the Board of County Commissioners' policy for protecting human health and the environment in Alachua County. The funding for the projects has been either from State grant monies or an established percentage surcharge from the landfill tipping fees. These events are held in the City of Gainesville, during a Thursday, Friday and Saturday time period, 12 hours a day every 18 months. The events were located in the parking lot of a major shopping mall until 1991. Three different contractors were utilized between 1984-1991. Over 1500 cars have take part in each of the events. Much was learned over those years, especially that the program can be very expensive unless a consciences effort is made to recycle/reuse the materials that are received at the collection event.

In 1991, a two year contract was negotiated with Quadrex Environmental Company, Inc., The contract was written to incorporate provisions for a strong infrastructure for the HHW management program. The major improvements to the program were establishing a regularly scheduled HHW collection occurrence of every six (6) months, holding the events at Quadrex's Treatment, Storage and Disposal (TSD) facility, just north of the city of Gainesville, and the provisions for hiring an local independent Solid and Hazardous Waste Specialist to strengthen the material recycling/reuse efforts.

PUBLICITY

The publicity campaign that accompanied these event has also improved over the years. The Office of Environmental Protection has contracted a publicity agency to assist in the organization of publicizing the HHW collection events. The campaign begins a week before the events, which are scheduled for April and September.

The media that are utilized for the champaign are:

- Newspaper
- Road Signs
- Radio
- Television
- Utility Billings Newsletter
- Schools

The publicity agency has proven indispensable for negotiating price structures. Often they benefits as a "bulk" buyer and receives special discounted rates for the announcements. They also have established ongoing working relations with the various orgainazation.

Area environmental companies are contacted in regards to providing donations towards the collections events. Those donating are recognized on the all written forms of advertisements.

Newspaper

There is one major newspaper in Alachua County that has a distribution reaching 51,000 people. The advertisement (2" x 13") is published for six (6) week day editions and the weekend prior to the event. "Thank you" adds are also published after the event. Often times public education articles are published and well as public service announcements (PSA's) at no cost. This announcement is also published in a "Buyer's Guide" which is distributed to all residents within the City of Gainesville once a week by the same publisher. The cost for this coverage averages around

$ 3,350. Announcements are also published in a secondary paper on two different days at a cost of $ 250. During the April event, the newspaper run a series of Earthday activities announcements which help

motivate the public into participating.

A lot of effort has be spent on developing a good rapport with the newspapers in order to receive a helping hand in this campaign.

Television

A 30 second commercial was made showing the "drive-thru" method used for the collection event. The commercial is shown seven times on 4 different cable networks a week before the event. The negotiated price for this coverage is $1,500 (50% discounted rate). The local TV station show the commercial as Run Of Station (ROS) three (3) times on the weekdays before the event. ROS provides a reduced rate and the commercial is seen at various time throughout the day. The commercial is also shown during the evening news casts Friday, Saturday, Sunday, and the evening before the last day. The cost associated with advertising is $ 3,000.

Radio

A major effort has been made to develop a good working relationship with the area Radio stations. The results have provided free 30 and 60 second PSA's and news coverage of the collection events over the past 8 years.

Road Signs

Directional road signs are placed on major roads leading to the collection site one week before the event with the dates of the event identified. This is a means of free advertisement reaching motorist traveling these roads.

Monthly Utility Billing Newsletter

An article was written for the newsletter mailed with the City of Gainesville monthly utility bill. Placement of the article in the newsletter required knowing the collection days 4 months in advance. The billing also only reaches the City of Gainesville utility customers. This form of advertising is potentially effective because close to 50 % of Alachua County's population receives this billing.

Schools

The school system can be a vital part of a publicity campaign. Flyers and news releases are distributed to K-12 grade school PTA organizations, teachers, and newsletter editors. This year a coloring contest was added for K-5 grades. Prizes (T-shirts) and certificates of participation were awarded.

RESULTS

Surveys taken during the HHW collection event show that most people are will to travel an average of 10 miles to participate. The most widely recognized means of advertisement is through newspaper announcements. Television is next with radio, utility billing and school respectively. Over the past two years we have been able to lower the cost spent on multi-media through aggressive negotiation and "discount rate" advertisement without adversely effecting the participation rate. Also it should be noted that a major effort is undertaken to obtain donations from area businesses to help supplement the overall cost of the advertisement campaign.

The key elements for the successful of Alachua County's HHW collection are a combination of:

- the development of an annual budget,
- a structure contract with emphasis on recycling/reuse of the collected materials and other cost saving activities
- the accessibility of a T/S/D facility within the county, and
- a strong publicity champaign.

The money saved through the recycling efforts has been utilized in public environmental educational campaigns.

Lois Kaufman
Environmental Research Associates
Source Reduction: Surveys

Environmental Research Associates (ERA) is the nations largest research company dealing in environmental issues. If the last month is any example, the next four years are going to be very interesting. Since the election, one newly elected official in California has urged the ban on all new fireplace construction in homes to cut down on air pollution. Environmentalists have petitioned that two new species of fish, the *Long Finned Smelt* and the *Sacramento Split-tail* be added to the endangered species list. I think we are going to be very busy.

One of the things we do at ERA, quite simply, is talk to consumers. We find out what they like and don't like--including types of packaging. What they know and what they don't know--including various environmental terms used on labeling and in the media; and how environmental concerns stacks up against other national issues.

The things I am going to say to you today are not my opinions only, they are based on thousands and thousands of interviews over the past years. Some of these interviews have been with average consumers to find out what they see and think about the environment. We have also done business to business surveys. We are just finishing the first part of a study of 500 opinion leaders across the nation. Some of these findings also come from our syndicated study called *"The Environmental Report"*, and from dozens of other proprietary studies that we have conducted over the past year. So with all this information we feel pretty confident about some of the trends that will affect all of us.

The title I've been given for this speech is *"Source Reduction and What Consumers Think About It"*. The problem is consumers don't think much about source reduction. That doesn't mean that consumers aren't concerned about the environment--they are; but source reduction is not top-of-mind. What is top-of-mind is recycling. Before we get into a discussion on source reduction and recycling and what people prefer, let's straighten out one thing right away. I've read some articles that the environmental concern is waning, and that people aren't as concerned as much about the environment as they once were. Nothing could be further from the truth. The environment isn't going to go away. In fact, there's clear evidence that it's ready to explode.

Seventy four percent of all consumers said they are doing something around their homes to improve the environment; a significant increase over the past year, and 44 percent said they have changed their shopping habits; also an increase. Now, we forced people to tell us specifically what they are doing to be counted in these numbers. But, even if there is some exaggeration in these numbers, we believe that if people lie, they lie consistently; which is good about tracking data over time. Whether they lie or not the trend line is going in only one direction and that is up.

Environmental concern is taking a very subtle and fundamental shift; this is where there may be some confusion. It is being institutionalized into the very fabric of our lives and is becoming less obvious, less controversial perhaps, but far more important. Consumers are focusing on fewer issues like oil spills and tuna caught in dolphin nets, and on many smaller, individual concerns that directly affect our everyday lives. Let me give you some examples: Thirty four percent of all adults said they have purchased a product or brand in the past three months because the manufacturer has a good reputation for environmental concerns; this is up 47 percent in the past two years. Eighty different companies or products were sighted by name as being or doing something good for the environment;

compared with only 37 companies just three months ago. This increase occurred among all age groups including older people who have been traditionally less involved with the environment. The variety of products being mentioned as "good" or "bad" for the environment is also significantly more diverse. Most companies mentioned are still food and oil [based], but automotive, clothing and personal health care products, as well as retailers are becoming increasingly mentioned by consumers.

The environment has moved from being issue driven to lifestyle driven and is based more and more on what people feel are their personal long-term needs. This is important because trends are based on basic human needs; fads are not. That is why trends last and fads don't. People will continue to be environmentally responsible for some time. And the fact is, to many people, being environmentally responsible means recycling. Consumers have inalterably linked recycling and the environment. When we ask them what companies have done to help the environment, they tell us--"recycle"; or that the company's packages can or have been recycled. When we ask them how can companies improve the environment, the number one answer to this is "improve the packaging"; and consumers universally focus on recycleability. This is both predictable and troublesome. Predictable because in virtually every study we've conducted over the past several years consumers have viewed recycling as **the** answer, not **an** answer, but **the** answer to all of our environmental problems; and that includes not just solid waste, but everything else as well. This is troublesome because consumers have unrealistically high expectations for recycling; this may spell problems for us in the years ahead when consumers feel that these expectations are not being fulfilled. Recycling is important, but we have to start selling the American public on the importance of other environmental issues and other solutions. Source reduction is just one of those other solutions.

The idea of source reduction or using less packaging sounds pretty good to consumers when they know about it; the problem is not very many do. Only 16 percent , or fewer than two out of ten people know what the term source reduction means. Even educated, upscale adults are no more knowledgeable. One company paid a fortune to run a full page editorial in *Fortune* magazine telling readers all about what they were doing in the area of source reduction. Unfortunately, very few understood what they were talking about; they wasted their money. Often we use terms and we expect people that we're trying to reach to understand those terms; they don't. We need to do a much better job of educating people about environmental terms and issues.

Source reduction is simply not a concept that many people talk about or think about. For example, we asked people to name a way to reduce household trash and waste (the only stipulation that we gave them was they couldn't say recycling). Half of the people we spoke to, simply couldn't do it. They couldn't name a single way, other than recycling, to reduce the stuff that we throw into the trash. Then we asked the question again. This time we explained each option (including source reduction), and then they could say recycling as an answer. Once people know about source reduction they think it's a great idea. Recycling is still the answer most Americans give for handling our solid waste problems. However, when people are introduced to source reduction and given a brief explanation of what it means, support significantly increases; indicating the need for better education and broader educational programs. When explained all of the terms, 44 percent of the people said recycling is the best solution to reducing solid waste; but, 33 percent said source reduction. Among more educated people, source reduction is viewed as just as important as recycling, when explained the term. Again, this indicates the need for educating people about source reduction. Incineration and landfilling are far less desirable options. The concept of source reduction is catching on, but very slowly. When we asked people, what specifically did a company do that causes you to believe that it's not environmentally

concerned? A small percent (5), told us excessive packaging; this is up from zero percent from the Spring of 1991.

But, recycling is what's happening, what's sexy, and what's now. Seventy five percent of all adults in this country believe we can recycle our way out of our environmental problems. They believe that 68 percent of our trash can and should be recycled. Divide that by three and your probably closer to the truth. Seventy five percent of all adults have a recycling program in their community; and 23 percent of those said that the recycling program is mandatory. This means that about 17 percent of all adults say that they have a mandatory recycling program. But, 59 percent strongly favor mandatory recycling. When asked if there is anything that business or government can do to encourage people to recycle; 63 percent said yes--"make it more convenient".

Most consumers correctly understand that curbside recycling increases the cost of trash collection. However, consumers have some pretty weird notions about recycling. For example, three out of four adults believe that once you recycle something, it can be recycled forever. Most also believe that recycled products cost more and that, on average, recycled products contain about 64 percent recycled contents; a far greater amount that's feasible for many products.

Adults aren't the only ones focusing on recycling; we recently completed a landmark study on 500 children and their actual parents on separate interviews. We also interviewed teachers for a study called "The Power of Children". We learned that children of all ages are significantly more concerned about the environment than their parents. This concern is likely to continue even when they're faced with the everyday responsibilities of adult life. Seven out of ten children say they've done something in the past 12 months to help improve the environment. What did children do? Recycling tops the list. Children are also an important influence on their parents. Four in ten children have asked their parents to help the environment. What did they ask? Again, recycling tops the list. Children also influence their parents when it comes to shopping. Half of all parents said that they either avoided or purchased a product based upon environmental information that they learned from their children. What did they avoid or buy? Twenty four percent purchase products in recyclable containers or packages. Four percent avoided products in excessive packaging. What are children learning about the environment in school? Almost one third told us they learned about the need to recycle more; and this is confirmed by educators. Nine out of ten educators told us that recycling is taught in their schools and also say that recycling is the topic that their students like the best. Few, if any, children or teachers mentioned source reduction.

So while I've been asked to talk about what consumers think about source reduction, you've heard mostly about what consumers don't know about source reduction, and how they focus on recycling. Companies and government both have their work cut out for them when it comes to educating the consumers on the environment. To be effective we'll have to go beyond vague messages such as "reduce, reuse and recycle". These words don't explain what we want consumers to do to help out and they don't explain specific corporate actions. Better educated and more concerned consumers will demand more precise information. Corporate marketers who believe that educators are responsible for educating and companies are responsible for selling will be left in the dust. The environmental leaders of the future will be those companies and organizations who can cross traditional lines and get involved in educational programs. This means not just giving money to a group that gives money to another group to develop an environmental program. It means getting involved in creating the messages; and some of our clients are already doing that.

Finally, while recycling may be the most recognized environmental message today, we all need to prepare for tomorrow by talking about and explaining issues other than recycling. The question's not whether or not the environment's here to stay, but whether or not we're all prepared to handle these issues. Vice President Elect, Al Gore, who wrote **Earth In The Balance**, was warned during the campaign to soft pedal his activism for fear of opening himself up for attack as an extremist by the Republicans. Regardless of what happened in the election there will be another surge of attention toward the environment for many of the reasons I mentioned; including the heightened awareness of children. Some people will call this the "rebirth of the environmental movement", in reality this will simply be a continuation of what has already begun.

Scanning For Consumer Behavior

Presented By

information resources inc

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- World's Second - Largest Market Research Company
- 1991 Revenues - $208 million (25% growth)
- Pioneers in use of scanner data for retail sales tracking & testing

IRI is the #1 Retail Sales Tracking Service among grocery Manufacturers.

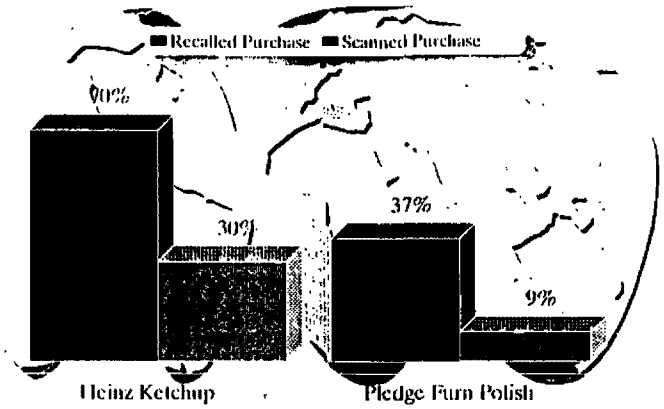
Clients Include:

RJR Nabisco	Lever Bros.
Procter & Gamble	Armour/Dial
Heinz	Conagra
Hunt - Wesson	Reckitt & Colman
Pepsi	Church & Dwight
General Mills	SC Johnson

IRI data is featured in the Wall Street Journal "Marketscan" column twice a week.

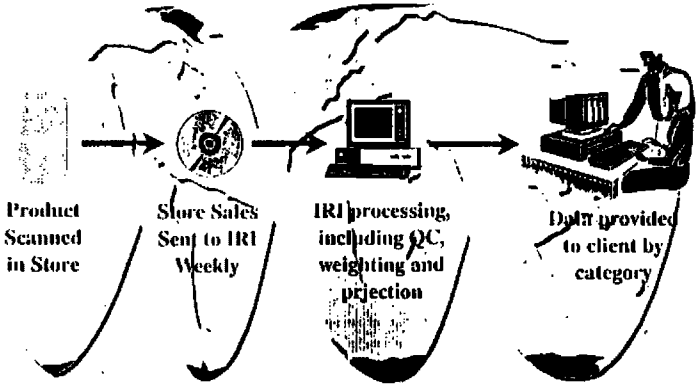
Why are scanner data necessary?

Consumer do not accurately recall thier purchasing behavior.

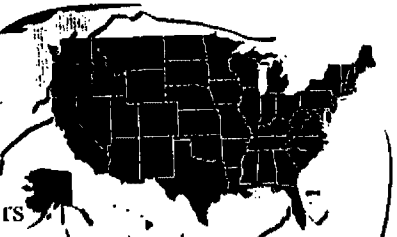


Source: IRI Study of Past 3 Mos. Purchasing

The IRI Process



The IRI Sample



- 2,700 grocery stores
- 500 drug stores
- 250 mass merchandisers
- Nationally & locally balanced sample representing virtually all important trade factors

IRI Data Quality Procedures

- Coding & updating of 2-million UPC "dictionary"
- "Expert System" software to detect & modify errors
- Sophisticated store weighting model

IRI Available Geographies

- Total U.S. Grocery, Drug, Mass Merch, combined
- 64 grocery markets
- 8 standard regions
- 9 combined-outlet markets
- 140 individual accounts

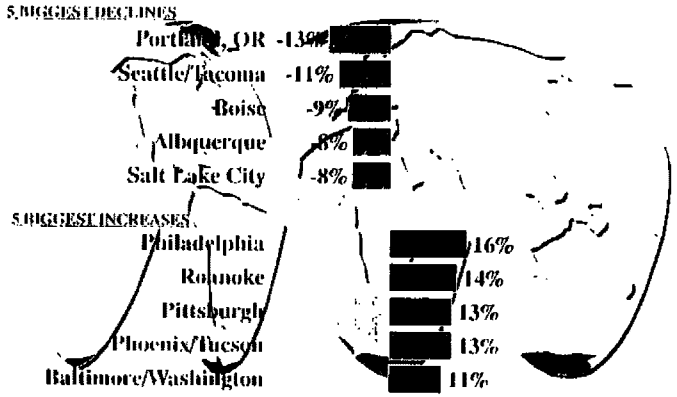
IRI's Multi-Category Syndicated Databases

- Supermarket Review
- Drug Store Review
- Mass Merchandise Review

THE "REVIEWS"

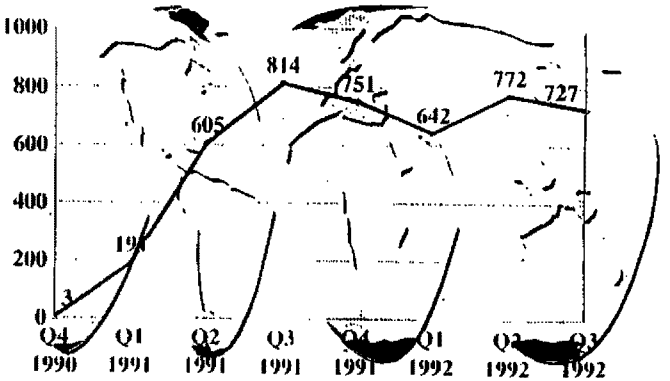
- Over 200 product categories
- Standard retailer-defined category & product hierarchy
- Updated monthly on-line and quarterly via hard copy
- Measures include
  - Unit/dollar sales
  - Market share
  - Distribution
  - Pricing
  - Merchandising

Furniture Polish Dollar Sales
% Change - Q3 1992 vs. Q3 1992



Source: IRI Supermarket Review

GOOD SENSE TRASH BAGS
QUARTERLY DOLLAR SALES($M)

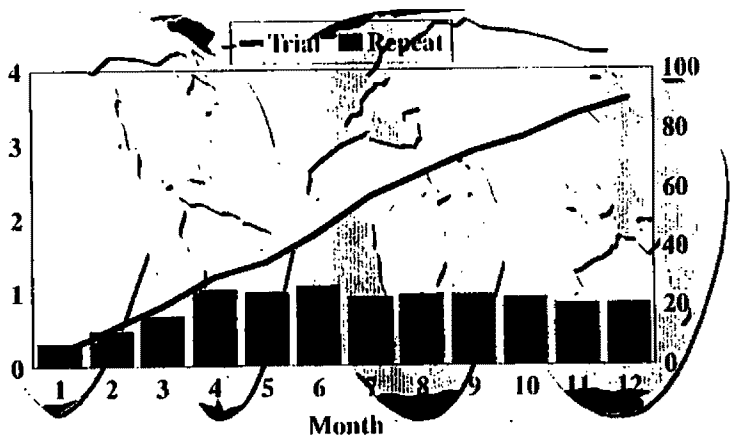


Source: IRI Supermarket Review

IRI's Household Panel

- Sample of 60,000 households in 26 markets
- Passive data collection
  - Show ID card at purchase
  - No recall involved
- Allows tracking of behavior over time, leading to better understanding of consumer dynamics

WILL CONSUMERS MAKE REPEAT PURCHASES?



Four Season Sorting

John Ikeda and Susan Mitchell

I. Introduction

In 1989, the Minnesota Legislature mandated a statewide analysis of solid waste composition as part of the Select Committee on Recycling and the Environment (SCORE) legislation. The statutory mandate reads:

> The minnesota pollution control agency, in cooperation with the office of waste management and the metropolitan council, shall study and comprehensively analyze the composition of solid waste on a statewide and regional basis during each of the four seasons of the year. The study must include but not duplicate existing waste composition information previously gathered and must provide information on recyclables and non-combustibles in the waste, generation of the waste, and other solid waste characteristics. The pollution control agency shall present its findings to the legislative commission on waste management by November 1, 1992. (1989 Minnesota Laws, First Special Session, Chapter 1, Article 22, Section 3.)

This report presents the results of the first comprehensive study conducted in Greater Minnesota. Waste composition studies provide useful information essential for planning effective solid waste programs. It is crucial to know what is in the waste to successfully and efficiently reduce the amount of waste going into disposal facilities. The information in this report can be used by the legislature, counties, and other units of government to direct policy.

A number of waste composition studies have been conducted in the United States and for the federal government. All of these studies provide information, but the data have only a limited application to Minnesota. Local conditions, economic base, and recycling and composting programs all have a noticeable effect on the composition of waste. The composition of municipal solid waste (MSW) in Minnesota differs from the national average because of Minnesota's far-reaching recycling programs and integrated waste management approach.

II. Methodology

The Minnesota Pollution Control Agency (MPCA) conducted a four-season waste composition study in Greater Minnesota (not including the seven counties of the metropolitan area) from July of 1990 to May of 1991. The MPCA decided to conduct the study itself to save money and to retain greater control of the methodology and data. A protocol was developed after reviewing the available literature. An interagency committee defined the sorting categories. Study sites were chosen after many interviews and several site visits.

Five sites were selected to represent different economic activities, geographic regions, and community sizes throughout the state. Prospective sites also had to 1) receive enough waste to be representative of that region, 2) have an owner or operator willing to participate in the study, and 3) have a building in which samples could be sorted. To avoid duplication of previous studies, sites were chosen that had not participated in a study as detailed as this one. County-operated landfills in Winona, Itasca, and Lyon Counties were chosen, as well as transfer stations in Becker County and the Tri-County area.

An MPCA staff coordinator was responsible for conducting the study at each site and for hiring 10-14 sorters each season from each community. The sorters were encouraged to work all four seasons. This saved money through reduced training costs. Also, it was hoped that retaining the same crew would lead to consistent data. It turned out that employees hired locally were able to provide insights into the composition of various commercial, institutional, and rural loads. In turn, the employees learned a great deal about local waste management.

The safety of the coordinators and sorters was paramount. The coordinators worked closely with the MPCA safety officer to develop safety procedures, site safety plans, and to determine what protective gear was needed. Coordinators received special training in hazardous material handling, CPR, first aid, and defensive driving. Safety was also a major part of the training the sorters received.

The sorts were conducted each season for a one-week period, Monday through Friday, at each site. The amount of garbage received on Saturday, if the facility was even open, was very small. Absolutely every effort was made to randomize the selection of sample trucks. When a truck was selected, the driver was briefly interviewed about the source and type of garbage being hauled (residential, commercial, or industrial).

The driver was then directed to dump the load in a specific area for sampling. A front-end loader or skid-steer loader was used to shave a quarter section off the entire length of the load. The quarter section was then mixed and a 200 to 400 pound sample was taken from it to the pre-sorting area. The site coordinator (or trained county staff person) sorted through the sample, opening bags to remove any waste that might endanger the sorters. Hazardous waste was documented separately by the site coordinators and was properly packed for disposal. Once pre-sorted, the sample was taken directly to the sorting tables. There, four to six sorters at each table sorted the sample into labeled barrels, one barrel for each category. After the entire sample was sorted, the barrels were weighed and the gross and tare weights recorded. The sample was then dumped into the landfill or transfer trailer.

The equipment needed to do this project was extensive. The equipment and protective gear were transported by the coordinators from site to site in a large rental truck or agency-owned van.

A total of twenty waste sorts were conducted. During those 100 days of sorting the MPCA coordinators and sorters analyzed 884 samples. The total weight of the samples was 285,927 pounds or approximately 143 tons. The average sample weighed 336 pounds.

The dates field work was conducted were: Summer--July17 to August 31 1990, Fall--October 15 to November 16, 1990, Winter--January 14 to February 15, 1991, and Spring--April 15 to May 17, 1991. Temperatures at the sites ranged from approximately 95 degrees F. with a relative humidity of 80 percent to -20 degrees F. with a wind chill of -35 degrees F.

III. Results

Table 1 shows the overall percentage estimates of material in the waste stream during the one-year study period at each site and at all the sites combined. Table 2 is also included to show the overall percentage estimates by season. All of the communities where the study was conducted had source-separation recycling programs. Therefore, the following percentages reflect what is still being thrown away.

Table 1. Overall percentage estimates of material in MSW (by weight) during the one-year study period at each site and at all sites combined.

	SITES					
SORTING CATEGORIES	Winona (%)	Itasca (%)	Lyon (%)	Tri-Co (%)	Becker (%)	TOTAL (%)
Newsprint	2.3	4.8	4.4	4.4	4.1	4.0
High Grade Paper	2.3	3.1	3.3	5.2	2.3	3.8
Corrugated/Kraft Paper	12.7	7.4	11.4	8.1	9.2	9.5
Magazines	1.9	3.1	2.8	2.8	2.2	2.6
Other Paper	21.3	21.6	20.5	20.0	15.3	20.0
Total percentage: Paper	**40.5**	**40.0**	**42.4**	**40.5**	**33.1**	**39.8**
High Density Polyethylene - HDPE	0.4	0.9	0.6	0.7	0.9	0.7
Plastic Film	5.8	4.4	6.4	4.6	4.6	5.0
Polyethylene Terephthalate - PET	0.1	0.3	0.4	0.4	0.5	0.3
Polystyrene	0.5	1.1	0.8	1.1	0.9	0.9
Other Plastic	4.9	2.2	2.5	2.8	1.9	3.1
Total percentage: Plastic	**11.8**	**8.9**	**10.7**	**9.5**	**8.8**	**10.0**
Aluminum Beverage Containers	0.2	0.5	0.6	0.5	0.6	0.5
Other Aluminum	0.3	0.4	0.2	0.3	0.3	0.3
Ferrous Food Cans	0.6	1.9	1.2	1.3	1.6	1.3
Other Ferrous	4.0	2.4	1.5	2.3	2.3	2.6
Other Non-Ferrous	0.2	0.4	0.3	0.2	0.5	0.3
Total percentage: Metal	**5.4**	**5.7**	**3.8**	**4.8**	**5.3**	**5.0**
Glass Food/Beverage Containers	1.1	4.2	2.4	2.4	3.5	2.4
Other Glass	0.6	0.7	0.6	0.8	0.7	0.7
Total percentage: Glass	**1.7**	**4.9**	**3.0**	**3.2**	**4.2**	**3.1**
Small Yard Waste	1.2	2.5	3.2	4.1	6.1	3.4
Large Yard Waste	0.1	0.2	0.0	0.3	0.2	0.2
Total percentage: Yard Waste	**1.2**	**2.7**	**3.2**	**4.4**	**6.2**	**3.6**
Food Waste	12.8	17.3	15.9	11.7	25.2	14.5
Wood Waste	8.5	1.6	5.1	6.7	2.8	5.9
Tires	0.0	0.0	0.1	0.0	0.0	0.0
Adult and Infant Diapers	2.0	3.1	2.5	2.6	3.3	2.6
Textiles	4.9	2.5	2.0	3.7	2.3	3.5
Other Organic Waste	3.5	5.6	4.6	2.5	2.5	3.3
Major Appliances	0.1	0.0	0.0	0.1	0.0	0.1
Small Electric Appliances	0.3	0.7	0.7	0.3	0.3	0.4
Demolition/Construction Debris	4.9	1.1	1.1	4.7	1.7	3.7
Hazardous Waste	0.5	1.0	0.7	0.9	0.6	0.8
Oil Filters	0.1	0.2	0.4	0.2	0.4	0.2
Other Inorganic Waste	1.8	4.9	3.9	4.2	3.1	3.6

Table 2. Overall percentage estimates of material in MSW (by weight) from all sites during **each season** and for all four seasons combined.

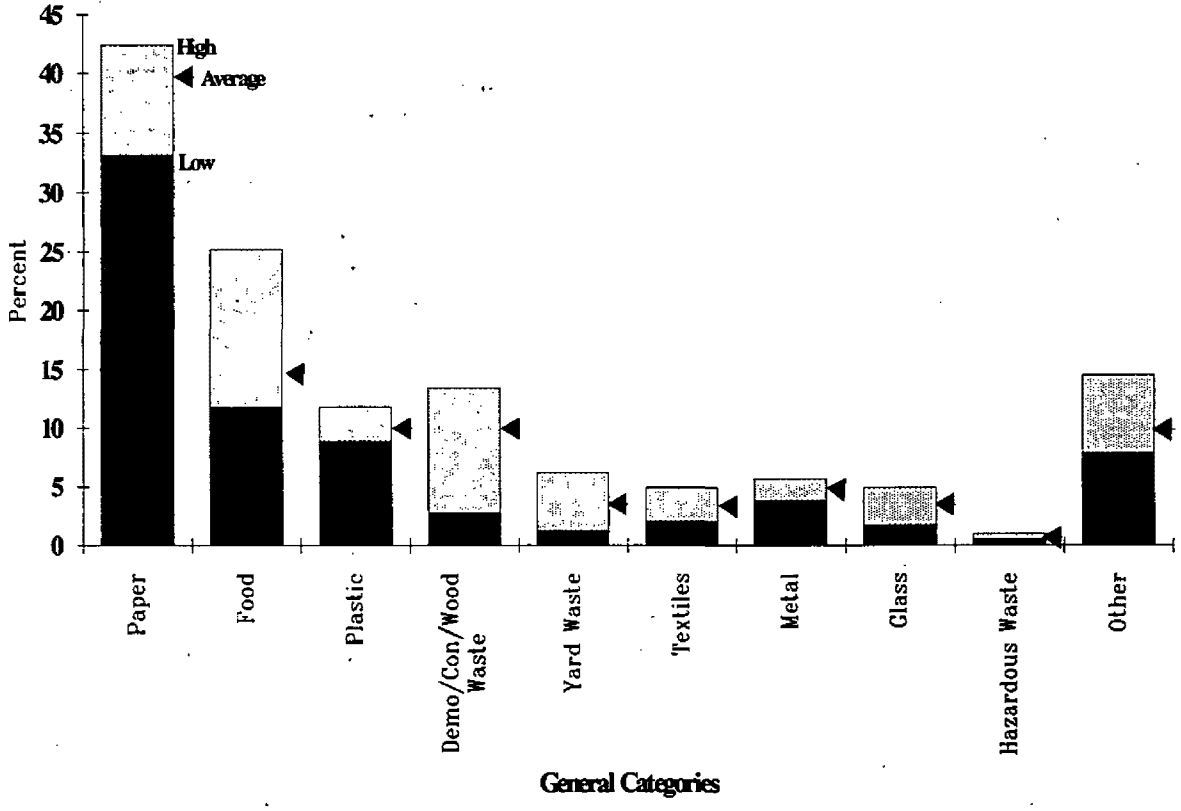
	SEASONS				
SORTING CATEGORIES	Summer (%)	Fall (%)	Winter (%)	Spring (%)	TOTAL (%)
Newsprint	4.0	3.8	3.5	4.4	4.0
High Grade Paper	2.9	4.3	3.7	4.5	3.8
Corrugated/Kraft Paper	9.5	9.7	9.7	9.0	9.5
Magazines	2.1	2.7	2.9	2.5	2.6
Other Paper	17.5	20.3	22.2	20.6	20.0
Total percentage: Paper	**36.1**	**40.7**	**42.1**	**41.1**	**39.8**
High Density Polyethylene - HDPE	0.6	0.6	0.8	0.7	0.7
Plastic Film	4.2	5.2	5.6	5.3	5.0
Polyethylene Terephthalate - PET	0.2	0.3	0.4	0.4	0.3
Polystyrene	0.9	0.9	1.1	0.8	0.9
Other Plastic	2.8	3.0	3.4	3.1	3.1
Total percentage: Plastic	**8.7**	**10.0**	**11.3**	**10.3**	**10.0**
Aluminum Beverage Containers	0.5	0.4	0.5	0.5	0.5
Other Aluminum	0.4	0.3	0.3	0.3	0.3
Ferrous Food Cans	1.0	1.2	1.7	1.2	1.3
Other Ferrous	2.7	3.3	2.0	2.4	2.6
Other Non-Ferrous	0.2	0.4	0.2	0.3	0.3
Total percentage: Metal	**4.8**	**5.6**	**4.7**	**4.8**	**5.0**
Glass Food/Beverage Containers	2.5	2.1	2.4	2.6	2.4
Other Glass	0.7	0.6	1.1	0.6	0.7
Total percentage: Glass	**3.2**	**2.7**	**3.5**	**3.2**	**3.1**
Small Yard Waste	4.9	3.6	0.4	4.1	3.4
Large Yard Waste	0.3	0.0	0.1	0.2	0.2
Total percentage: Yard Waste	**5.2**	**3.7**	**0.5**	**4.3**	**3.6**
Food Waste	14.8	14.3	15.5	13.5	14.5
Wood Waste	7.3	5.5	5.4	5.3	5.9
Tires	0.0	0.0	0.0	0.0	0.0
Adult and Infant Diapers	2.4	2.5	3.2	2.4	2.6
Textiles	4.5	2.8	2.6	3.7	3.5
Other Organic Waste	3.8	2.6	2.8	3.6	3.3
Major Appliances	0.0	0.1	0.2	0.0	0.1
Small Electric Appliances	0.2	0.5	0.5	0.5	0.4
Demolition/Construction Debris	4.6	4.3	2.8	2.7	3.7
Hazardous Waste	0.8	0.8	0.7	0.9	0.8
Oil Filters	0.0	0.3	0.2	0.3	0.2
Other Inorganic Waste	3.5	3.4	4.0	3.5	3.6

All together, the paper categories represented the largest portion of the waste stream. The largest paper was Other Paper, the catch-all category for all paper that did not fit into one of four more specific categories. Other Paper was composed of a heterogeneous mix of papers, only some of which could be recycled today. Composting may be another alternative.

Food Waste accounted for an overall percentage of 14.5. This category includes dead animals and the remains from hunting seasons, as well as uneaten food and food scraps. The Food Waste percentages across sites varied substantially because of food processing plants located in two of the study areas. The ranges shown in Figure 1 illustrate the highest percentage and lowest percentage found in the general categories at all five sites. The arrows point to the overall average. .

Fig. 1. Aggregated Waste Compostion Data: All Sites

(Illustrates Range and Average)



The category Plastic Film, which includes flexible wrapping material and garbage bags, was a significant component of the waste streams. Overall, the plastics categories were 10 percent of the waste stream with the Plastic Film category accounting for 50 percent of all plastics. This is particularly significant considering the data are measured by weight and plastic films are so lightweight.

A number of the categories represented items that are banned from landfills. Tires, large appliances, and lead acid batteries are all examples. Few of these items were found in the samples or observed by the loader operators in the truckloads they sampled. The Tires category includes bicycle and motorcycle tires as well as automobile tires. A couple of bicycle tires and a motorcycle tire were found during the summer season. Parts of several large appliances, four lead acid motorcycle batteries, and four other small lead acid batteries were found in the waste. It would seem that the deposit/refund system is working to keep automobile batteries, if not motorcycle batteries, out of landfills.

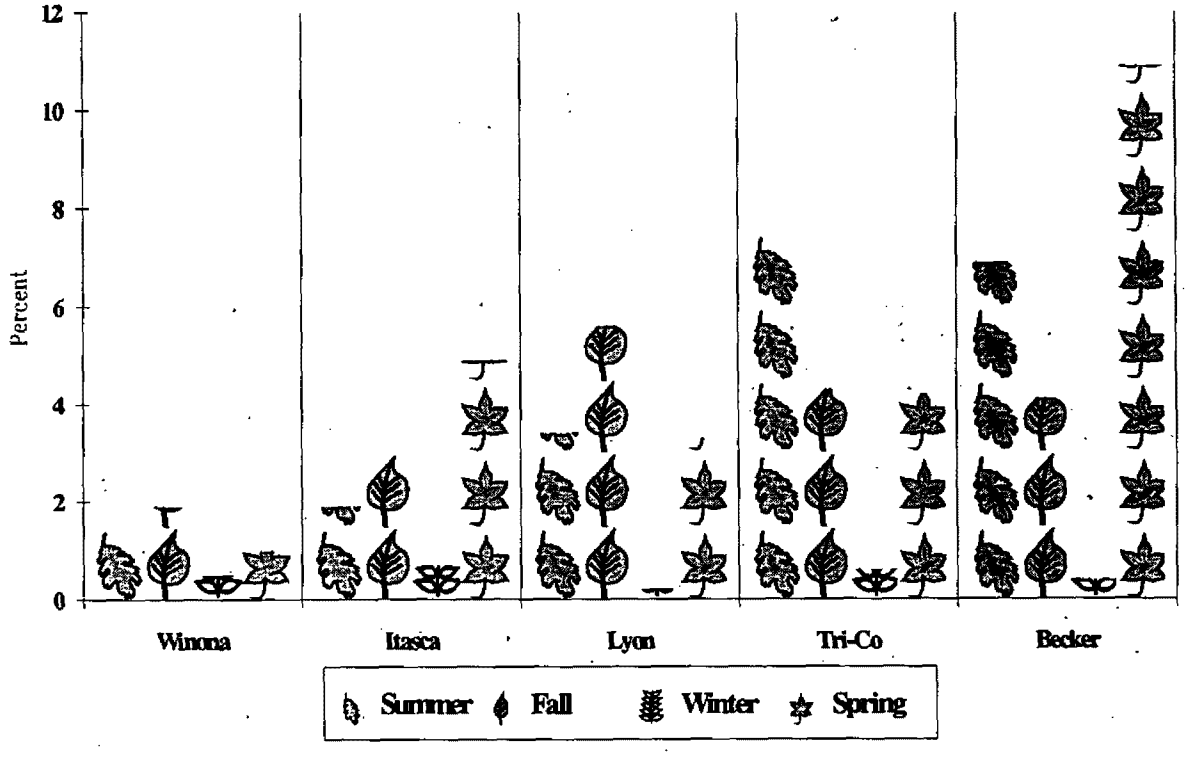
Yard Waste was another category of interest. At the time the study was conducted, yard waste was not yet banned from Greater Minnesota disposal facilities. Even so, Winona became the first county in Minnesota to ban yard waste in November of 1987. The cities in Itasca County started their own yard waste composting programs about the same time the waste composition study started in July 1990. These composting efforts had a clear effect on the amounts of yard waste received. See Table 3 for start-up dates of county programs.

Table 3. Summary of start-up dates of county programs.

	Winona	Itasca	Lyon	Tri-Co	Becker
Curbside Recycling	1985	NA	1990	1989	NA
Yard Waste Composting	1987	1989	1990	1989	1990
HHW Collection	1985	1991	1988	1990	1989

Of all the categories, Yard Waste was the one category whose percentages showed a statistically significant difference from season to season (see Figure 2). The distinct seasons in Minnesota would account for these findings. Other than Yard Waste, it does not appear that there is a significant difference in the composition of MSW from season to season. There is a difference in the amount of garbage received season to season at the facilities that were part of this study (see Figure 8). Statistically significant differences in the percentages of some of the categories vary from site to site. These site-to-site differences probably reflect differences in economic base and recycling programs.

Fig. 2. Percent of Yard Waste by season at each site.



Hazardous waste was one of the categories used in this waste composition study. It should be noted that the term "household hazardous waste" refers to the unused portion of products found in most kitchens and garages that is eventually disposed of. This category includes such things as paint, home

and garden pesticides, aerosols, and charcoal starter. Hazardous waste was culled from the samples before the sort crew had access to them. Because the MPCA became a hazardous waste generator by separating hazardous materials from MSW, it was necessary to properly separate, package, document, and transport the material to hazardous waste collection centers. Because this level of documentation was required, the MPCA maintained an extensive and detailed list of the items categorized as hazardous waste during this study.

Hazardous waste is grouped into the following categories: Aerosols, Acids, Bases, Flammables/Solvents, Chlorinated Products/Other Pesticides, Flammable Solids, Oxidizers, Organic Peroxides, and Paints. Some of the hazardous waste categories deserve further explanation. For example, all aerosols were removed during pre-sorting and classified as hazardous waste whether they contained toxic liquids, a food product, or were empty. The rationale for this is that the aerosol package itself presents a hazard because it is pressurized. An unpunctured aerosol is also never truly empty because it contains butane, propane, or other propellants. Residual product frequently remains in the can, also. A great deal of information about this type of container is available to the recycling industry because of separate documentation during the study.

Paints were recorded because they can be hazardous wastes. Empty paint containers were also separated and documented in order to compare discarded paints with the number of completely used and/or properly disposed of paint products. (Paints in aerosol cans are recorded in aerosols, not paints.)

All types of batteries were considered hazardous waste in this study because of mercury, cadmium, and other hazardous materials contained in many of them. By calling these materials hazardous for the purpose of this study, they could be recorded in detail. Lead acid batteries are banned from land-disposal so the study was interested in discovering the effectiveness of the ban. See Table 4 for the number and types of batteries found in the samples.

Oil filters were composite materials and it was difficult to determine the representative weights of the components, especially since there were a wide range of sizes of filters. After the summer sort, they were recorded separately. Removing filters during pre-sorting helped to keep drain oil off of the other waste in the samples and the sorting equipment. In sorting 143 tons of waste, 497 oil filters were documented.

While the information in the hazardous waste summaries is primarily non-quantitative, tallying the number of items in each category as representations of disposal decisions made by individuals can give some hints about program effects on waste streams. (See Tables 4 to 6.) Because of the difference in the number of samples taken at each site, the total tonnage sorted at the sites, the relatively few number of hazardous items, and other factors, no comparisons may be safely made statistically. But, this type of analysis can be instructive for program planning and evaluation if the information is studied in context. The itemized lists, the study definitions, and information about programs affecting the wasteshed should be examined together to get a picture of hazardous waste in municipal solid waste in Minnesota.

In the commercial/industrial sector, six materials are consistently found in the five heaviest categories at each site. (See Figure 3.) Three of these categories--Wood Waste, Plastic Film, and Corrugated/Kraft Paper--represent materials commonly used as packaging and shipping materials. Large quantities of other recyclable materials were also seen in the commercial/industrial waste stream.

Results of other waste composition studies conducted in Minnesota and other states are also provided for comparison. Not surprisingly, results from other Minnesota studies were most similar to the results of the MPCA study. Compared to a national study conducted for the U.S. Environmental

Table 4. Number and type of batteries removed from sorted samples.

	SITES					
Battery Type	**Winona**	**Itasca**	**Lyon**	**Tri-Co**	**Becker**	**TOTAL**
Alkaline/Carbon-Zinc:						
AAA	7	22	3	7	8	47
AA	158	170	134	137	156	755
C	51	98	49	52	50	300
D	45	111	59	82	56	353
9v	35	33	22	7	30	127
Unidentified	0	0	0	96	0	96
Other Alkaline/Carbon-Zinc	1	7	6	6	11	31
Nickel-Cadmium	3	4	2	1	0	10
Button	5	5	1	2	3	16
Large Mercury	0	2	1	0	0	3
Lead-Acid	0	1	2	4	1	8
Other	3	2	5	1	11	22
TOTAL	308	455	284	395	326	1768
No. of samples	205	152	142	194	158	851
Tons sorted	34.6	30.3	22.0	34.5	21.6	143.0

Table 5. Number of containers of hazardous waste removed from sorted samples.

	SITES					
Category	**Winona**	**Itasca**	**Lyon**	**Tri-Co**	**Becker**	**TOTAL**
Aerosols	85	111	67	40	86	389
Flammables/Solvents	27	45	38	32	33	175
Flammable Solids	0	0	0	0	0	0
Paints	20	42	19	11	46	138
Chlorinated Products/ Other Pesticides	7	12	3	4	7	33
Acids	0	9	0	0	3	12
Bases	2	2	0	2	7	13
Organic Peroxides	0	1	1	0	0	2
Oxidizers	0	2	1	0	2	5
Other	14	11	4	6	14	49
TOTAL	155	235	133	95	198	816
No. of samples	205	152	142	194	158	851
Tons sorted	34.6	30.3	22.0	34.5	21.6	143.0

Table 6. Number of empty hazardous material containers that were removed from sorted samples.

Category	SITES					TOTAL
	Winona	Itasca	Lyon	Tri-Co	Becker	
Aerosols	273	417	263	448	307	1708
Flammables/Solvents	69	75	38	102	53	337
Flammable Solids	0	0	0	0	0	0
Paints	25	42	72	98	42	279
Chlorinated Products/ Other Pesticides	12	5	7	4	0	28
Acids	0	7	17	3	3	30
Bases	2	6	2	7	3	20
Organic Peroxides	0	1	0	0	0	1
Oxidizers	0	0	0	0	0	0
Other	2	23	1	11	3	40
TOTAL	383	576	400	673	411	2443
No. of samples sorted	205	152	142	194	158	851
Tons sorted	34.6	30.3	22.0	34.5	21.6	143.0

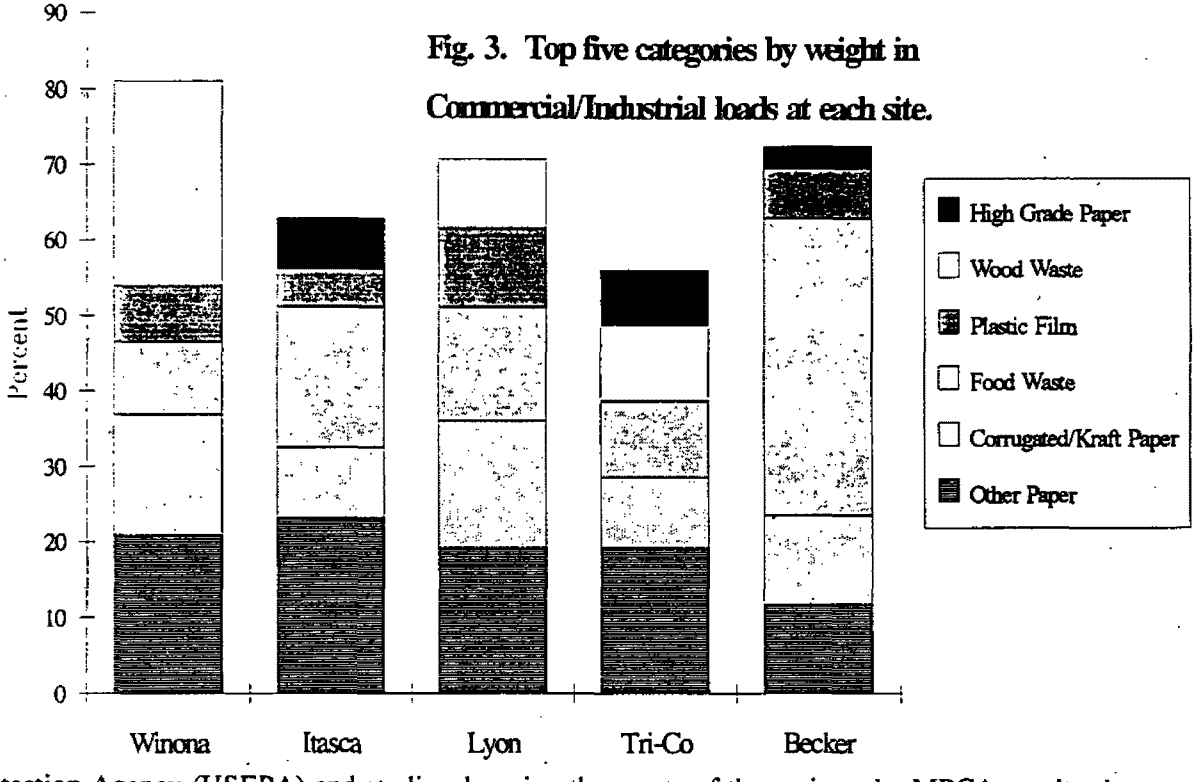


Fig. 3. Top five categories by weight in Commercial/Industrial loads at each site.

Protection Agency (USEPA) and studies done in other parts of the nation, the MPCA results show significantly less yard waste, less glass, and more plastic (except plastic is at a similar level in the USEPA study). When comparing results, remember that if certain fractions of the waste stream are reduced or eliminated, the other categories must increase in proportion to add up to 100 percent.

When comparing the 1990 projected per capita generation figures from the USEPA study with the MPCA study per capita generation figures, it appears that Minnesotans dispose of an average of 20 percent less MSW than the national average at landfills and transfer stations.

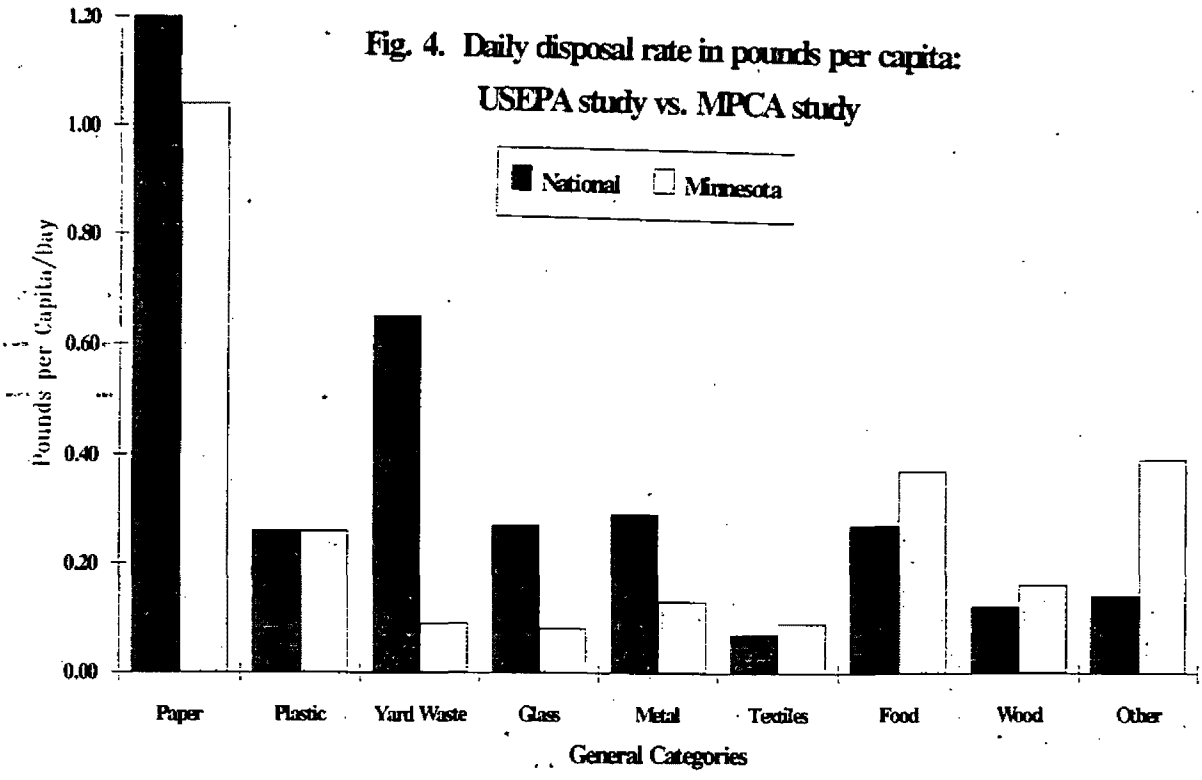


Fig. 4. Daily disposal rate in pounds per capita: USEPA study vs. MPCA study

A large portion of the full report details how the study was conducted. This information is included for two reasons. First, enough information is provided that a company or unit of government could use this document to perform a waste composition study. Second, should an entity elect to contract with a consultant for a waste composition study, the information in the report should simplify developing a request for proposals and should make it easier to judge the quality of work.

VI. Conclusions/Recommendations

The following conclusions and recommendations are based on the study data and observations made by MPCA staff.

A. Residential recycling

Residential recycling programs are removing quantities of materials from the waste stream. Newsprint has diminished in quantity in household garbage cans, as have aluminum and ferrous cans and glass containers. Residential samples at sites with aggressive recycling programs would produce a handful of cans, a couple of bottles and jars, a few newspapers, and a couple plastic jugs and bottles. At sites with newly-implemented recycling programs, sorting one sample could rapidly fill a 16-gallon barrel with aluminum cans and a 30-gallon barrel could be packed with newspapers. The difference between sites was pronounced to the coordinators. Figure 5 indicates differences in commonly recycled material between sites.

The differences are also apparent in Table 7, which presents the data on per capita waste generation. Winona County began a pilot recycling program in 1985. The figures for common household recyclables (aluminum cans, newsprint, ferrous food cans, glass food and beverage containers, HDPE, and PET) in Winona County are lower than any of the other four sites. Curbside collection of recyclables started in the other four communities around 1989. It appears that the longer programs are in place, the more successful they become. Therefore, continued state and county funding for positions, waste programs, waste education, joint projects, and market development is recommended. A great deal of resources are needed to implement a recycling program, but as the program matures and recycling becomes a part of people's daily routines, the investment of time and resources seems to pay off.

Fig. VI-1. Percent of recyclables in the waste stream.

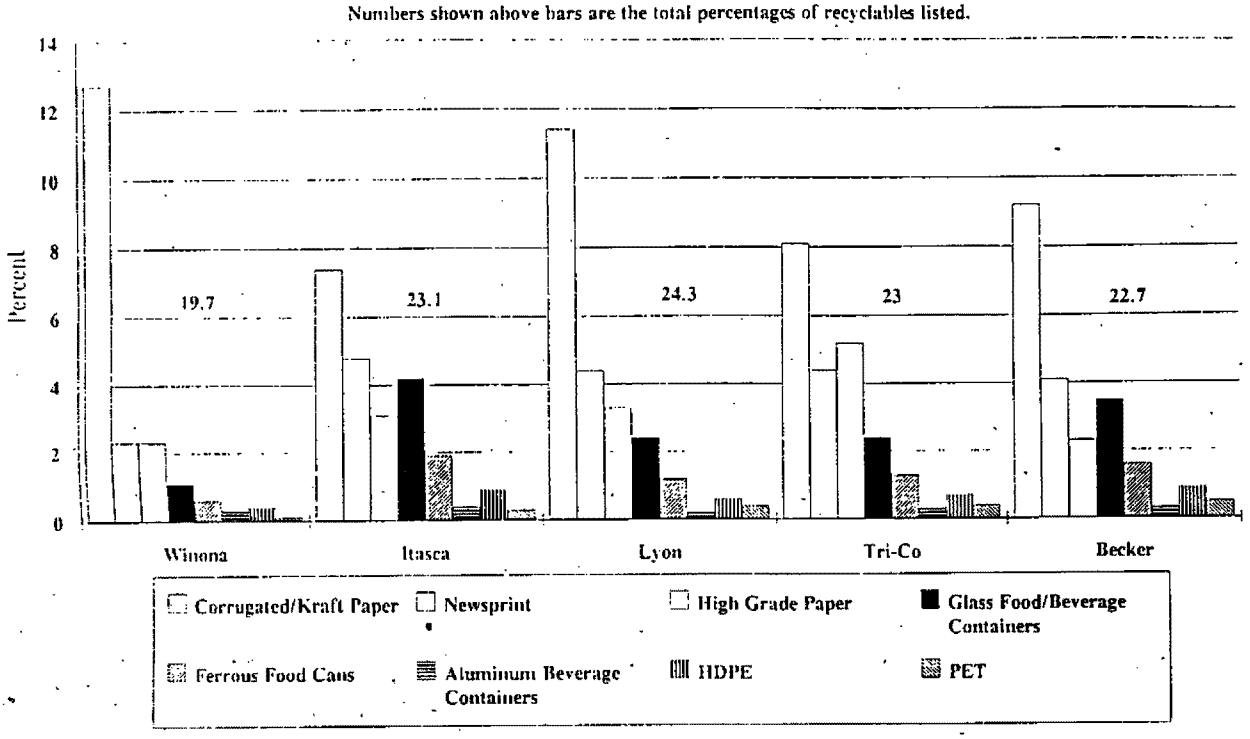


Fig. VI-3. Overall percentages of general categories.

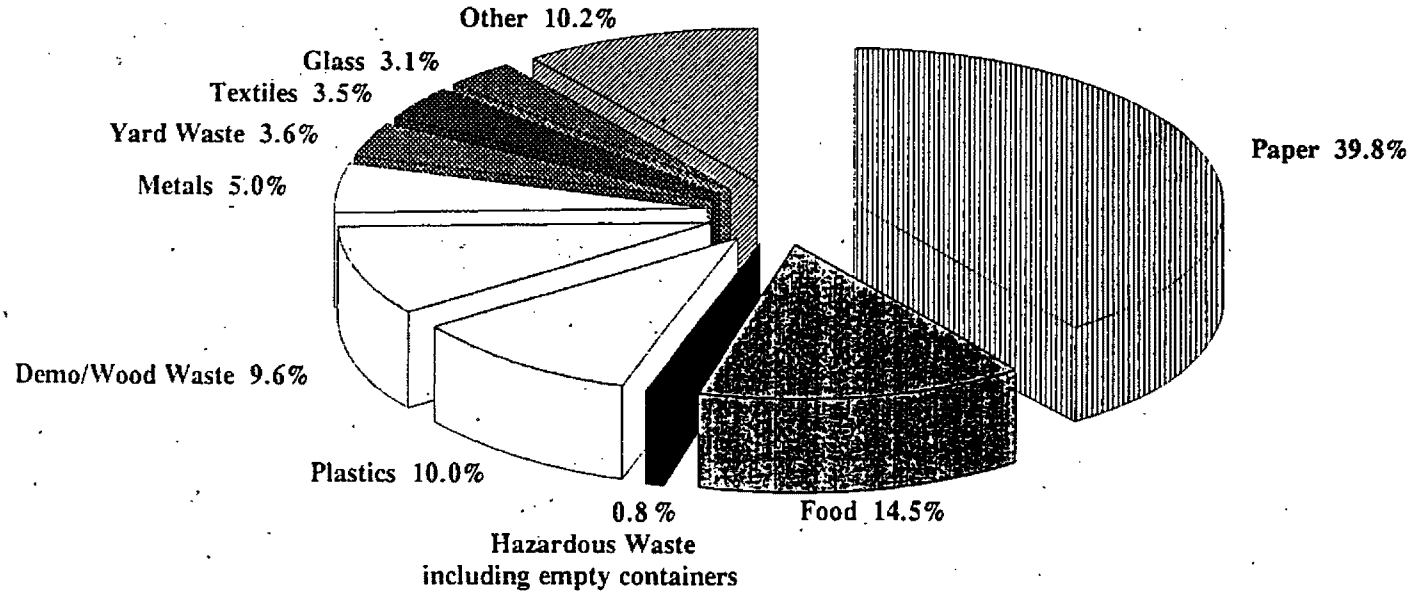


Table 7. Estimated annual weight (pounds) of material discarded per capita within the five wastesheds.

	SITES				
SORTING CATEGORIES	Winona lbs/capita	Itasca lbs/capita	Lyon lbs/capita	Tri-Co lbs/capita	Becker lbs/capita
Newsprint	28.0	32.2	51.0	41.6	35.2
High Grade Paper	28.5	22.5	38.4	48.4	21.6
Corrugated/Kraft Paper	156.0	49.4	132.6	75.9	72.5
Magazines	23.4	21.5	32.3	26.0	19.6
Other Paper	260.8	148.9	237.3	188.1	132.9
Total pounds/person: Paper	**496.7**	**274.5**	**491.6**	**380.0**	**281.7**
High Density Polyethylene - HDPE	5.3	6.0	7.5	6.3	8.2
Plastic Film	71.2	30.0	74.3	43.4	41.3
Polyethylene Terephthalate - PET	1.3	1.9	4.4	3.5	4.7
Polystyrene	6.3	7.5	9.4	10.3	7.0
Other Plastic	60.0	15.1	28.5	26.2	16.7
Total pounds/person: Plastic	**144.0**	**60.5**	**124.0**	**89.6**	**77.9**
Aluminum Beverage Containers	2.9	3.6	6.5	5.0	5.3
Other Aluminum	3.6	2.9	2.2	3.0	2.7
Ferrous Food Cans	7.4	13.3	13.9	12.5	14.6
Other Ferrous	49.3	16.4	17.2	21.9	14.5
Other Non-Ferrous	2.8	2.4	3.6	2.3	4.4
Total pounds/person: Metal	**66.1**	**38.6**	**43.4**	**44.7**	**41.5**
Glass Food/Beverage Containers	13.2	28.2	27.7	22.7	30.8
Other Glass	7.9	4.8	6.4	7.5	6.1
Total pounds/person: Glass	**21.1**	**33.0**	**34.1**	**30.2**	**36.9**
Small Yard Waste	14.5	17.7	37.0	38.6	51.2
Large Yard Waste	0.7	1.1	0.2	2.4	1.1
Total pounds/person: Yard Waste	**15.2**	**18.8**	**37.2**	**41.0**	**52.3**
Food Waste	157.0	119.6	184.8	109.6	219.9
Wood Waste	104.7	11.3	59.5	62.8	22.0
Tires	0.1	0.1	0.5	0.3	0.0
Adult and Infant Diapers	24.0	20.8	28.6	24.8	30.5
Textiles	60.7	17.2	22.7	34.3	20.3
Other Organic Waste	42.8	36.1	53.1	23.4	21.7
Major Appliances	1.1	0.0	0.0	0.9	0.5
Small Electric Appliances	4.1	4.7	7.9	3.2	2.7
Demolition/Construction Debris	59.5	7.6	13.3	44.2	16.1
Hazardous Waste	6.4	6.2	8.6	8.7	5.7
Oil Filters	1.0	1.4	4.2	2.0	3.8
Other Inorganic Waste	21.5	33.3	45.6	39.3	27.5
TOTAL POUNDS/PERSON/YR	**1225.9**	**683.8**	**1159.1**	**939.0**	**860.9**

B. Commercial/Industrial sector recycling and reduction

Consumers do not often think about the amount of waste created in the production and shipping of consumer goods. Off-specification products, wooden pallets, shrink wrap, and corrugated cardboard are all out of sight by the time products are on the store shelves. Because this segment of the waste stream is not obvious to most people, it has not received as much attention from recycling programs. In the data a decrease in recyclables in the residential waste stream can be hidden by large quantities of recyclables disposed of by the commercial sector. Although a great deal of effort has concentrated on residential recycling programs, the need to focus on commercial recycling programs is indicated by the large quantities of film, high grade paper, and corrugated cardboard still found in the waste stream. (Refer to Figure 3) Large volumes of material could potentially be removed from the waste stream by focusing attention on commercial recycling. Items such as corrugated cardboard, film, and office paper are the obvious examples and perhaps the easiest to divert from the waste stream. However, this should not preclude recycling opportunities for other materials that are specific to each business.

Besides encouraging increased recycling in commercial establishments, another option would be the design and use of reusable shipping containers. Many of the corrugated boxes, shrink wrap, and wooden pallets could be eliminated by reusable containers that could be shipped back to the supplier. Reusable shipping containers would ultimately be less expensive even when considering additional shipping. Figure 3 illustrates the top five categories by weight in commercial/industrial loads at each site. Corrugated, Plastic Film, and Wood Waste are in the top five at almost every site.

Waste audits could help industries and businesses to uncover disposal patterns and waste reduction opportunities. For example, a knitting mill in Winona County disposed of fairly uniform truckloads of yarn and other textiles on a regular basis. Textiles at the Winona County site were almost 5 percent of the waste stream, the highest Textile percentage of any site. A waste audit could show the knitting mill the quantity of its waste that could be recycled.

C. Opportunities for reuse

Textiles, mainly clothing, are a small percentage of the materials in the waste stream, but very few of the items needed to be there at all. Clothes in good condition, large pieces of fabric, fabric scraps, and yarn are all found in the Textiles category. Although Textiles account for an average of 3.5 percent of the waste stream by weight (see Figure 6), textile reuse and recycling deserves more attention. Textile recycling has been in existence since the early part of the century, but has been underutilized by recycling programs. A combination of textile reuse and recycling could be accomplished with a single pick-up. Reusable items could be diverted to second hand operations. Items which could not be reused could be recycled.

Hidden within the categories are other items which still have useful life. Children's toys and games, tools, kitchen utensils and tableware, office supplies, bedding, rugs, clocks, cameras, books, and hobby supplies are just some of the useful things found during the sorts. In urban areas groups such as Goodwill, The Salvation Army, The Association of Retarded Citizens, and Disabled American Veterans are usually willing to pick up these items for reuse. The public needs to be encouraged to use these already-existing outlets for reusable items rather than using the trash can.

Coordinators and sorters were also disgusted to witness the misuse of solid waste facilities by large stores and mail order businesses who performed inventory control by dumping truckloads of perfectly good items such as dishes, bedspreads, shoes and clothing. This practice epitomizes wastefulness. Businesses justify this behavior by saying that items they might donate to charity could easily be returned to their stores for cash. Although this is a legitimate concern, a system of marking donated items to prevent their return for cash could be developed. The advantages to businesses of donating excess inventory include lower disposal costs, community goodwill, and tax benefits. The current situation wastes resources and facility capacity.

D. Food Waste

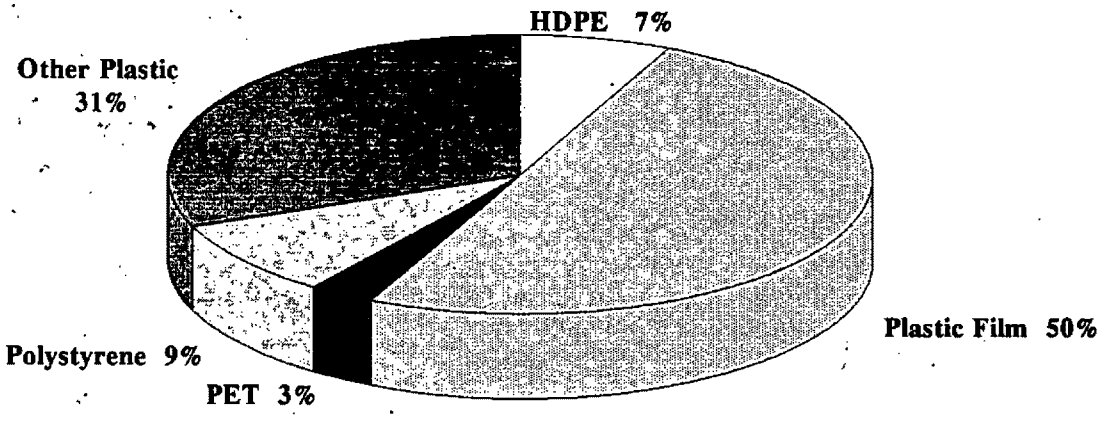
Food Waste accounted for an average of 14.5 percent of the garbage by weight. This study's Food Waste category would be more accurately titled "putrescibles" because it also includes road kills and other deceased animals. Deer hunting season impacts this category with the weight of carcasses, heads, and heavy hides. However, the largest quantities of food came from commercial establishments (grocery stores, restaurants, schools, and nursing homes). Establishments that produce large quantities of food waste could be targeted for programs where food scraps are turned into animal feed. Some industries, such as food processing plants, may have wastes that lend themselves to a food composting program.

E. Plastic Film

One of the biggest surprises was the large amount of plastic film in the waste stream. Plastic Film accounted for 50 percent of all plastics. (See Figure 7 below.) This is remarkable because the categories are measured by weight and film has a very low density. A large portion of this category is fully intended to be waste. Large, heavy-duty garbage bags, medium kitchen trash can liners, and small office or bathroom trash can liners are quite prevalent in virtually every load. Offices, hotels, hospitals, and nursing homes go through a large number of small bags because it appears that each room has a small lined trash can which is emptied daily. The coordinators saw hundreds of plastic bags that contained one or two pieces of paper or a single tissue. Some trash cans could certainly be emptied while leaving the liner in place.

At four sites, Plastic Film was one of the top five heaviest categories overall in the commercial/industrial sector (see Figure 3). Large pieces of plastic film are discarded by the commercial sector. It is evident that shrink wrapping units of merchandise is an effective method of packaging for transport. Large, thick, empty plastic bags were also seen in many commercial loads, as well as other forms of plastic film. Opportunities for recycling plastic film are limited at this time, but should be encouraged and expanded. Perhaps as plastic film recycling becomes more sophisticated, film shipping material could be closed-loop recycled. Polystyrene, HDPE, and PET comprise 9 percent, 7 percent, and 3 percent of the plastics sorted, respectively. Much attention has been paid to the recycling of these plastics. However, since Plastic Film accounts for 50 percent of the plastics sorted, films could be a prime recycling candidate.

Fig. 7. Composition of the Plastics category.



F. Paper

Of all the sorting categories the largest was Other Paper, averaging 20 percent by weight. The study identified categories for recyclable newsprint, corrugated cardboard and kraft paper, high grade paper, and magazines. Everything else composed of paper fibers went into Other Paper. Other Paper contains papers that are recyclable such as mixed paper. However, observationally a large fraction of the category is contaminated or of low grade. Much of the category is paperboard, waxed corrugated cardboard, used tissues, paper towels, and napkins, and newspaper used for other purposes than reading.

Overall, the paper categories represent nearly 40 percent of the waste stream. A lot of recyclable paper fiber is still missing the opportunity to be recycled. Continued efforts in waste reduction, recycling, and composting are needed to reduce the percentage.

G. Hazardous Waste

Although the category Hazardous Waste constituted less than one percent of the waste stream by weight, attention must be paid to these materials because of their ability to harm human and environmental health in small quantities.

To reduce paint in the MSW waste stream, community paint exchanges appear to work and to relieve some of the cost of packing and shipping hazardous material. Paint is brought into the hazardous waste facility by citizens, checked by an employee of the facility, and, if the paint is acceptable, is put out for others to take. In communities with paint exchanges, large quantities of paint are given away rather than disposed of. In 1990, Winona County exchanged 534 gallons of paint or 52 percent of the paint received. In 1991, 630 gallons were exchanged, which represented almost 70 percent of the paint it received. Nobles County, located in the southwest corner of Minnesota (not a study site), conducted a one-day paint exchange in 1992. The Nobles County hazardous waste coordinator estimated that 1,200 cans of paint were exchanged that day. The remaining 700 various-sized cans of paint that were not exchanged that day were sent to the local rummage store where now only a few remain. With this high success rate, paint exchanges should be encouraged in all counties.

This exchange concept could also be expanded to include other hazardous wastes. For example, not only did the Tri-County Solid Waste Management Commission exchange 3,405 gallons of paint between January 1991 and August 1992, but it also exchanged other household hazardous products in its program. They were able to exchange 1,545 aerosols and 520 gallons of miscellaneous solvents including paint thinner, charcoal lighter fluid, stain, gas, brake fluid, and other oils. Also exchanged were 2,693 pounds of acids, bases, pesticides, adhesives, and other materials that would normally have to be specially packed and shipped out-of-state for disposal. The Tri-County Commission estimates that 55 to 60 percent of the hazardous material received at its facility is exchanged.

Table 6 shows that aerosol cans are abundant in the waste stream. Technology exists to recycle aerosol cans, but the main barrier to residential collection is the safety of handling during collection and processing. In order to effectively recycle aerosols through a curbside program, the safety issues must be addressed.

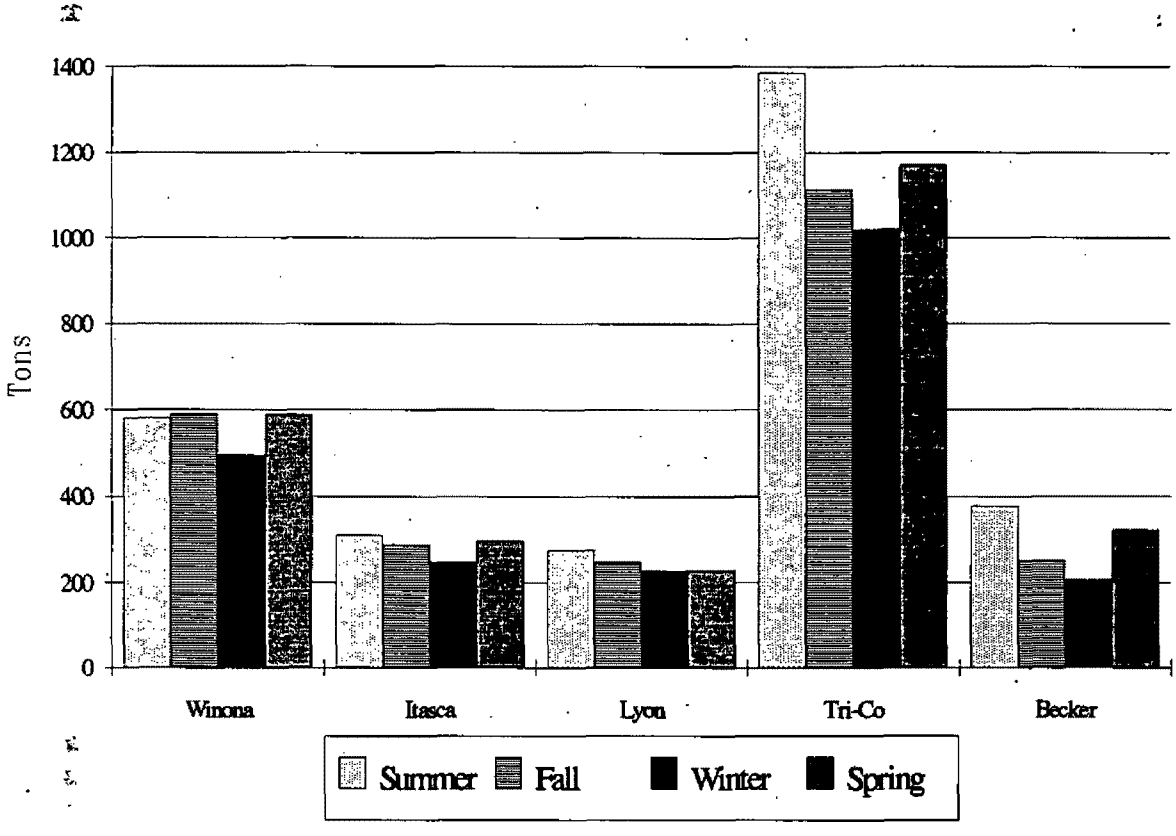
There are non-hazardous alternatives to many of the hazardous products that were pulled out of the samples by coordinators. To further reduce hazardous materials in the waste stream, these alternatives should be used. Through more public education and state purchasing policies, use of these alternatives could be encouraged.

H. Seasonal variability

Many previous studies based annual waste composition estimates on one week of field work, raising the question of whether one week of sorting accurately represents the waste stream throughout the

entire year. Four seasons of sorting were conducted for this study because it was expected that the waste stream would vary between spring, summer, fall, and winter. According to the data (Table 2), this is not the case. Yard waste, which does vary by season in Minnesota, is the only exception. Overall composition does not seem to change from season to season. Knowing this now, in the future it seems that time and resources would be better spent on improving the precision and accuracy of the data. However, the volume of trash does vary seasonally. Minnesotans throw away more trash in the summer and less in the winter. (See Figure 8.)

Fig. 8. Amount of garbage received at each site during each season.



I. Waste composition study as an audit

Composition studies not only provide a picture of a community's waste, but also pictures of the composition of waste from area businesses and institutions. For example, some entities announced their lack of solid waste reduction and recycling efforts by what was found in their loads. When these establishments are identified, special efforts in education and assistance can be targeted to help them reduce and recycle their waste. A similar example is the load from one site brought in by a city collection vehicle that had made the rounds of all the city parks and public landings. The load was primarily composed of pop and beer cans, bottles, and disposable picnicware. With knowledge of this load, the community can implement a plan to divert these materials for recycling by such means as side-by-side recycling and garbage cans in the parks.

A good example of targeting the commercial wastestream is the action taken by the county solid waste officer and the County Board of Commissioners in Winona County. After receiving preliminary data on the percentages of material in commercial loads, the county banned corrugated cardboard and high grade office paper originating from commercial sources from being disposed of at the landfill. Thus, commercial establishments had to recycle the cardboard and office paper they generated.

J. Additional study

The MPCA recommends that the waste composition study started in 1990 be an ongoing project with at least one site studied per year. Additional studies would provide information on the progress and effectiveness of solid waste programs in communities where a baseline now exists. Further data could be added to the statewide picture of solid waste by studying different communities as well. More detailed information on broad categories, data on packaging, and analysis of the effect of new materials added to recycling programs would be provided by an ongoing study. It may be possible to identify and track trends in the solid waste stream with further study as well.

K. Safety

Safety was a primary consideration during the course of the study, and while the safety of the landfill and transfer station employees was not directly a concern of MPCA staff, several hazards were observed. 1) At all of the facilities where the study was conducted workers were exposed to airborne and windblown substances from the waste deposited at the sites: dusts, dirt, wood particles, powdery dyes, toner, resins, and other unidentifiable materials. The operators were using no personal respiratory protection. 2) One operator routinely found sharps (hypodermic needles) in the pan of his compactor during maintenance. He had no training in how to handle sharps, only a warning to be careful. 3) A couple of sites had inadequate washing facilities. Even those facilities with soap and hot and cold running water were not well used by landfill personnel. 4) Noise level was a concern at several sites, particularly for the people operating the large equipment or working near the machinery. Either protective equipment was not readily available or it seemed to be the responsibility of the employees to decide if they wanted to wear it. While safety regarding heavy equipment operations and traffic was clearly important to the employees, the work atmosphere still conveyed a feeling of casualness about potential hazards and the chronic effects of exposure to MSW. This was disturbing to study personnel. More extensive job hazard analysis should be conducted at disposal facilities. If it warrants, more safety and health programs should be established to protect these workers through their employers and the MPCA.

L. Finally

This study employed approximately 100 Minnesota residents across the state to perform the hand sorting of MSW. Minnesota gained 100 knowledgeable solid waste activists. A week of hand sorting mixed municipal solid waste is an education like none other. Everyone should have the opportunity to sort garbage for a day.

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MEASURING SUCCESS OF HHW COLLECTION, EDUCATION AND SOURCE REDUCTION PROGRAMS

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The title of my presentation today is "Measuring Success of HHW Collection, Education and Source Reduction Programs. I included the collection and education aspects of a HHW program because they form the foundation upon which a successful source reduction program can be mounted. Before we get into a discussion on measuring the success of source reduction programs, let's look at a typical HHW program.

Most Household Hazardous Waste Collection Programs have the following pattern of growth. Early efforts focus on the collection aspects of the program and outreach and educational efforts are geared to inform the public of the new services. Participation or attendance at these events are the primary objective. As the program matures, more emphasis is placed on informing the public about why it is important to properly dispose of HHW. There is also a growing awareness that collection events are costly and, consequently, reuse, recycling and other diversion efforts are instituted. Source reduction activities are also investigated as a long term alternative for reducing costs and protecting the environment.

During the early stages of most HHW programs, efforts at measuring program success receive little or no attention. This is unfortunate because the long term success of the HHW program can be substantially enhanced if certain steps are taken early in the program to measure the success of each initiative. Figure 1 lists typical outreach tools utilized by HHW programs.

FIGURE I

TYPICAL OUTREACH TOOLS UTILIZED BY HHW PROGRAMS

FLYERS, POSTERS	BILLBOARDS
ARTICLES	SPEAKERS BUREAU
POINT OF PURCHASE INFO	DOOR HANGERS
SHOPPERS GUIDE	HOME SHOWS
MOVERS PACKAGE	BILL INSERTS
TV,RADIO,PSA'S	HOTLINE

For many programs the choice of tools, the audience to target, and the specific message to be conveyed is more of an afterthought rather than an integral part of an overall management strategy. Measuring behavioral responses to evaluate the effectiveness of the outreach efforts is frequently overlooked. And, all too often, the type of measurement tools utilized to measure "success" are selected out of convenience or availability of information. Let's take a look at some of the methods commonly used to measure success (Figure 2) and then I would like to share with you some of our experience in Santa Clara County in developing a pesticides source reduction campaign.

FIGURE 2

TYPICAL EVALUATION TOOLS

THE "NUMBERS" GAME	QUESTIONNAIRES	SURVEYS
flyers distributed	at events	impact of message
lbs. at events	after training	assess retention
workshops conducted		behavioral changes
requests for info		level of satisfaction
referrals by client		correct targeting

The tools listed in the first two columns are most often utilized to measure the success of outreach efforts to gain participation at collection events. These evaluation techniques provide some indication of effectiveness and are easily quantified. Surveys have not been used as frequently as the other techniques primarily because of economic reasons. However, a well designed survey can provide an important baseline for measuring the success of HHW programs.

HHW programs have been in operation in Santa Clara County since the early 80's when the City of Palo Alto held its first collection event. Since that time all of the cities have conducted collection events. In 1991, the County proposed a consolidation of the individual city programs in order to provide access to collection events on a countywide basis. In 1992, twelve of the fifteen cities agreed to participate in the countywide HHW program. One of the planning priorities of the program was the development of a source reduction strategy.

The general guidelines we used to select an area for source reduction were as follows: ease of implementation, potential for source reduction, waste stream was not recyclable or generally reusable, and the product was of concern to other programs. This quickly eliminated batteries, oil, paint, and a number of household cleaners. The remaining items included solvents and pesticides. One of the reasons we selected pesticides was because the Nonpoint Source Program was also concerned about pesticides usage and was willing to contribute financially to the source reduction effort.

Our next task was to identify our target audience and develop a delivery system to convey our message. We felt that it was important to reach the consumer at the point where they were making a purchasing decision. This had the benefit of self selection, i.e. information was made available primarily to those interested in purchasing a pesticide product. For that reason we discarded the approach of blanketing an area with flyers as being too broad brush and selected the point of sales as our primary distribution source.

The source reduction information takes an Integrated Pest Management (IPM) approach and identifies specific less-toxic pest control materials and brand name examples relying on information from established pest control experts. All of the brand names cited are registered as pesticides

by the State of California. The next step focused on the distribution of our brochure. We first contacted the corporate offices of the large retail stores and got their buy in. We then took our finished brochure to the retail outlets that carry pesticides and spoke to the store managers. Most of the managers, upon hearing that "corporate" approved of the concept, readily agreed to carry the brochures in their stores and were helpful in determining the optimal location to place the information. In addition, we contacted the local nurserymen's associations, pest control applicators, and chemical distributors to make presentations on our materials. We researched and printed a list of wholesale sources for the products we identified in our pesticide brochure and make the list available to retailers, applicators, and distributors.

Our criteria for success has both short and long term measures. For the short term we have identified the following criteria as measurable success: an increase in the retail availability of alternative products at the targeted retail stores; and co-location of alternative products traditionally carried in the store but not in the pesticides area e.g. copper strips next to snail pellets. We did not consider the amount collected at HHW events as a good indicator in the short run because of the large inventory of materials currently stored in most homes. Interviews of event attendees may reveal some change in buying habits. In the long run we are looking for a diminution of recently purchased pesticides brought to a collection event.

We have not developed rigorous measurement techniques to evaluate our long term success. We lack data on the time span between when a product is purchased and when it is used up or discarded. We are exploring the feasibility of using scanners or other methods to determine the date that a product was manufactured or sold. With this data we can get a sense of the proportion of old stuff that is being brought to an event versus newly acquired material. The information can also be used as an indicator of any reduction in overall usage.

Our pesticides source reduction efforts have been in operation for approximately six month. Our next steps will be site visits to the retail stores to interview the store manager and to establish a baseline of existing inventories or shelf space for future comparison. We are also considering interviewing repeat attenders to determine what they are bringing, how recent were the items purchased, and to identify any changes in their purchase of pesticides. Over the long term, we will continue to monitor the amount of pesticides brought to the HHW collection events, interview the attenders to see if there has been any change in their use of pesticides and to determine why they made the switch.

MANAGEMENT OF NON-REGULATED HAZARDOUS WASTE: Barriers and Opportunities for Rural Communities

Lola Schoenrich

How Big is the Problem and How do Rural Communities Prioritize?

Rural communities are struggling with a host of solid waste management issues, all demanding time, money, and attention. Many rural communities are not even thinking about non-regulated hazardous wastes. Those that are concerned, struggle to decide how big the problem is and where it should come on their list of priorities.

It is clear that non-regulated hazardous wastes present environmental and public health problems. The New York Times reported that every two weeks do-it-yourselfers dump on land and in water the amount of oil spilled in Alaska in the Exxon-Valdez incident. Hundreds of tons of non-regulated hazardous waste is thrown in the trash each year. While it is difficult to determine the exact amount, experts estimate the amount of household hazardous waste to be about 500,000 to 800,000 tons annually.[1]

Surveys in Minnesota determined that hazardous waste from farms is also of concern. The Minnesota Pollution Control Agency estimates that Minnesota farmers are storing approximately 1,200,000 pounds and 280,000 gallons of liquid unusable or unwanted pesticides, and that some of these farm chemicals are as much as 30 or 40 years old.[2] A survey of farmers in Kandiyohi County, a rural Minnesota county, found that over 40% of survey respondents did not know how to safely dispose of used motor oil and lead acid batteries.[3]

A survey of CESQG in Vermont found that these businesses generate an estimated 5,000 tons of non-regulated hazardous waste in the state each year: used motor oil, antifreeze, paints, photochemicals and more. In addition, the study found that most of these survey respondents were unaware of the environmental problems caused by the waste materials.[4]

Non-regulated hazardous waste is believed to be the source of the chemicals in the toxic leachate from the 62 landfills in Minnesota that are on the State and Federal Superfund lists and hundreds of others around the country. It is the leading source of heavy metals and other contaminants in incinerator ash and toxics in compost made from municipal solid waste. In addition, unknown but significant quantities of non-regulated hazardous waste enter municipal sewage systems, home septic systems, and are poured into storm drains and on the ground, going directly from there to our surface and groundwater.

In addition, to these environmental and health problems, non-regulated hazardous waste can pose occupational safely problems to garbage haulers, workers in recycling centers, and other people handling trash. Stored hazardous waste can be dangerous to firefighters and other emergency response teams. Some rural firefighters will let a barn burn to the ground rather than risk contact with stored toxic farm chemicals. Small amounts of hazardous waste can also cause serious damage to waste hauling and processing equipment. An explosion at one refuse derived fuel facility in Minnesota, thought to be caused by a container of less than one gallon of solvent, caused $800,000 in damage and two years of down time at the facility.

Still, we must not let this emphasis on "waste" distract us from the larger issues of toxics in rural communities. After all, remember that if the *waste* is hazardous the *product* was just as bad or worse. If, for example, we worry about empty pesticide containers, we ought not forget that the contents of those containers were spread over the land in regular application, contaminating surface and groundwater in the process. There is good evidence that this and other uses of toxics can be extremely damaging. A survey of over 700 private wells in agricultural areas in Minnesota found that 42% exceeded drinking water standards for nitrates, and pesticides were found in 39% of all wells tested. The U.S. Geologic Survey has found atrazine in all of the 146 samples taken recently from eight midwest rivers.

There are numbers of other sources of large quantities of toxics in rural communities, all of which need to be addressed. The 1989 Toxic Release Inventory in Minnesota lists over 20,000 tons of hazardous air, water, and land emissions from manufacturing businesses in the rural parts of the state.[5] Certain types of mining, and oil and gas exploration and drilling create toxic wastes. It is

estimated that mining produces some 800 million tons of rock waste each year which contain leachable heavy metals, all in rural areas.

Other pressing problems abound within the area of solid waste. While, no comprehensive overview of solid waste systems in rural communities exists, experience tells the following. Many rural communities face huge problems in the collection and disposal of the bulk of their municipal solid waste, not to mention household or other non-regulated hazardous waste. Legal backyard and illegal dumping & burning is common. Green box or other waste collection systems may not work well. Old town dumps and local landfills are being closed, and new landfills prove very expensive to build and difficult to site. Rural communities are beginning to recycle, and the programs are running into problems because of the distance from or lack of ready markets for materials.

Right or wrong, dealing with the problems of non-regulated hazardous waste in rural communities usually comes last, after the community has addressed its other solid waste management concerns and scores of other pressing local environmental issues.

Review of Current Management Strategies

Before examining the special problems, opportunities, and needs of rural communities trying to deal with non-regulated hazardous wastes, it is important to understand the national picture, because ideas about the best way to solve the problems of these wastes are changing in this country. The state of management efforts for non-regulated wastes from households, farms, and small businesses is a little different, but the trends are the same.

Household Hazardous Waste

The first management efforts began in the early 1980s with government supported household hazardous waste roundups or collections and public education campaigns. These first efforts were largely urban and efforts nationwide are still mostly urban. In 1991 there were over 800 household hazardous waste collections held in the U.S., but these efforts were concentrated in less that 10 states, and one can safely say that most rural communities have never had any collection of household hazardous waste. Still, some ten to fifteen states do have rural programs, and we can learn from their experiences.[6]

Today, the "state of the art" rural household hazardous waste program consists of a comprehensive public education campaign, usable product (usually paint) "drop an' swap" programs, and ongoing collection efforts, either one day events, or permanent or mobile collection units. Usually education programs stress use of alternative products and safe disposal of products.

In most cases, little or no funding is available to rural communities from the state or federal government. The states with the most successful programs do provide funding to local counties, municipalities, or solid waste districts.

Farm Programs

Farm pesticide collection programs and waste pesticide collection programs are, for the most part, funded and run by state government, often the state Department of Agriculture. More than half of the states have held waste pesticide collection programs, with little or no cost to the farmer to participate. A 1991 survey of state programs indicates that almost every state is in the process of planning farm chemical collection programs and seeking funding for these efforts. In general, the intent of these programs is to clean up the highly toxic materials, especially the canceled and banned pesticides farmers are currently storing in barns and sheds.[7]

A few states are beginning waste pesticide container collection programs. The intent is to improve recycling programs by providing a special closed loop system for agricultural pesticide containers. Again, these programs are most often funded and run by state government.

Conditionally Exempt Small Quantity Generators

Programs for CESQG are much less developed. Only six collection programs nationally - urban and rural - provide for disposal of waste from businesses. Data from these programs indicates that participating businesses have hazardous wastes that are very similar to household wastes. Four or five additional states are in the process of rule changes or program planning to allow businesses to dispose of waste at government sponsored household hazardous waste collection facilities.

Nationwide, people generally feel that businesses should pay for disposal, but that government may be able to provide the necessary opportunity for reasonably priced disposal.[8]

How Well Are These Programs Working?

As collection and management programs for household, farm, and CESQG hazardous wastes have developed and matured, it is becoming clear that the cost is very high and that the programs recover only a small percentage of the existing waste.

HHW collection programs in Minnesota cost between $40 and $84 per program participant, and serve an average of 3% to 5% of the population.[9] Is this good or bad? It is good compared to other collection programs nationally, and Minnesota is seen as one of the leaders in rural household hazardous waste programs. Yet, many rural policy makers feel that there must be a better way.

Policy makers generally agree that collection of stored old, unusable, canceled, and banned farm chemicals is the only way to clean up these very real hazards from the countryside. Farmers will not and should not store these toxics forever. The public will have to pay to collect and dispose of these chemicals in the safest way possible. However, most do not see these programs as ongoing efforts. Some other mechanisms will need to be devised to prevent or deal with hazardous waste from farms in the future.

Programs to recycle used pesticide containers are seen as important because these containers are contaminants in recycling programs. Plastics are hard enough to market without the possibility that the product is contaminated with poison. If pesticide containers are separated and cleaned, there is the possibility for a closed loop recycling system, making used pesticide containers into new ones. But, again the cost is high. A pilot pesticide container program in Minnesota had a cost of $3.69 per container recycled.[10] Ongoing programs would likely have somewhat lower costs. Still, these costs are probably too high to be sustainable.

Local and state governments are beginning to think that these taxpayer based solutions are not feasible or desirable over the long term. While providing an option for disposal of the waste now stored in homes, farms, and other businesses is seen by most as unavoidable, the vision of the primary solution is changing.

Policy Options: the New Solutions

Many policy makers and some states are beginning to see *reduction* of the toxic components of the waste stream along with manufacturers' responsibility for the remaining toxic waste as the next step. States are taking the lead at this point, creating the potential for a hodge podge of regulations affecting national and international businesses, which will force federal legislation. These new policy directions have two main components. The first is an emphasis on removing or reducing toxics in the waste stream through legislation and other incentives to consumers. The second is a trend toward putting responsibility for the remaining toxics problems on manufacturers, sellers, and finally consumers of products containing toxics. This corresponds to a trend away from overall public responsibility for preventing and cleaning up toxic problems. In most states, rural communities are not particularly active in these policy debates. The role that they can and should have in this arena should be discussed. Some of this new legislation will resolve certain problems of non-regulated hazardous waste. Some will create the need for new levels of cooperation between communities and the private sector, with unknown impact on rural communities.

Source Reduction

Reduction of toxic waste *at its source* is increasingly being seen not only as a good idea, but as *the* solution to the problem. There are a number of different types of source reduction efforts around the country.

The federal government has banned hazardous components in products for years, eg. lead in paint and gasoline. States are now taking similar proactive positions. Minnesota and a few other states have essentially banned mercury in batteries. Other states are involved in similar efforts.. The Council of Northeastern Governors (CONEG) has developed a plan which bans heavy metals in packaging, and other states are beginning to develop similar legislation. This type of legislation is seen as highly effective, and quite directly removes specific problem materials from the waste stream.

Fees or taxes are another mechanism being used. Vermont is working to develop a plan to address paint, used motor oil, and dry cell batteries. The plan developing in cooperation with industry to address paint stresses both waste reduction and manufacturers' responsibility using advance disposal fees to encourage consumers to buy only what they need and to provide an ongoing funding mechanism for waste disposal.[11]

Other efforts are geared toward helping consumers make better educated choices. Specifically, there are national efforts at product labeling such as the Green Seal, Green Cross, and Blue Angel in Germany. Some states, Vermont, Iowa and others have mandated in store shelf labeling programs.

Some states (Minnesota and others) are beginning to require that businesses carry out planning processes designed to reduce use of toxics in manufacturing. This is currently aimed at larger manufacturers, but these pollution prevention planning models can in time be carried to smaller businesses as well.

Manufacturers' and Sellers' Responsibility

Policy makers are increasingly putting the responsibility for management of waste on manufacturers and sellers. In Minnesota agricultural chemical dealers are currently required to take back empty pesticide containers and unused product beginning in 1994, unless the local government has developed a program to manage these wastes. Minnesota battery legislation also requires manufacturers of certain types of batteries to develop collection, disposal, or recycling programs in the state, both for businesses and for consumers. In many cases, laws will require local units of government to work closely with manufacturers and sellers, and rural communities will be faced with the need to decide how much assistance they will provide to local businesses in complying with these new laws. They will also need to decide how hard to push to make sure that these businesses are doing their share.

Challenges and Opportunities for Rural Communities

Rural communities face numerous challenges and have some special opportunities in developing management systems for non-regulated hazardous wastes. Some of these may also be shared by more urban areas. Many are similar or identical to barriers and opportunities to recycling and other new waste management strategies. Some may be complete barriers for some communities. It is, at least in part, these experiences that have led some state regulators and legislators to conclude that current management strategies are not feasible as a long term strategy for dealing with these toxic wastes.

Over the past three years, the Minnesota Project has worked closely with a number of rural communities in Minnesota on projects designed to manage non-regulated hazardous waste and has been a part of a number of advisory committees and networks working on these issues. An advisory committee made up of rural people and state level staff and regulators has provided invaluable assistance with this work. At each of the last two national household hazardous waste management conferences we convened "networking" sessions for rural participants.[12] The following discussion presents issues identified by rural people working to manage non-regulated hazardous wastes in their communities, Minnesota Project advisory committees, rural communities with which we have worked, and our own experience.

Problems Encountered with Current Management Practices

Imported Waste

One of the most important and difficult problems rural communities can have with non-regulated hazardous waste is that it may not come from within their community. If contained in waste imported from other states, or even from other cities within the same state, rural communities may be essentially powerless to do much to address reduction or management. They may be bought off with promises and up front money, leaving them with big problems to address down the line. Part of the solution to the problem of non-regulated hazardous waste in rural communities is directly tied to resolving the problems of interstate transport of waste and waste facility siting issues, as well as rural / urban respect and coexistence.

This problem of toxics in imported waste also highlights the importance and potential impact of the newly developing policy solutions to the problems of non-regulated hazardous waste. Hazardous waste is not only an "urban" or a "rural" problem, but a society wide problem. Urban problems can

quickly become rural problems. Community by community programs will not be enough. Solutions will need to address the big picture in some consistent fashion.

Problems of Priorities, Cost, and Effectiveness

Imported waste aside most rural communities do not see non-regulated waste as a crisis issue. Fewer people generate less trash and so, rural communities have much smaller volumes of trash, and much less non-regulated hazardous waste, than metropolitan areas. Rural areas, like any other place, respond first to crises. And, rural areas face many, many issues which feel far more pressing and immediate than the possibility that the landfill might leak some day in the future. Health care, local jobs, the economy, transportation, toxics concerns, pressing solid waste problems, and many more compete for attention.

With limited funds all communities must make choices on which waste management problems to address first. As previously discussed, the cost of programs to manage non-regulated hazardous waste is high and impacts are uncertain. In practical terms, communities must decide whether to spend $25 to manage one gram of mercury, collect and dispose of five gallons of solvent, or recycle 500 pounds of glass. There is no one right answer to the question of whether the $10,000 to $100,000 a rural community might spend on a program to manage non-regulated hazardous waste is "worth it".

The answer to these questions of priority require complex management decisions. Disposal methods are an important consideration. Local geology and weather play a part. Mercury emissions and so battery programs might be critical if the community relies on incineration. Solvents, paint, and used oil are probably more important to a community with a landfill. Communities with the technical expertise to evaluate these various considerations may make educated decisions about the best ways to spend their limited solid waste dollars. Others tend to rely on factors like public opinion on relative program importance and mandates from above, not necessarily leading to the best decision.

State Mandates

One of the ways that communities prioritize issues is in response to mandates from above, whether that be the county, the state, or the federal government. Since by definition, there are no federal mandates to address non-regulated hazardous waste, this direction, where it exists, comes from state governments. Whether or not rural communities even put non-regulated hazardous waste on their list of things to worry about often depends on whether or not the state identifies it as a priority issue for all communities and whether funds are made available to rural areas.

Fragmentation of Toxics Issues

In Minnesota and other states, regulations and programs which seek to address different issues related to toxics in our environment and our trash are segmented and handled by different regulatory agencies or departments within agencies. This creates confusion and frustration for local officials trying to figure out the best strategies for toxic reductions. For example, counties in Minnesota are required by the state to develop a plan for maintaining the quality of local groundwater resources, a local water plan, which will probably address issues of toxics in general and non-regulated hazardous waste in specific. In so doing, they work with one state agency. There is a second state agency which requires solid waste planning, including a plan for addressing household hazardous waste. A third agency provides funding and technical assistance for local household hazardous waste programs. A fourth state agency, the Department of Agriculture, handles the waste pesticide and pesticide container collection programs. This is not to mention SARA Title III, emergency planning and "Right to Know" programs, business pollution prevention planning, and actual regulation of businesses. This fragmentation of regulatory authority creates a situation which discourages wholistic thinking and planning on a local level. Local officials can spend all their time responding to directives from different state agencies, and it is only with extraordinary foresight and coordinated planning efforts that communities can see the big picture.

Distrust of Outside Regulators

Even where non-regulated hazardous waste is a recognized problem, state and federal regulators are often seen with distrust. People in rural communities often feel ill used by outside regulators. Regulations change over time and county and municipal officials who followed the rules all along can still face huge costs for needed improvements. Farmers and small business people might prefer

to lay low rather than take part in collections and "get their names on a list". Several farm pesticide programs report increased participation over time, as word gets around that it is "OK" to participate. In some cases the stringent regulations placed on collection, transportation, and disposal of hazardous waste may in fact be barriers to the goal of collecting material, causing anger and frustration on the part of both rural residents and state and federal regulators.

Lack of Funding

Lack of funding for programs is a major limitation for most rural communities. Even if the state mandates planning and / or action, decision makers are sometimes concerned about the cost and effectiveness of existing management options. Given the high cost and questions about program impacts, local decision makers who are asked to foot the bill take a hard look, and often say no to the programs. On the other hand, where someone else is paying for the programs, rural communities are willing participants and active partners.

Limited Capacity

Rural communities tend to be ill equipped to make the difficult management decisions necessary to prioritize solid waste management problems. They have limited capacity, in terms of financial resources, local expertise, and administrative capacity to address their problems.

First, rural communities have less money to work with than urban areas. Rural areas tend to have a lower tax base than metropolitan areas. People living in non-metropolitan areas earn 73.5% of what urban people earn in similar jobs. Property values tend to be lower.[13]

Rural areas and small towns, unlike urban areas, tend not to have the skilled people resources to call upon to solve new problems. For instance, many rural communities have only a few staff members who must be experts in everything. In addition to having less technical knowledge and expertise, rural areas, particularly those that are low income or disadvantaged, may have reduced administrative capacity. They have less experience in working with consultants, managing programs, and in securing funds from outside sources. They may not have experience in writing proposals, in managing funds, or in handling the paperwork required if outside funds are secured. They may not be experienced in selecting or working with technical consultants. Finally, they may not have technical expertise to actually run a program once it is established and the consultant gone.

Finally, many government grant and loan programs are designed to first serve large urban centers. Very often grant funds are used to help these cities establish programs. By the time these programs reach the most rural areas, less money is left, and these communities are asked to pay a larger percentage out of pocket. Too often, those communities with the least capacity to pay are asked to pay the most.

Distance

Low population densities and long distances to collection sites and disposal pose obvious problems in rural communities. Surveys of collection program participants in Minnesota show that residents typically drive no more than 10 miles to a collection. Yet rural communities can have very low population densities and long distances between towns. Long distances to disposal can also greatly increase transportation costs, leading to increased costs of these already expensive programs.

Unique Opportunities for Rural Communities

While rural communities have their problems as they try to deal with non-regulated hazardous wastes, there is a bright side as well. Many rural communities are very proud of their programs. They have been creative and diligent, and feel a tremendous sense of accomplishment. They are masters at "making do" with less, and have transferred those skills to this new area of concern. Rural communities do have special opportunities in managing non-regulated hazardous wastes.

The People

The most important of these is the people. They are involved in the community; they care; and they can move an issue. In smaller communities and rural areas one or two dedicated leaders really can make a difference. A person(s)- volunteer, county staff or elected official - who wants to work to solve a particular problem can often do so, mobilizing support within the community at large in order to build the political support needed. This local activism is what has made many rural recycling

programs and existing household hazardous waste programs successful and is a key ingredient in the success of future programs.

People in rural communities are often able to mobilize volunteers to work on household hazardous waste and farm related programs. Volunteers are often active in all aspects of programs - from public education to collection. These people can be creative and excited. They think up and carry out all kinds of ideas, from an award winning shelf labeling program, to youth education, to local videos, and more.

Rural communities in Minnesota tend to have tried and true ways to educate people about new community issues. Schools are responsive to community needs, church groups are active, people come to the county fair, and on and on. While difficult to quantify, rural program managers tend to think that their educational efforts are paying off. Young people know more than their parents about household hazardous wastes, and many people have the impression that at least some adults are in fact making wiser purchasing decisions. One Minnesota collection program is seeing a decrease in participation which they attribute to the success of their public education effort.

Local Cooperation

Many of the household hazardous waste programs in rural Minnesota are successful because the counties have been able to work cooperatively with businesses in the region. This might mean that the a local store collects used lead acid batteries, a service station collects used oil, and / or the used clothing store will put a paint exchange in the back of the store. For many communities, this cooperation has provided options other than disposal for handling some hazardous materials.

Creativity

Rural areas are less bureaucratic and are often particularly creative in programs. Given that creativity, they often pioneer new and better ideas. For example, in Minnesota, the rural programs have pioneered useable product exchanges. Winona County, a rural county of 50,000, was able to document savings of over $11,000 in disposal costs as a result of their exchange program.[9] Several counties in South Carolina are working on a project to help farmers exchange usable but unwanted farm chemicals.[7]

Rural Communities and New Policy Directions

In addition to specific concerns and opportunities with respect to existing programs to address non-regulated hazardous waste, rural communities have a place in the larger policy debates. People from rural areas need to get involved in developing new policies to address those problems which most concern them. This will, of course, vary from one part of the country to another. In some places, the prime concern is the issue of imported waste, in others issues of toxics use on farms are most important. People who have been trying to run household hazardous waste programs may wish to get involved in developing new strategies to prevent these wastes.

In some states, the involvement of rural legislators may be important in passing legislation requiring the reduction of toxic components in products and mandating manufacturers' responsibility. At least in some places, rural legislators will be freer from the pressures of big business and are able to respond more directly to the best interests of their constituents.

One recurring local issue arising in some rural communities as a result of new policy initiatives is the issue of jobs vs the environment. It can be hard for rural communities to confront local businesses and get them to comply with environmental legislation, if there is a real or perceived increase in costs or hassle for the business. Jobs might be at stake. So, if local governments are left to work out the mix of government and business responsibility for non-regulated toxics, some will have difficulties. Conversely, some are and will continue to be very successful in developing local government - business partnerships that work well for both parties.

Conclusions and Challenges

All communities, rural and urban, struggle with a number of difficult issues when they begin to address management of non-regulated hazardous wastes.

First, they grapple with the question of how to prioritize the problem. In choosing to address non-regulated hazardous waste, are we coming at the toxics issue from the right angle? What about the rest of the product, which presumably was used somehow? How important is the issue relative to

the many other solid waste problems a community might face? How much non-regulated hazardous waste is there and what damage is it doing?

Second, is the question of the cost and effectiveness of current management practices? At what cost do we deal with non-regulated hazardous waste? How effective are the current management strategies?

Third, where should the responsibility for non-regulated hazardous waste and other toxics lie: taxpayers and communities; consumers; business; retailers, wholesalers, manufacturers? Who gets to say when enough is enough - or when enough is too much?

Finally, what impact can and should rural or urban communities have on the solutions to these questions? Communities have limited abilities to impact the problem because regulation occurs on a state and national level, and most relevant policy changes will also happen on state and national levels. How active should rural or urban communities be in trying to impact the new policies being developed by state and federal government?

Rural communities face a number of specific difficulties as they work to prevent and then manage hazardous waste from non-regulated sources, both waste coming from within and outside of their communities. Their uniqueness also offers them the ability to be creative and successful in many ways. To succeed they will have to both manage existing wastes and get involved in the developing regional and national policy debates that will begin to offer more workable long term solutions. In order to truly solve the problems of non-regulated hazardous waste, rural communities have a number of specific needs.

First, rural people need **to talk with one another**. They need to share stories, of successes and things that did not work well. Rural people tend to be isolated as they work to resolve specific technical problems, and so sharing is particularly important to them. There is power and energy in learning directly from one another. Cross-state peer matches are an excellent tool for sharing of information and experience. Networks and coalitions help everyone, and especially rural people, to organize for political action and to learn about the best ways of setting up programs.

Rural people do not have the time and resources to reinvent the wheel. They need **technical support and assistance**. They need to know why they should care about hazardous waste. They need to know specifically how it does or will impact them in their communities. In order to understand what they can and cannot do they need to understand the complex regulatory framework of hazardous waste, in simple nontechnical terms. They need an understanding of the program and policy choices and their implications. Case studies and specific examples of successful program ideas are very helpful. Resources such as tried and tested curriculum materials, educational materials, handbooks, or manuals are useful.

Most rural communities probably need **a push from above**, a mandate from the state level, before they will tackle the many issues of non-regulated hazardous waste. States can provide: the mandate to act by requiring local plans or programs; program frameworks; funding in the form of grants or pass through money; technical assistance; educational materials, handbooks and more. But, too much fragmentation of regulation creates difficulties for rural communities.

At the same time, rural communities need regulators to give them **room to be creative.** Regulators need to know when to get out of the way of great ideas. Because of the level of regulation surrounding this issue, this sometimes means changing or bending the rules to make rural programs work. Many state and federal regulators benefit from information and training about the specific needs and abilities of rural communities, so that they can be more responsive to these communities.

Many rural people and communities need to get active and **participate in the different policy debates** that are in progress and still to come on toxics issues. Many of these affect rural communities quite directly. Citizen action groups, environmental organizations, technical assistance providers, churches, and other organized groups will play a key role in this organizing.

Finally, in order to significantly reduce the amount of non-regulated hazardous waste in our communities, rural people, and everyone else, needs to make different choices about what we purchase and how we use those toxic products we do need. We need more "environmentally" friendly businesses, providing jobs without destroying our health and our natural environment. We need to

take a very close look at the origins of the toxics in our environment, and figure out how to live without them. Changed lifestyles may well be the bottom line.

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Lola Schoenrich is a Solid Waste Specialist with the Minnesota Project. The Minnesota Project is a nonprofit organization dedicated to working with Minnesota's rural communities to assist them as they build their capacity to address development and resource problems. There are currently three major program areas at the Minnesota Project: Groundwater Protection and Sustainable Agriculture; Alternative Solid Waste Management and Community - Based Development, including leadership development. Contact us for or more information about the Minnesota Project or for information about other publications.

RURAL WASHINGTON'S PROGRAMS

by

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I will begin by introducing the current Washington State Moderate Risk Waste (moderate risk waste is the combination of household hazardous waste and conditionally exempt small business (SQG) waste) Program. By the end of 1992, Washington will have nineteen permanent facilities and three mobile systems. Fifty-two collection events were held in the state in 1992. Over the next three years, twenty additional facilities are planned.

Area-specific implementation was in the original design of Washington's moderate risk waste system. Although minimum efforts were delineated in the planning guidelines, the basis for approval of local plans and projects was more oriented towards problem solving. Actually, most counties, both urban and rural are now exceeding the minimum requirements.

If you look at the system, can you distinguish the rural areas from the urban districts as far as efforts to manage household hazardous waste? There are seven urban counties in Washington (divided out for the purposes of this talk). By "urban", I used the following criteria:

Population density greater than 200 people per square mile, and

Total population of county greater than 100,000.

Using these criteria, the state was divided into two distinct groups as shown in table 1.

Table 1: A Comparison of Rural and Urban[1] Washington

Identifier	Rural Areas (%)	Urban[1] Districts	Total Washington
# of Counties	32 (82)	7 (18)	39
Population	1,255,792 (26)	3,610,900 (74)	4,866,692
Area (sq. mi.)	57,175+(86)	9,407 (14)	66,582
Pop. Density	21.96	383.85	73.09

[1]Urban districts are defined as those counties whose population exceeds 100,000 and whose population density exceeds 200 people/square mile.

Notes: Numbers in parentheses represent percentages.
Population density is measured in people per square mile.

I am going to use a comparison of the urban and rural programs to better describe what's going on in rural Washington. I chose to present the information in this manner because I feel that, in many respects, the urban and rural areas are actually performing similar tasks, but in manners geared to the needs of their respective areas.
There are three areas where I will compare the urban and rural areas of Washington: utilization of state support, education efforts, and collection systems. These, along with additional areas of comparison, are summarized in Table 2.

In the first area, utilization of state support, is where there is the greatest distinction between urban and rural. In the rural areas, most of the requests to the state are financial and logistical. By "logistical" I am referring to actual physical support such as brochures, "how to" manuals, individualized training for staff, and assistance in working with elected officials. Questions regarding the eligibility of tasks for grants support are often asked.

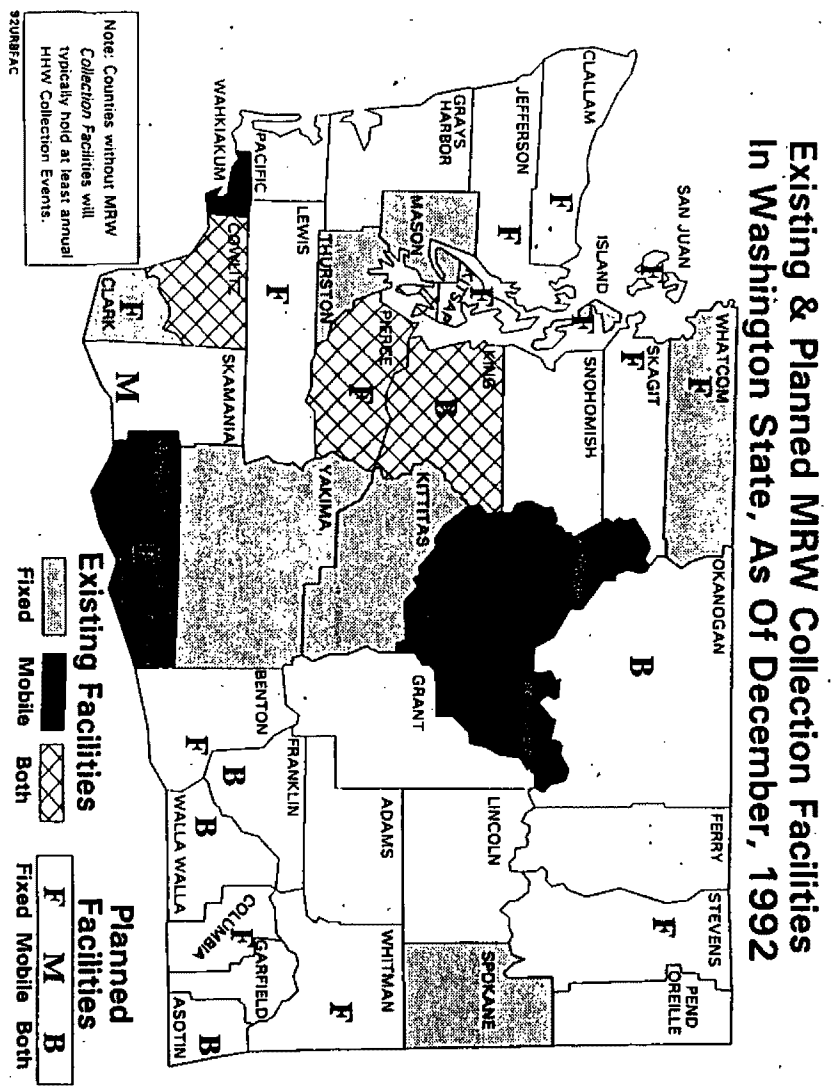
The urban areas rely on the state more for legal support, i.e. regulatory interpretation, back-up on enforcement actions, and support in working with cities and towns. Most programs in the urban districts are locally designed and implemented. Many rural areas choose to implement Ecology programs--in their own way. Additionally, in the urban districts cities act independently or as major implementing agencies, whereas in the rural areas, moderate risk waste is generally implemented by the county.

In education, counties throughout the state are focussing on the schools as a major source of behavior modification. For the general public, the urban counties tend to use the electronic media for PSA's and other advertising. Advertising is more organized into "campaigns". In rural counties, the printed media is a major vehicle for information dissemination. Moderate risk waste is rarely front page in the Seattle Times. However, the Skagit Herald, Newport Miner, and Tri-Cities Herald all have featured moderate risk waste. Also in the rural areas, brochures and other printed material are available at public buildings. In several counties, cooperative extension agents have dedicated time to moderate risk waste education.

In collection, the distinction between urban and rural systems lies in the amount of waste handled. Urban systems are large, with mobile systems that remain in place for extended periods of time. Due to their less transient nature, consideration is being given to requiring permits for some of the urban mobile systems. Supplemental collection events are commonly sponsored by cities to augment the capacity and convenient of the system. SQG waste is generally handled by the private sector, all three metropolitan districts have licensed hazardous waste treatment, storage and disposal facilities (TSD's). Urban counties tend to contract collection services and/or disposal with their local TSD's.

Table 2: Comparison of Urban and Rural Programs in Washington

Item for Comparison	Rural	Urban
Utilization of state assistance	Financial and physical resources Cooperative Extension	Regulatory interpretations, working with cities and businesses
Implementation of programs	County (cities act under county umbrella)	County and cities
Education	Schools Printed Material Use of print media Use of state materials	Schools Video/electronic media Local design and implementation
Collection facilities	Small <$75,000 One central in county Satellites facilities at drop-boxes	Large >$50,000 More than one in county
Mobile systems	"Tailgate" few hours at each site semi-annual or annual Lower costs	Standard two weeks per site on-going or regularly scheduled High operations and disposal cost
Collection events	Major towns or areas May supplement facility	Suburban and rural areas, often sponsored by local area
Business assistance	On-site, upon request Enforcement rare	Pro-active on-site Enforcement capable Use of Trade Associations
Business collection	with HHW or collection events	private only, some assistance as "milk run" pilot collection underway



In the rural areas, there is only one TSD in central Washington. Rural counties contract with this TSD, the metropolitan TSD's, or even out-of-state TSD's. Rural systems tend to be smaller, and many rural facilities collect SQG waste along with the household waste. Mobile systems are more mobile--usually serving two or three towns in a single day. These "tailgate" collections are much more reminiscent of a collection event that their urban counterparts.

Also growing in the rural areas are "satellite" facilities. These facilities, which are manned infrequently collect waste from the more remote parts of some of the rural counties. The waste is removed and transported by the county to the central MRW facility. There the waste is combined and processed for shipment.

Collection events are still common throughout Washington, in both urban and rural areas. In many urban areas, these events are used to supplement other collection efforts, and are generally held in suburban and rural districts (all of Washington's counties have some portion which is considered rural). Collection events are the mainstay in some rural counties, but most of these counties are also planning permanent facilities within the near future.

Probably the most outstanding feature in the Washington system is that all areas have staff which are dedicated to moderate risk waste. There are currently some 129 local staff dedicated to moderate risk waste, with about half located in rural areas. Some of the larger rural counties may have up to four staff dedicated to moderate risk waste. There are at least three advantages to having local dedicated staff:

there is always someone to contact at the local jurisdiction;

there is a local advocate for moderate risk waste programs; and

the local jurisdiction has ownership of the local system.

This leads to the rather paradoxical ending--resources. As I sat at a teleconference sponsored by Washington State University on household hazardous waste, I realized what will probably be the next challenge for Washington's program, especially in the rural areas: the program is larger and more successful that the early planners had envisioned. And it is growing. And it is collecting more waste. And it is costing more. The challenge: how do we pay for all this? and how do keep the system cost-effective? And yet, this was the challenge from the beginning.

TARGET CRITERIA FOR RANKING BUSINESS

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King County has a population of about 1.5 million people. Seattle is the major city and there are 29 suburban cities. Our hazardous waste plan is a cooperative effort of 5 existing agencies and jurisdictions with each having specific programs which they are responsible for implementing. The three components that involve Conditional Exempt Small Quantity Generators (CESQGs) are education, collection and compliance. The Health Department and Metro, which is the major sewer utility in the region, implement the education and compliance components, with the King County Solid Waste Division currently in the process of developing the CESQG collection component.

We have 50,000 businesses in King County, with 45,000 being small businesses. Through work that we have done using SIC codes, we estimate that we have over 20,000 CESQG's. In 1992, they will generate 13,000 tons of hazardous waste, and that waste is currently either being (1) managed properly, (2) or mismanaged by being disposed of in the solid or liquid waste streams or on the ground.

Our CESQG program became fully staffed about April of 1992. However, a lot of the groundwork required to start up the program was begun in 1987 when we started to design the CESQG components.

All of our components are founded on the premise that we will achieve greater positive behavioral changes through education, technical assistance and cooperation with the businesses than with enforcement.

Businesses and business associations have played an integral role in the development and implementation of our program.

The purpose of this discussion is to describe the process and rationale we use to prioritize the businesses we will assist through our program.

The ranking of small businesses is not as clearcut a process as it is for larger hazardous waste generators. We need to look at a number of less tangible criteria for ranking CESQG's when delivering our services.

I'm assuming that our businesses are similar to those all across the country, and I can tell you that they take great offense when we referred to this process as selecting target industries. The word target has a very bad connotation to

them, so that we have started to refer to them as priority industries instead. This may seem trivial to you, but I can't emphasize enough the importance of being sensitive to the needs of businesses and the environment they have to operate in.

GENERAL CATEGORIES FOR RANKING

The three broad categories we use to rank businesses include determining the:

(1) nature of the waste;
(2) the nature of the industry; and
(3) other considerations.

Some of the criteria are interrelated and some appear in one form or another in several or all of these categories.

NATURE OF THE WASTE

The nature of the waste contains a number of the traditional methods for prioritizing businesses. It includes criteria such as:

- How hazardous are the materials they are using and what wastes do they generate?

- How much hazardous waste is produced by each shop?

- How many shops are located within the county, what is the total volume of waste generated by this industry type?

- How many waste streams are involved? Are there discharges to air, solid waste, sewers and surface waters?

- What are the types of problems encountered by these industries? We don't want to spend inordinate amounts of time on business types that are already managing their wastes effectively.

- What technology options currently exist for source reduction, alternative processes and technologies, and recycling?

The next two categories are less tangible, but contain equally important criteria.

NATURE OF THE INDUSTRY

- Again when looking at the industry as a whole we need to know the number of businesses involved. This is critical in determining what resources are needed and what we have available. This is an important issue when developing our work plan goals for the CESQG program.

The next seven criteria can provide us with opportunities for us to assist businesses with their hazardous waste management practices. They include:

- How receptive is the industry to pollution prevention practices?

- What is the economic environment they are currently working in? Our desire is that our CESQG program not put shops out of business. This is not beneficial to our community nor is it politically beneficial to our own programs.

- How organized and active is the business association? Early on we realized that acceptance of our program was predicated on a good working relationship with existing structures that could disseminate and promote the information we had, to a large, well organized audience. Questions we ask are, do they have a newsletter? How many members do they have? What proportion of the businesses belong? Are there existing programs, such as trade fairs, and seminars? How successful are they at policing their own industry?

- Are they a strong association, with a strong legislative lobby?

- Are other agencies currently concentrating their efforts on this business type?

- What level of knowledge do they have concerning regulations?

- Are there other pressures exerted by their own industry?

OTHER CONSIDERATIONS

The last category the catchall deals with even more nebulous criteria. They include:

- How many other agencies are starting aggressive programs in this industry type, and are there new regulations that are having a significant impact?

- Are the current regulations having a significant impact or will there be major changes in the near future? We don't want to be advising businesses to take on new and expensive technologies if they will not be needed or will have to be changed in the short term.

- What is the impact of the regulations? Does this impact provide us with a window of opportunity a way of getting our foot in the door to provide education, technical assistance and clarification of often very complex regulations? Are there conflicting regulations between different agencies?

Our program has been instrumental in doing the unthinkable, of having all of the agencies that affect a business sit down and talk about what the intent and desired outcome of all of our different regulations are, and if there are conflicts how they can be resolved.

- What are the private sector initiatives? What positions are their associations pushing on their members?

- Is the industry receiving a lot of either positive or negative exposure in the media?

- Are there very vocal individuals in the industry that are not supportive of the direction we want to go?

- Are the businesses willing to work with us?

- Is this the appropriate time for us to deal with the industry?

- Is the economic climate right for us, or are the industries attention distracted by more pressing issues, like just trying to stay in business?

Of utmost concern to us is how our CESQG program can work with our businesses. Because of the large number of businesses that we have to deal with, we need to take an educational approach, not the big stick approach. We could never get out to all of the shops within one business type in a timely manner. The approach you have to take when confronted with inspecting thousands of businesses is not the same if there are only five or ten.

Again, I have to stress the importance of developing a good working relationship with the associations. Even though not all of the shops in an industry belong to the association they may still receive the newsletters, or hear by word of mouth what is going on. Its crucial that you get businesses to work

with you.

In our program, we are looking for long term positive behavior change. We are interested in effective changes in poor waste management handling practices. We are not interested in short term, short lived big changes. All of these criteria can either work for us or against us.

After evaluating an industry type using these criteria the next stop we undertake is the needs assessment.

In the needs assessment we visit a randomly selected portion of the industry. We look at all of the manufacturing processes the types of products that they use, study their waste handling practices, assess the level of sophistication they currently have concerning the regulations, source reduction, recycling, and very importantly the awareness of us and our CESQG program and services.

We conduct multi-agency inspections, so that our people know what other agencies expect when they visit this industry.

We have extensive meetings with the association and business leaders. We make presentations at their scheduled meetings to inform them of who we are and what our objectives are.

All of this information is then used to design the training we use to bring all of our field teams up to speed. During the development of this training we rely heavily on our next speaker, Ann Moser to research questions we have on the industry and new and innovative products and technologies available to them. In selecting new priority industries, in the future, we will also be using the results of our on-site technical assistance, survey team results and our complaint based team results to assist us in prioritizing future business types.

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Accessing "green" information : methods and motives

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I. Introduction

Technology and computers have become almost second nature to society. In fact, it has been said that technology has become an important and essential dimension of humankind. From the beginning of time, humans have been tool makers, constantly striving to make tools that ease the burden in their lives. Until very recently, industry crafted these tools. It is only in the last decade that the computer has become the most popular tool. The computer has created a new commodity for our society — information. This new commodity has created a new age in our society — an age affectionately referred to as the "information age."

We send and receive information daily. However, society has not collectively reached an understanding of the enormous role information plays in our lives. It will be helpful then, to first define what we mean by "information" before we begin to talk about how to access it.

What is "Information"

Information is defined in Websters's Ninth New Collegiate Dictionary as "the communication or reception of knowledge or intelligence." What does this definition tell us? Information can be thought of as the sharing of knowledge with one another. On the basis of this definition, information is everywhere — in books and newspapers, on television, from gossip heard from the next door neighbor. Although often times misunderstood, information has become a driving force in our society.

As the world grapples with global information networks, the proliferation of information continues ad infinitum. With a shift from an industrial society to an information society, the presence of information has a greater and greater influence on how we live our lives and how we perform our jobs. The shift is also a reflection of underlying changes in technology and in the economic structure of our society.

What has the introduction of computers and the arrival of the information age meant practically in our lives? It has meant that everyday our lives are being driven faster by this technology and we are forced to absorb a greater amount of information. As a result, we view our world in a multiplicity of viewpoints and horizons. For example, the people in the United States were hearing about the attempted coup in the former Soviet Union almost at the same time that it was occurring. This illustrates how the computer has enabled us to tap into a global body of knowledge and hints that this access to information on both sides may have contributed in a small part to the end of the Cold War.

The advent of the computer age has not been without problems The political campaign illustrates the speed at which information moves. Many people in the western portion of the country complained heavily because they are finding out the results of the presidential election hours before the polls close in their district. This is a symptom of the overload and the speed in which information travels in the '90s. There is even talk of a new ailment called information overload.

It is important however, to keep in mind that information as well as computers exist primarily to assist us in our daily lives, especially in what we do on the job. The context of what you or I know however is just as important as the ability of the computer to process the data or knowledge that we possess. We should not define ourselves in terms of computers, just as our minds are not software programs.

II. From Your Computer Screen To Your Mailbox

People share and disseminate information in three basic formats — print, computer and verbal.

The most traditional format of information is the print medium. This medium has maintained its popularity even in today's age of computer wizardry. Many people enjoy sitting down to read a good book or depend on certain reference materials such as the Merck Index to quickly locate bits of information. This medium includes books, journals, magazines, newspapers, brochures, and even junk mail. The one drawback to this medium is the tendency by society today toward desiring rapid delivery of information. The computer has raised the expectations of society so that everyone anticipates things to happen quite rapidly. That is what makes the book appear outmoded. This expectation will not disappear any time soon so the print industry is beginning to respond to this need and they are trying to provide their materials in a more timely manner.

The second medium of information is the most technologically modern — the well-loved computer. With the arrival of computer technology, we can access an enormous body of knowledge through bulletin board systems, on-line databases and CD-Roms and we can also quickly share information with our colleagues over these networks. Computers have made the access of information quick and relatively painless, providing comprehensive, timely, and reliable dissemination of knowledge. In addition, computers provide a clearinghouse for information in a relatively small space. Computers are able to tap into resources around the globe and bring up-to-date information from throughout the world to our doorstep. On-line searching for example can help locate company or product information, current news articles, regulatory changes and toxicology and chemical information. There is one catch, however, to this modern wonder — finding and sharing information through computer technology is often a one-way conversation. This is limiting because the ancient form of two-way communication is a vital link to our need for information.

The third medium for the exchange of information is an ancient mode. However, it is probably the most valuable of all — spoken communication. Networking with colleagues provides a unique opportunity to share expertise and experience in a way that the printed and computer mediums do not allow. Much of the quantity and quality information that exists is not available in any other format. The computer already has a role in the survival of both spoken communication and printed format. Electronic mail (e-mail) has proven to effectively combine both the computer and verbal mediums by providing a way to electronically network. Computers have also advanced the publishing industry into the future where books and magazines are only available in electronic format.

III. Role of Information in the Hazardous Waste Field

One of the most challenging demands facing people working in the hazardous waste field is creating, sharing and using information to help society choose to use less hazardous chemicals. This is true whether one is working with households, small businesses or large quantity generators. The environmental field and in particular the hazardous waste field has grown dramatically over the last 20 years and as a result there exists a large abundance of information. It is our challenge then to link information with our final goal — a CLEAN ENVIRONMENT through an increased use of safer alternatives. There is a great social need for information in the hazardous waste field because information is one of the strongest links between where we are today and where we want to get to. Information in essence is a public good and the public benefits when they understand, through information, about the hazards of the chemicals we use every day. We use information in the hazardous waste field to support three activities — education, basic research, and public policy development.

A. Education

The first way we use information is in support of education. The state of the environment has become a very high profile issue. Society is constantly being bombarded with negative news concerning a new disaster that is related to the environment, often caused by a hazardous waste spill or discharge. Public awareness grows in the wake of increased media attention. This awareness heightens the

motivation of the public to do something to change. People working in the hazardous waste field should be poised with good information in hand to assist the public in making intelligence decisions and conclusions about the environment. As public awareness grows about these issues, so does the need for good information.

If our premise is that the goal of many hazardous waste programs is to educate society about the use of hazardous chemicals with the result being increased use of alternative products, then public awareness begins with education and education begins with information. The first step in changing society's practices is take was is known and use it to help society understand the implications of hazardous chemical use.

B. Basic research

Information supports basic research that will ultimately lead to alternative technologies or alternative chemicals. Any research performed in this field should include investigation into the wealth of research information that already exists. This will aid us in efficiently using our available resources. It is essential that we continue to network with others around the country to avoid duplication of effort.

C. Public policy development

Information assists in the development of public policy that is the catalyst for compliance with regulatory requirements. We use information to draft guidance documents, laws and regulations.

In summary, information in the hazardous waste field is already abundant in quantity and in many cases, superior in quality. It is vital that we avoid reinventing the wheel in all instances and that we keep our mission of helping the environment clear. We must carefully examine the wealth of information and use that information to design and implement programs for small businesses and households.

IV. Setting Priorities — How To Find baseline Information on a SQG

As an illustration of the different sources of information and how to go about accessing them, I would like to use an example from the CESQG portion of the Hazardous Waste Management Program at Metro. The Program chose to assist the screen print industry in King County as one of our first priority groups. In our initial stages of developing a workplan, it became evident that we needed several bits of information about different aspects of screen printing — who they are, what they did, what they did with their waste and what other groups or programs might be working with this industry elsewhere in the nation. After several years, this baseline information will help us evaluate whether we have been able to create a change in the industry in their handling and use of hazardous chemicals and hazardous wastes. Screen printers in King County were chosen because little or no outreach has been provided to the group. Nor could we find any research performed on new and innovative waste management or reduction options for the industry.

I will illustrate in detail the steps I took in researching the answer to the question "Who?" to show how a simple search for information often involves investigating all three formats of information that I have mentioned above. I believe it also will illustrate some of the pitfalls and surprise successes that can also occur. Anyone who is gathering this kind of information will probably experience the same phenomena.

Who are they?

How do you find out how many screen printers exist in King County? This question had the appearance of being easy to answer but was the most difficult task in our original information gathering. There are at least four reasons why this is so. First, the screen print industry is a very diverse group. The industry works on many substrates, such as textiles, plastics, paper. The result is that the industry is scattered among ten different Standard Industrial Codes. Second, most small business owners want anonymity. Many of them are teetering on the edge of existence and are nervous about having anyone

know they exist who be able to put them our of business. (i.e., as a regulatory agency) Third, there are probably as many as many "do-it-at-home" screen printers as there are "legitimate" shops. It is nearly impossible to reach this portion of the industry. Finally, there is a statistic that is thrown around, which I cannot completely substantiate, that says 90% of all small shops go out of business within 2 years. These four issues are true not only for the screen print industry but for any industry that might be included in an CESQG program and are only a few of the challenges facing programs that want to work with small business.

Some of the places employed in the search for screen printers included:

a. Local or state agencies, particularly business licensing depts.

For the screen print group, we contacted the city of Seattle and King County licensing depts. to find out how many licenses have been issued for this industry class. In addition, we obtained from the state environmental agency, the Washington State Dept. of Ecology a list of permited generators

b. Local, state and national trade and professional organizations

The screen print industry does not have a local group, but does have an active national association, *Screen Printers Association International.* This group is already well aware of hazardous waste issues and is working with EPA to study some equipment and chemical alternatives.

c. Electronic lists

The best source for lists of screen printers wound up being an electronic version of a phone book. Lists of company names are sold as a commodity and are usually the most accurate and up-to-date because the vendor usually has the most current technology to handle a heavy duty textual file. However, it is important to note that these lists, or any list of small businesses that is generated is only good as of the moment they are purchased or created. Many small businesses dissolve within 2 years that is another important note to make when involved in an CESQG program.

d. Vendors

This source of is a very good one but requires a trustful relationship between an agency and a vendor. The screen print project has an advisory board of screen printers and vendors and a good relationship has been formed between the two. Luckily the screen print vendors have volunteered to assist us. They are the people who have the most contact with the screen printers and have a good idea of who they are. They cannot actually share their mailing lists with us but they are willing to be spokespeople to the agency on our behalf and are willing to disseminate information for us.

Some other questions that we wanted to answer as part of our baseline information included the following:

What chemicals do they use?

What are their processes?

What wastes to they generate?

What waste management practices do they keep?

Are there any waste reduction options already available to them?

What other programs or organizations are working with same industry group

Our program will go through a similar process for every business type that we wish to assist. By seeking the answers to these questions, we were able to get some baseline data that will help us evaluate

the effectiveness of our program.

V. Conclusion

In summary, I hope that this paper has illustrated four important points. First, access to information is vital in the hazardous waste field. Most programs are attempting to change behavior of the public, on the part of both citizens and business owners, so that they begin to use safer alternatives for hazardous chemicals. To change this behavior, we must raise public awareness. Public awareness begins with education and education begins with information. Second, it is important to be efficient in what we do and use available resources wisely. A tremendous body of knowledge already exists and we each much tap into that wealth before we reinvent the wheel. Third we must all become more educated about how the computer taps into a huge body of knowledge. It should not be our only source of information, but it is an important one that currently is being under utilized. And last, I would add a personal caveat that I have found in my years of seeking information — that is that finding information is a frustrating and time-consuming effort. However, it can be the key to much what you need to know.

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GREAT LAKES TECHNICAL RESOURCE LIBRARY
PROJECT OVERVIEW

David S. Liebl

The Great Lakes Technical Resource Library (GLTRL) was conceived as a tool to promote the implementation of pollution prevention in the Great Lakes Region. By providing an extensive listing of technical resources the GLTRL will give users access to information for implementing pollution prevention that may not be otherwise available to them. The GLTRL has been modeled on existing library classification systems at the Minnesota Technical Assistance Program - Minneapolis, MN (MnTAP) and the Hazardous Waste Research and Information Center - Champaign, IL (HWRIC). Using INMAGIC library software as a personnel computer (PC) interface, the library gives users access to over 5,000 unique technical resource listings for books, technical papers, manuals and government documents. A second component of the library, the vendor/equipment/services database, is available to give users access to listings of companies that provide equipment, supplies and services that can be used for pollution prevention activities.

Although on-line access is available for some of the resources found in the GLTRL the documents that have been included have been previously reviewed and classified by two established technical assistance programs. Consequently the library will include most existing references of interest for pollution prevention and exclude materials that are not useful. Being able to access the library on a PC gives a vast improvement in useability in comparison to other on-line systems. Being a PC based library also allows each user to continually add references to their copy of the library and provides the opportunity for contributions of new references from throughout the region.

The shelf coding systems for both MnTAP and HWRIC are available allowing users to organize and label their reference materials without the need to devise a coding system of their own or invest resources in using an established cataloging system. MnTAP has created a shelf code system based on industrial processes commonly found when doing technical assistance for pollution prevention. HWRIC has chosen to use Dewey Decimal classification. Either system can be adopted for use by noting the entry in the DN field.

The ongoing addition of new entries to the database will be the responsibility of both the individual users and of the user group as a whole. Semi-annual updates containing new references will be compiled from the entries of each participating program and redistributed for incorporation into the GLTRL. This arrangement will provide an opportunity for each program to benefit from the acquisition and cataloging of materials by other programs and avoid missing any valuable references.

Programs that would like to obtain hard copies of references listed in the library are requested to contact the publisher of the reference or a local library. If a copy cannot be obtained from those sources HWRIC may be able to provide copies of small documents. A search-only version of the databases is available for companies and non-profit organizations. For more information on the search only-version of the GLTRL, contact SHWEC.

Funding for the establishment of the GLTRL has been provided by the Solid and Hazardous Waste Education Center and by a grant from the Great Lakes Protection Fund. Any citation of the GLTRL should acknowledge both SHWEC and GLPF. The technical reference database has been derived from the libraries of MnTAP and HWRIC. Any questions concerning the GLTRL can be directed to:

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Designing a Training Program for Household Hazardous Waste (HHW) Programs

Leslie C. Goldsmith
Minnesota Pollution Control Agency

PROGRAM DESIGN

Each HHW program must assess the practical and regulatory conditions that exist in their community to determine training needs. A comprehensive Household Hazardous Waste training program should have as its objective ensuring safe operation of the program, compliance with all necessary laws and efficiency of operation.

An evaluation of a program will lead to an understanding of the knowledge, skills and abilities necessary to perform these tasks. Once a detailed list of training objectives is established, the training program should be designed to ensure that each worker is competent, and aware of the areas in which they are competent.

This paper discusses some general training concepts, as well as providing an example of the analysis and rationale that led to the development of the Minnesota Pollution Control Agency's safety training program.

STAGES OF COMPETENCY-BASED LEARNING

Once the minimum knowledge and standards of competency have been established for a program, workers should be assessed for their competency in all required areas. For safe and smooth operation, it is vital for the supervisor or training manager to consider the competency of each worker within a framework similar to the one described below. This can be complex, because each worker may be at different stages with each of the many necessary competencies in a HHW program.

Unconscious Lack of Competence

At this stage, a new worker is too unfamiliar with HHW to recognize unsafe or illegal conditions, or understand that certain actions are unsafe. Even if closely supervised, this worker may not recognize a situation that is beyond their understanding, and fail to solicit assistance from the supervisor. For instance, a new worker would be unlikely to discriminate between incompatible chemicals, and might not even be aware that mixing chemicals can have serious, dangerous results. There is no place for these workers in the management of HHW, because they pose a danger to themselves and the people that work with them. New workers must receive sufficient training to move beyond this stage before they are allowed to handle ANY waste.

Conscious Lack of Competence

These workers are aware of the limitations of their knowledge, and can be trusted to recognize situations beyond their competency. They must work with close supervision.

Unconsciously Competent

Knows and follows procedures safely, without constant supervision, but is not fully aware of the principles involved in the development of the procedures. This worker is fully capable of safely and efficiently performing the job and making necessary decisions, but may not be able teach, supervise or design new procedures.

Consciously Competent

This worker knows the job and understands the science and principles that underlie the procedures. This type of worker can teach, research, supervise and improvise in the areas that they know.

DRIVING FORCES IN TRAINING PROGRAM DESIGN

Worker safety is the most important factor in a HHW training program, from both a practical and a regulatory perspective. Handling HHW can be hazardous, due to the wide variety of materials handled. The typical HHW worker handles a wider variety of materials than almost any other type of worker, even those in jobs that are considered to have a great deal of chemical use.

The primary regulatory force in HHW programs is occupational safety, particularly the Hazard Communication Standard (HCS), or "Employee Right-to-know." Explained simply, HCS requires an employer to provide each employee with sufficient information to enable them to understand all of the chemical and physical hazards associated with their job, and know how to protect themselves from those hazards.

The cornerstone of HCS is the Material Safety Data Sheet (MSDS). The MSDS is a standardized form that provides information on the safe use, hazards and necessary protective equipment for a chemical or chemical product. Employers are required to obtain and make these documents available to all potentially exposed workers.

In a HHW program, many of the chemicals handled are of unknown age and uncertain origin. This makes the provision of accurate MSDS for all chemicals impossible. As a result, a general competency approach must be used to provide the necessary information on chemical hazards.

Hazardous waste management is another vital area of training. In Minnesota, operators of HHW programs are subject to almost all of the requirements applicable to large-quantity generators of hazardous waste. Because of this, a thorough knowledge of state and federal hazardous waste rules is necessary.

The Department of Transportation also has regulations that may be important. In many cases, the shipment of collected household hazardous waste falls under the requirements for the shipment of hazardous materials. These regulations cover hazard classification, labeling and containers. In addition, specified minimum training and qualifications for Hazardous Materials Transport drivers will soon be applicable to transporters of HHW.

MINNESOTA POLLUTION CONTROL AGENCY (MPCA) TRAINING AND TECHNICAL ASSISTANCE

The MPCA has three primary training areas: Safety, program operation and education. The MPCA has a variety of methods for the delivery of training. They range from classroom presentations to one-on-one coaching and training at HHW facilities with the operators.

The classroom training developed by the MPCA includes a three day safety training program, a one day education training workshop and a four hour training in the use of a manual for providing HHW management advice by telephone. The MPCA provides a variety of manuals, fact sheets, newsletters and camera-ready public education information to complement these training programs.

SAFETY TRAINING REQUIREMENTS

The remainder of this discussion will center on the safety training program, as an example of an area in which the MPCA assessed the requirements of the job, the skills of the work force and designed a training module to address those needs.

The MPCA strongly recommends that a person responsible for the operation of a HHW facility have at least two years of college level training in science and chemistry. A four-year degree is preferred.

In many labor markets in Minnesota, this is not always feasible. As a result, the MPCA has developed a system of training and assistance to help HHW program operators in safely managing waste.

Our initial safety training is a twenty-four hour course adapted from the program mandated for workers conducting emergency operations in hazardous waste cleanup and response actions. This program has been tailored to provide training and experience in situations that approximate those likely in HHW operations. In order to to perform a job that includes the unsupervised handling of the all HHW, a worker must have completed the twenty-four hour course. This provides the worker with the minimum knowledge required to address HCS issues for HHW. The outline of the training is as follows:

LECTURE
Government Regulations: EPA & OSHA
Occupational Health & Toxicology
- Toxicity/Hazard
- Acute/Chronic
- Dose/Response
- Routes of Exposure
- Exposure Limits

Identification of Hazardous Materials
- Material Safety Data Sheets
- Labels
- Hazard Hotline (A vendor providing Right-to-know assistance)
- Reference Materials

Chemical Groups
- Allergens(Sensitizers)
- Corrosives and Irritants
- Gases
- Pesticides
- Solvents
- Mutagens, Teratogens & Carcinogens

Biological and Physical Hazards
- Biological Agents
- Radiation
- Noise
- Heat Stress

Medical surveillance
Flammable Chemicals
Reactive Chemicals
Safety
Proper lifting
Respiratory Protection
- Selection, Limitations and Use
- Cleaning, Inspection and maintenance

Protective Clothing
- Selection
- Use

Levels of Protection
Identification and handling of Explosives
Safety Plans
- Emergency Procedures
- First Aid and Spill Response
- Decontamination

EXERCISES
Fire Extinguisher Use & Live Solvent Fire Practice
Respirator Fit Testing
Respirator Maintenance
Personal Protective Equipment Dress-out
MSDS & Chemical Reference Use

Permanent Program Overview
by Carolyn Dann

With the help of many people around the country, we at the WWC gather together information on all of the permanent facilities in existence. We have prepared a summary of each one, based on the information we received, which will be available at the end of this session. From this information, I can give you a bird's eye view of HHW programs with permanent facilities.

First, let me define "Permanent". To separate collection event type programs (i.e., one or multiple day programs) from ones with a fixed facility, we at WWC define "permanent" programs as those with a dedicated facility (either fixed or mobile) that is open to the public at least once per month, on most months of the year. For this presentation, I will focus on fixed facilities and Jennifer will discuss mobiles.

Based on our surveys, we have seen a significant increase in the number of permanent facilities, from 96 that we knew of as of last year to 128 as of this year. In our count of HHW programs being held, we have counted each permanent facility as one program, although we recognize permanent facilities offer more opportunities for collection than most one-day events. For fun, we have also calculated the number of days of service the permanent programs provide. I would like you to guess the number - 15,772 days.

I do not know as much about any of them as you may know about those in your state but we have looked at every state and can see enough to identify trends. I will be reviewing:

- the major types of facilities,
- the factors that influence the choice of type,
- the types of construction used, and
- the major types of staffing options,
- overall trends, and
- some of my own favorite ideas and program options.

Types of Facilities

The major types of facilities, I have broken down into three categories: minimalist, medium-scale, and full-service. The categories are defined by the types of activities the structure is designed to accommodate. For example, the minimalist facility is one which has space storage, but little or no indoor office space, lab space, bulking or reuse space. Communities in Florida have often used this model because they can do much work outside. A good example of this is Brevard Co., FL, were they have a prefab HHW storage building with a concrete pad in front, a prefab equipment shed, pallets outside for latex paint, and a fence.

At the other end of the spectrum, a full-service facility has indoor space for all of possible the HHW activities: receiving, storing, lab-work, office-work, consolidation, storing for reuse, and storing for transport. Full-service structures can be either large or small. The extreme example of this is Anchorage Alaska, which has 6,000 sq. ft. There are other good examples elsewhere where the climate is not so extreme, such as the one in Yuba/Sutter, CA, which has a separate, heated work area attached to a large, unheated bulking and storage area, for a total of nearly 3,000 sq. ft. Monroe Co, NY's facility is likewise a large, full-service structure, encompassing 1,614 sq. ft for accepting, sorting and storing wastes, although bulking is done outdoors. An example of a smaller version is the Franklin Co, KS facility, for which the County built a 10' x 20' addition onto an existing building. It is equipped with a sink and sorting table, safety equipment cabinet, full height shelves and room for 22 drums and supplies.

In between the extremes, there is a wide range of variations, all of which have space for receiving and storage, plus some bulking and testing areas and maybe an office nearby. These tend to have storage capacity for fewer drums (15-20) than the minimalist versions (which have space for 20-40 drums) because a portion of the facility is devoted to work space. The Ellis Co., KS facility is a good example of this type. This is a 10' x 20' prefab concrete building with drums inside around three sides and a work table

on the fourth side.

A fourth model has recently been developed, which can be described as an indoor-outdoor facility. This type of facility is used in Montgomery County, MD, Spokane WA, and also in Tucson, AZ. The sites have a roof covering a 20 ft. x 20 ft. or larger area, walls consisting of brick or concrete half-way up with fencing above, and epoxy-painted concrete or paved floor. Inside the facility, there are several storage units including one for flammable, one for supplies, and some administrative space either within the facility or nearby.

What Type of Facility Does My Community Need?

There are many factors which determine the type of facility that is right for a community. I will identify some basic ones, although the list is by no means complete. The most basic factors include:

- level of service proposed/participation expected - if the facility is to be well advertised and the sponsor anticipates 40-50 participants per week, the facility and the staffing level will have to be designed accordingly. There should be a full time staff person to coordinate the program and develop reuse and recycling opportunities. In addition, there should be a second person available when accepting wastes and/or consolidating materials.
- weather conditions - does the operator of the facility need protection from weather? This is a function of both the climate and the number of hours and which months the facility is likely to be open. Florida Counties have predominantly opted for the minimalist version, often with protection from the sun. Minnesota, in contrast, has predominantly opted for the medium or full-scale version facilities equipped with heat.
- location and staffing - if the facility is to be located at the landfill and operated with landfill staff, and if there is already a gatehouse or office space, less new space is needed for HHW. If the facility is to be run with additional County staff more often than once per month, then work space, and ideally, bulking space need to be provided.
- existing space available - if there is space to retrofit or add on to an existing building, this is often the least expensive option and may allow for efficient use of staff time too.
- budget - there appears to be only a slight correlation between type of facility and cost. My information comes as reported by each community and I have included data where the community reported both building and site costs. The minimalist versions have cost between $30,000 and $102,000 for the buildings, concrete pads, and site work. The medium-scale facilities cost between $18,000 and $185,000 and the full-scale facilities have cost as little as $20,000 for an addition and up to over $450,000 for a new structure.

What type of structure is the most cost effective?

There are many variations on the type of structure that can be used. The options used around the country include: prefabs, pre-cast concrete structures, modified trailers or containers, retrofit existing buildings, new construction of either cement block style or Butler building style, or a combination.

Prefabs

The most commonly used is the prefab hazardous waste storage unit. This has the advantage of being available with all sorts of safety features and may save the expense of design engineering fees. This type of space tends to be expensive (in the range of $109 to $195 per square foot) but is often used in combination with some inexpensive outdoor space. It provides storage space but does not usually allow for any work area (for bulking, sorting, or testing, or office work). The larger sizes are slightly more cost-effective, but still are in the same range.

Pre-cast Concrete

Pre-cast concrete buildings have been used in at least three places for which I have information and the cost for them seems to range from $63 to $75 per square foot, depending on the size of the

facility. Like the prefabs, they can avoid much of the need for design engineering. They can be laid out to be used for storage only or for a combination of storage and some work space.

Modified Trailers or Containers

Modified trailers and containers have been used by Southeastern Public Service Authority of Virginia, San Bernardino, CA and by Riley County, KS. These facilities are long and narrow, but can provide space for sorting, bulking, testing, and storage. The costs have ranged from $22 to $118 per square foot. SPSA's units are 8' x 8' x 20' or 40' in size. They are equipped with fiberglass grating, a containment area, a floor berm to divide the facility double doors at each end, a fan, light, eye wash and safety equipment.

Retrofits and Additions

Where there is available space, good use has been made of it by retrofitting it or adding onto it for an HHW facility. In some cases, the costs have been as low as $22-$45 per square foot. They have also been over $200 per square foot.

New Construction

New construction has mostly been chosen in places where there was some other construction underway either for a transfer station or recycling center. The cost of new construction appears to be similar to the costs of the prefabs on a per square foot basis, but the designs are more flexible are can provide more work space, office space and space for reuse areas. The costs experienced at four of the most recently constructed facilities ranges from $100 to $190 per square foot. In Spokane, WA, for example, an "indoor-outdoor" type facility cost $140,000 for a 25' x 34' facility or $165 per square foot.

What are the Staffing Options

There is also a variety of staffing options possible, which I have again sorted into three categories, ranging from maximum involvement of the contractor to minimal.

Maximum Contractor Role

The first option is one that primarily on contractor staff. The municipal staff may be responsible for accepting some wastes and storing them until the contractor comes. The contractor is responsible for most of the waste acceptance, plus the categorization, identification of unknowns, lab-packing, transportation, and paperwork.

Medium Amount of Contractor Involvement

The second option is to have the municipal staff trained to bulk flammable, used motor oil, and paints and to do some of the lab-packing under the guidance of a contractor. The bulking reduces the number of drums required and saves some of the contractor's time. In most communities, the municipal staff time is less expensive than the contractor's hourly rate, but it's not true in all communities. In this scenario, the contractor is responsible for identification of unknowns, the rest of the lab-packing and paperwork, plus transportation.

Minimum Contractor Role

The third option is for the municipal staff to be fully trained to handle all bulking, lab-packing, and paperwork, and the contractor is primarily responsible for checking the lab-packing and transporting the drums when they are full.

Trends

Although there are many variations in the size, function, construction type and staffing arrangements for permanent facilities, there are also several trends that are of note.

Think Big

In general, the recent facilities are larger than the earlier ones and some of the earlier ones have expanded or wish they could. When the older facilities were asked what they would have recommend to others, they

said "think big". More of the new facilities are the full-service variety than was the case in previous years, incorporating space for more than just storage. The indoor-outdoor facilities have provided that most amount of space at reasonable cost.

Trained Staff

More and more facilities, both existing and new ones, are using trained staff, fewer volunteers and are relying less heavily on the contractor's staff.

Appointments and Fees

Several programs are using appointments as a way of managing their costs, although no data is available on the effect of this on participation levels. Some places have stopped using it because of complaints but other programs have offered a combination of regular hours and appointments for those who can not make the regular hours. Very few of the existing and none of the newest facilities are charging fees. In Larimar County, Colorado, by dropping their fee they saw a dramatic increase in participation levels.

More drum space

The newer facilities need to accommodate more drums and the minimum number of drums is increasing as the level of sophistication increases and the degree of separation also increases. The minimum number is now approximately 20 drums.

Satellites

Another trend is toward satellite facilities or satellite mobile programs. The satellite facilities are simplified versions of a full permanent facility. Satellite mobile programs often do less consolidation on-site than would a normal one-day event. They may collect materials to be consolidated at the permanent facility. There are satellite facilities in San Bernardino, CA, Palm Beach, FL, Seattle, WA, Island County, WA, Chittenden County, VT, and are planned for Wichita, KS. The use of satellite facilities helps offset the problem that any permanent facility can not be nearby enough for everyone in the service area. Satellite mobile units and satellite storage units offer the advantages of increased access for residents and the opportunity to generate publicity and heightened local interest with the advantages of time to consolidate and find alternate uses for materials that is best done at the central facility.

Collecting and Sharing Information

We and others are working towards developing a consistent means of reporting information so that it is meaningful to others and as helpful as possible for you. To do so, we have encouraged programs to collect information on the specific products that are received, especially those that get lab-packed. We have found that programs know they are getting a large amount of pesticides but they do not have data on types or actual quantities, only on the number of lab-packs.

My Own Favorite Ideas

My own collection of favorite ideas from the programs across the country include:

- Separate building for flammable
- Acids and bases neutralized by WWTF
- Pesticides used by Parks & Rec Depts.
- Materials Exchange Areas and Programs to Develop Markets
- Appointments and Hotlines for Public Education
- Promotion focus on "movers"
- Source Reduction focus on "movers and shakers"
- Satellite operations

As you develop your programs, we hope that you will be willing to share your start-up and operational information with us and with others so that we can gain the benefit of your experiences. You can rest assured that we will be calling you and sending you a survey so it will appear in next year's compilation. Please also feel free to call us for more specific advice or references to people you can call.

Mobile Permanent Programs

Jennifer Holliday

WHAT IS A MOBILE FACILITY?

1. Don't bring waste to permanent facility.
2. More than one site per year.
3. Not a one day collection event.

KNOWN MOBILE PROGRAMS IN THE COUNTRY

1. Carver County - Minnesota
2. Chittenden County - Vermont
3. King County - Washington
4. Riverside County - California

IF NOT A MOBILE FACILITY WHAT IS IT?

1. One day collection event
2. Satellite of permanent facility.

KNOWN SATELLITE COLLECTION FACILITIES IN THE COUNTRY

Detroit Michigan - 14 sites, 6 hours every Saturday, bring back to permanent facility.

Wichita Kansas - 2 permanent sites open one day each per year. Bring materials back to permanent facility.

Lake County Florida - Collections at mobile home parks upon demand, Bring materials back to permanent facility.

Rutland Vermont - 11 sites, visit 3-4 sites for 1-2 hours every Saturday. Bring materials back to permanent facility.

Tacoma Washington - 4 sites, open 100 days/year, bring materials to permanent facility each night.

WHAT TO CONSIDER WHEN PLANNING A PERMANENT MOBILE PROGRAM

1. Cost $ Budget $$ Funding $$$ MONEY!
2. Permanent facility or not
3. State and local regulations concerning storage, transportation & safety
4. Community Size; population and area
5. Site availability/Convenience/Visibility
6. Staffing
7. Mobility of unit
8. Storage
9. Length of time at each site/# of sites
10. Length of season
11. Long term goals

1992 Mobile Household Hazardous Waste Collection Programs

Location	Carver County Minnesota	Chittenden County Vermont	King County Washington	Riverside County California
Sponsor	Carver County Env. Services	Chittenden Solid Waste	King County Solid Waste	Riverside County Health Services
Contact	Leslie Loeffler (612) 448-1217	Jennifer Holliday (802) 655-9801	Victoria Holt (206) 296-4464	Michael Shelter (714) 358-5055
Date Started	September 1992	October 1991	September 1989	February 1990
Type of Sites	(3) 1 day/year 1 home base 80 X 40'	6-8 per year permanent 45' X 65'	24/year various 6,000-10,000 sqft	6 sites/year permanent 5,000 sqft
Season	May-October	April-October	Year-round	October-May
Time open each site	1 day/year/site 17 days /home base	4-5 weeks/site	2 weeks/site	1 month/site
Hours	Sat 8-12	Wen & Fri 10-5 Sat 8-3	Thurs & Fri 12-7 Sat 10-5	Tues-Thurs 9-1 (1 Sat/site 9-3)
Days Open/Year	20	83	144	100
Participation	220 to date ave. 40/day	1,393 for 92' ave. 20/day	22,303 for 92' ave. 155/day	3,800 for 91' ave. 40/day
Field Staff	1.5 in-house	1.5 in-house	5 contractor	8 - 10 weekdays 10-20 weekends in-house/contractor
Community Size	Pop:48,000 359 sq. miles	Pop:127,000 532 sq.miles	Pop:991,059 2,000 sq.miles	1.1 million
Permanent Fixed Facility also Available	no (just home base)	yes Burlington	Yes Seattle	No
HHW Storage	Overnight (on-site)	Overnight (on-site)	TSDF	Overnight (on-site)
Permits Required	None	State, Local	Fire	None
Capital Cost	$30,000	$55,000	none (contractor)	$45,000
Cost/Participant 92' Operational Budget	NA $131,000	$82/Participant $115,000	$90/Participant $2,000,000	$186/Participant $707,000
Funding	Tip Fees Solid Waste	Tip Fees Solid Waste	Tip Fees Sewer & Water	Tip Fees Solid Waste
Amount Materials Collected	21 (55 gallons) 5 (15 gallons)	27 Tons	748 Tons	Not Available

1992 Satellite Household Hazardous Waste Collection Programs

Location	Tacoma Washington	Rutland Vermont
Sponsor	City of Tacoma Public Works	Rutland County Solid Waste
Contact	Doug Pierce (206) 591-5543	Steve Parker (802) 775-7209
Date Started	March 1992	June 1992
Type of Site	4 sites/year permanent 60' X 60'	11 sites permanent Transfer Stations
Season	February-November	March - November
Time Open Each Site	2 weeks (revisit site 3X's each year)	1 - 2 hours visit 3-4 sites every Saturday
Hours	Tue-Sat 11-6	Saturday 8-5
Days Open/Year	100	approx. 40
Participation	800 to date ave. 10/day	300
Field Staff	1 in-house	1 in-house
Community Size	Pop:175,000 100 sq.miles	pop:32,000
Budget (fixed & Mobile)	$810,000	$132,000

Chittenden
$411,333
for Rover & Depot 92

REGULATORY REQUIREMENTS FOR PERMANENT HHW FACILITIES

by

Judi Frantz

California Environmental Protection Agency
Department of Toxic Substances Control

Regulatory requirements for permanent household hazardous waste programs vary greatly from state to state. These variations are the basis for this presentation, i.e., a comparison of some of the regulatory requirements in various states. The particular requirements compared include: siting criteria or limits; storage requirements; training requirements; generator status; and whether or not a state permit or approval is required.

The states compared include: California, Connecticut, Massachusetts, Minnesota, New York, and Washington.

Siting criteria: three states -- California, Massachusetts and Washington -- have siting criteria:

California's siting criteria are generic, requiring that all proposed sites conform to all local land use plans, building codes and ordinances; the site must also be consistent with the county's hazardous waste management plan (if that plan has been approved by the state). While california primarily relies on the local jurisdictions -- since they will conduct the programs -- to determine appropriate sites, there certainly is an expectation that good judgement will prevail.

In Massachusetts, site approval is the first step of the approval process. The applicant must submit sufficient information to convince the state that the site chosen "will not cause a significant impact on public health, safety, the environment, or drinking water supplies."

The State of Washington requires facilities to comply with all of the location standards for a solid waste facility, including geology (no holocene faults, etc.); Groundwater; flooding; surface waters; slope; airports; critical habitats (for both threatened and endangered species); buffer zones (100' from the property line of a nonresidential property, 250' from the property line of a residential property, and 1000' from the boundary of all state and national parks); and all sites must conform to all local land use plans, zones and ordinances.

Three states (Connecticut, Minnesota, and New York) do not have siting criteria per se, although two of the three (Connecticut and Minnesota) do provide "guidance", and New York has "recommendations" for siting.

Storage requirements and limits: in general, most states appear to allow up to 90 days storage time at permanent facilities. There are the usual variations, though, such as Washington state where the storage time is indefinite. Minnesota, on the other hand, will allow greater than 90 day storage with state approval. California automatically allows the standard 90 days, but will approval longer storage times if they are requested.

Training requirements - In general most states require the 40 hour OSHA training, the exceptions in this criteria being Connecticut and Washington:

Connecticut does require a training plan and that all staff be trained, including volunteers handling the hhw.

Washington requires safety training for all staff and all are required to be familiar with the hazardous waste handling procedures.

Generator status: this is one of the more interesting aspects because this varies significantly across the U.S.

In three states (Connecticut, Washington and California), the generator is the local jurisdiction hosting or sponsoring the activities.

In Connecticut, it's the contractor.

In Massachusetts, it can be just about anyone, i.e., the organizer, sponsor, contractor, public works department, etc.

In Minnesota, 50% of the programs are operated by the state, so the state is the generator; in the remaining 50%, it's the program sponsor -- usually the county.

In New York, the generator is whoever fills in the "generator" blank on the manifest.

State permit or approval - In Connecticut, 2 permits are required: one to construct the facility and one to operate it.

In Massachusetts, permanent facilities must obtain state approval (but not a permit).

In Minnesota, state approval, not a permit, is required if storage will be greater than 90 days. Notification is more extensive than for one-day events; an actual permit is needed only if treatment or disposal will occur on-site.

In New York, 2 permits are required: one to construct and one to operate.

In Washington, permits are required, but they are issued by local health districts, not by the state.

In California, a state permit is required, but a recent piece of legislation has created a whole new permitting structure for hazardous waste facilities. The new structure consists of five permit tiers which now will include conditional exemptions, conditional approvals, permit by rule, standardized permits and full permits. Permanent household hazardous waste facilities will be included in the standardized permit tier. And since this legislation is so recent, the details of exactly what that means are still being worked out.

Several other states - North Carolina, Pennsylvania and Vermont, also have regulatory requirements for permanent household hazardous waste facilities. But I must be honest with you and admit that I ran out of time, haven't reviewed their regulations and requirements, and have not included them in this comparison. If there are representatives in the audience is from any of these states, first I offer my apology. Second, you are sincerely welcome to speak up and fill in the blanks.

Additional states appear to have regulatory requirements, and hopefully they can be included in this discussion at next year's conference. These states include New Jersey, Florida, Illinois, Texas, Oregon, Virginia, Wisconsin, Kansas, Tennessee, Idaho and Nevada. The same apology is offered and the invitation to speak up is extended to any representatives of these states who may be in the audience.

In closing, I want to share an observation. It is simply that in the last two years, the number of states that have developed and/or implemented regulatory requirements for permanent household hazardous waste facilities appears to have at least doubled -- maybe tripled. It will be interesting to see if this trend continues in the future.

Hard Surface Cleaning Performance of Six Alternative Household Cleaners as Measured by Soil Removal and Microbial Reduction Under Laboratory Conditions

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Many groups and agencies promote the use of alternative household cleaners because of the belief that they are environmentally preferable to commercially formulated hard surface cleaners. These alternative cleaners include food products such as vinegar or baking soda as well as cleaning and laundry aids such as borax or ammonia.

The "recommended uses" of most of the alternative cleaners are for general cleaning, but some of them are also recommended as alternatives for disinfectants. Household cleaners that are registered as disinfectants must meet testing requirements of the Environmental Protection Agency (EPA) and it is recognized that the alternative cleaners do no meet this criterion. The purpose of this project is to test and compare the efficacy of these alternatives using both soil removal and microbial reduction (which includes both physical removal and cidal action) as the evaluation criteria. These alternative products were tested as single ingredient products even though in actual practice some of them are mixed together in make-your-own recipes.

Several researchers have studied the role of contaminated surfaces in the home and the spread of respiratory and intestinal diseases. According to Gerba (in press), household surfaces can play a significant role in the transmission of viruses and bacteria that cause infectious diseases such as the common cold and flu and intestinal diseases. Proper cleaning methods are a major defense against the spread of these microbes because one is more likely to "pick up viruses from touching contaminated surfaces than from shaking the hand of someone who is infected" (Ansarsi, Sattar, Springthorpe, Wells & Tostowaryk, 1988).

An examination of over 200 homes in England documented the pattern of bacterial contamination in the home environment. Sites where cleaning methods needed improvement included hard surfaces and textile products in the kitchen and bath areas (Scott, Bloomfield, & Barlow, 1982). In a study of food preparation in the household kitchen, work surfaces were identified as potential areas of contamination requiring disinfection (Borneff, Hassinger, Wittig, & Edenharder, 1988). The researchers were concerned that "housewives are content if their kitchen appears to be clean." There may be fecal contamination of surfaces in homes with infants and toddlers and a recent study revealed contamination of surfaces in out-of-home child care settings (Van, Wing, Morros, & Piekering, 1991).

Methods

The surface chosen for these tests was a high pressure decorative laminate. The material was cut into 6 inch by 17 inch sections (tiles). The center of each tile was artificially soiled with a simulated bathroom

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soil or a simulated kitchen soil. A microbial agent *(Serratia marcescens)* was applied over the soiled section. Alternative cleaning products and commercially formulated hard surface cleaners (referred to as commercial cleaners in the remaining text) were used to clean the surface; the commercial products were used as a point of reference. The ingredients as listed on the label of each product are found in appendix 1. Complete soil test methods are available from the authors. For bathroom cleaners, six tiles per cleaning product were tested and for kitchen cleaners, ten tiles per product were tested.

The simulated bathroom soil test method was a modification of a method being developed by ASTM. The soil mixture was applied to the sample surface by dipping a mini-trimmer paint applicator into the mixture, then "painting' the mixture on the test surface. The soiled samples were heated in a 70° C oven for one hour and were cooled overnight. Samples were tested for soil removal within one week after soil application. The soil was comprised of the following:

4.5 g synthetic sebum	1.5 g super mix dirt
40.29 g sodium stearate	3.0 g stearate premix
0.6 g carbon black	259.71 g deionized water

The simulated kitchen soil was a modification of a fatty acid sebum soil. The soil mixture was applied by adding 2.0 ml warm soil to each sample surface using a 10 cc syringe. A mini-trimmer paint applicator was used to spread the soil. The soiled samples were dried and were stored for 12 days prior to cleaning. The soil was comprised of the following:

20 g stearic acid	5 g paraffin
10 g Crisco^{R}	160 g bandy black research clay
20 g palmitic acid	160 g isopropyl alcohol
10 g linoleic acid	10 g oildag
5 g squalene	

The microbial agent was a 24 hour stock culture of *Serratia marcescens*, approximately $1x10^{7}$/mL concentration, diluted in Butterfields phosphate buffer solution to approximately $1x10^{4}$/mL concentration. This organism was chosen because it is relatively non-pathogenic to immune competent hosts and because it forms a readily identifiable red pigment so that it can easily be distinguished from background microbes on the surface. Thus a definitive picture of before and after counts can be obtained specifically related to the cleaning product used. A sterile cotton-tipped applicator was used to apply 0.2 ml of the *Serratia marcenscens* mixture to the soiled area of each bathroom tile and 0.5 ml to the soiled area of each kitchen tile immediately prior to cleaning. RODAC plates contained Standard Methods Agar (SMA) with 0.7 g/L lecithin and 5.0 g/L polysorbate 80 for general purpose neutralization. Three RODAC plates were applied to soiled areas of each tile a) immediately after bacterial application and prior to cleaning and b) to the soiled area immediately after cleaning except in those cases in which the cleaning product specified a five-minute product contact period to allow disinfectant action. before and after sampling sites were mutually exclusive to avoid interference (colony reduction) attributable to the sampling method. The RODAC plates were incubated at 25 degrees Centigrade for 24-36 hours then counted using a Quebec Colony Counter. Only red pigmented colonies were counted. At this dilution, all before cleaning plates were Too Numerous To Count (TNTC). Thus results and comparisons are based only on after cleaning counts rather than on percent reduction, with the assumption that the initial inoculation was consistently applied from the same stock culture for all cleaning products and therefore would not bias the results.

A Gardner Abrasion Tester was used to clean the soiled samples. For each test a cleaning product was applied to the cleaning face of a new sponge which had been soaked in warm synthetic hard water (referred to as water in the remaining text) to add 70 g water to the dry weight of the sponge. The sponges (3.5 inches by 5 inches by 1.5 inches cellulose) had been previously washed and dried. The tester

was set to complete a selected number of cycles, 50 for the samples with the simulated bathroom soil with microbial agent and 20 cycles for the simulated kitchen soil with microbial agent. The number of cycles was based on trials to determine where obvious differences in cleaning ability between products could be observed.

Alternative cleaners used in this research include not only food products but cleaning and laundry aids other than hard surface cleaners (Lemeley and Wagenet, 1992). The types of cleaning products and their use concentrations are presented in Table 1. Products were used full strength or diluted according to manufacturers' directions for cleaning heavy soil. Four alternative cleaning products were used on the simulated bathroom soil with microbial agent: lemon juice, vinegar, baking soda and borax. Two liquid commercial cleaners were used, one registered as a disinfectant and one that is not registered as a disinfectant. The alternative cleaning products used on the simulated kitchen soil with microbial agent were lemon juice, vinegar, baking soda, household ammonia, and a hand dishwashing liquid. Three commercially formulated hard surface cleaners used; they include two liquids, one registered as a disinfectant and one not, and a dry cleanser registered as a disinfectant. Water was used as a control.

The outcome data recorded for each cleaned sample were the number of *Serratia marcescens* colony forming units (CFU) recovered after cleaning and an evaluation of soil removal. The cleaned samples were judged for soil removal by a panel of impartial judges. The samples, coded to avoid recognition bias, were compared to a sample board portraying five different levels of soil removal. Each test sample was independently evaluated by eight judges and assigned a soil removal score (SRS) from 1 (greatest soil removal) to 5 (least soil removal). Statistical analyses of the data were conducted on the number of colony forming units on each RODAC plate and the soil reduction score for each tile. Analyses performed included the analysis of variance and the Tukey Test.

Results and Discussion

Microbial Reduction Application of the Tukey test for the difference in group means indicates different levels of effectiveness in microbial reduction. The effectiveness of the cleaners in both microbial reduction and soil removal are reported in Table 2 for bathroom soil and in Table 3 for kitchen soil. For both soils there were significant differences in the microbial reduction within the alternative cleaner group but not within the commercial cleaner group.

Among the bathroom soil cleaners, the commercial cleaners, vinegar, baking soda, and lemon juice were more effective in reducing microbial counts than borax and water (Tukey analysis at alpha=0.05). Further application of the Tukey analysis to the low count group revealed that the two commercial cleaners and vinegar had lower group means for microbial counts than baking soda and lemon juice. For kitchen soil cleaners, the same pattern emerged; the three commercial cleaners and vinegar were most effective in reducing microbial counts. Water and ammonia exhibited intermediate results and dishwashing liquid and baking soda were the least effective in reducing microbial counts. Lemon juice results were not included due to a lab error (plate contamination) which resulted in too few observations.

Microbial reduction results must be interpreted with caution. It is clear that for both bathroom and kitchen products, lowest microbial counts are achieved by the commercial products, whether or not registered as a disinfectant. However, vinegar (and to a less extent lemon juice) gave statistically similar results presumably because of its very low pH. *Serratia marcescens* is typical of gram-negative enteric bacteria which are known to be sensitive to acid conditions. Water and ammonia were in an intermediate group; dishwashing liquid and baking soda yielded the highest microbial counts on the kitchen soil. One possible explanation for this phenomenon is that the detergency action of the dishwashing liquid and baking soda tended to break up clumps of viable cells to a greater extent and therefore resulted in high colony counts although the actual number of viable cells was equivalent to the products with less detergency.

It is also important to note that this sampling protocol does not distinguish between cidal action

and physical removal in the lowering of viable counts. Previous research on dilute solutions of the alternative cleaners, borax, vinegar, ammonia, and baking soda, has shown that they did not meet EPA guidelines (cidal action) for registered disinfectants (Rubino & Bauer, 1992). The concentrations of the alternative cleaners in the Rubino study were 16 to 32 times more dilute than those used in this study, however. Although the commercial products and some of the alternative cleaners clearly resulted in fewer colonies recovered from the tiles, transfer of the microbes to the sponge could have occurred but was not tested. Thus attention to the cleaning mechanism and ultimate fate of organisms physically removed but not killed may be important as well as the absence of organisms from hard surfaces.

Soil Removal The results were tabulated as mean scores for 50 cleaning cycles for the bathroom soil and for 20 cleaning cycles for the kitchen soil. With additional cycles, all cleaners may have had the same soil removal scores. Using the Tukey test to test for the difference between the means resulted in several groups of levels of effectiveness in soil removal (Tables 2 and 3). For soil removal under the test conditions, there were significant differences within the alternative cleaner group for both the kitchen soil and the bathroom soil. However, within the commercial cleaners, there were significant differences for bathroom soil only. Because the bathroom soil was baked onto the tiles, it was a much more difficult soil to remove.

For removal of bathroom soil, the high removal group consisted of one commercial cleaner without disinfectant and the low removal group consisted of one alternative cleaner, vinegar. The alternative cleaner with the best soil removal score was borax. The soil removal scores of the other alternative cleaners, baking soda and lemon juice, were not significantly different from the commercial cleaner with disinfectant.

For removal of kitchen soil, ammonia, an alternative cleaner, was in the high soil removal group with all the commercial cleaners; lemon juice and vinegar were in the low soil removal group. Baking soda, dishwashing detergent (hand) and water were in separate intermediate groups.

Conclusions and Implications

In this laboratory study, alternative household cleaners were used to clean high pressure decorative laminate surface soiled with simulated kitchen or bathroom soils over which a microbial agents had been applied. The cleaners were then evaluated on their effectiveness in reducing microbial contamination, as measured by the number of colony forming units cultured after cleaning, and their effectiveness in removing soil. Because the simulated bathroom soil was a tougher soil to remove than the simulated kitchen soil, the soil removal results are somewhat different for the two soil types. The cleaners used were chosen to represent cleaners that are often recommended for cleaning bathroom or kitchen soils and were compared with commercial hard surface cleaners used in those two areas.

The results indicate that compared to commercial cleaners, the alternative cleaners as a group are less effective in both microbial reduction and soil removal. However, the alternative cleaners vary in their effectiveness. Two alternative cleaners, borax and ammonia, were more effective in soil removal than the other alternative cleaners. However, borax was not at all effective in reducing microbial contamination. Vinegar was more effective in reducing microbial contamination than the other alternative cleaners but was least effective in removing soil.

All of the cleaners, including water, could conceivably have removed the soil from the tiles with enough cleaning strokes. Therefore, consumers who wish to use alternative cleaners may find them effective in removing soil if they are willing to work harder. The microbial reduction in this research could be the result of either cidal action or physical removal and transfer of the microbes to the sponge. Washing the sponge with a disinfectant or drying the sponge will ultimately destroy the microbes. Because the microbe used for testing in this research was susceptible to acid conditions, the acidic cleaners, particularly vinegar, were effective in reducing microbial growth. For cleaning soil with these

types of microbes, a vinegar rinse following cleaning with a more effective soil-removing alternative cleaner, may be effective in reducing microbial contamination. However, when there are health-related concerns that prompt the use of cleaners that kill microbes, consumers should be aware that only registered disinfectants have been tested using standard methods to show cidal action. This laboratory study is useful in evaluating some differences among alternative cleaners. Further testing of these products needs to be conducted in the home environment under conditions of consumer use.

Table 1. Cleaning Products and Use Formulations for Bathroom and Kitchen Soils

Cleaner	Simulated Soil Cleaned	Formulation
Synthetic Hard Water	Bathroom & Kitchen	40m.-0.10g/L calcium carbonate 0.03g/L magnesium carbonate warm deionized water
Alternative Cleaners		
Lemon juice	Bathroom & Kitchen	40ml undiluted
Vinegar	Bathroom & Kitchen	40ml undiluted
Baking soda	Bathroom & Kitchen	10g baking soda + 40ml water
Borax	Bathroom	10g borax + 40ml water
Ammonia	Kitchen	40ml 1:1 dilution ammonia with water
Ivory Liquid® - hand hand dishwashing liquid	Kitchen	40ml 1:10 dilution Ivory Liquid® with water
Commercial Hard Surface Cleaners		
Spic and Span with Pine®	Bathroom & Kitchen	40ml undiluted
Clorox Clean-up® (registered disinfectant)	Bathroom & Kitchen	40ml undiluted
Comet Cleanser with Chlorinol® (registered disinfectant)	Kitchen	10g Comet + 40ml water

Table 2. **Effectiveness of cleaners on bathroom soil as evaluated by differences in group means (Tukey test alpha=0.05)**

Cleaner	Microbial Reduction	Soil Reduction
Water	Least effective	High intermediate
Alternative Cleaners		
Lemon juice	Intermediate	Low intermediate
Vinegar	Most effective	Least effective
Baking soda	Intermediate	High intermediate
Borax	Least effective	High intermediate
Commercial Hard Surface Cleaners		
Without disinfectant	Most effective	Most effective
With disinfectant	Most effective	Low intermediate

Table 3. **Effectiveness of cleaners on kitchen soil as evaluated by differences in group means (Tukey test alpha=0.05)**

Cleaner	Microbial Reduction	Soil Reduction
Water	Intermediate	Low intermediate
Alternative Cleaners		
Lemon juice	(not included)	Least effective
Vinegar	Most effective	Least effective
Baking soda	Least effective	High intermediate
Ammonia	Intermediate	Most effective
Dishwashing Liquid	Least effective	High intermediate
Commercial Hard Surface Cleaners		
Without disinfectant	Most effective	Most effective
With disinfectant	Most effective	Most effective
Dry cleanser with disinfectant	Most effective	Most effective

Appendix 1 Description of Cleaning Products

Product	Signal word on label	Ingredients listed on label
Baking soda: Arm & Hammer Baking Soda®	—	—
Bleach with cleaner Clorox Clean-up®	Warning (kills staph, strep, mildew, & athletes foot fungus)	Sodium hypochlorite 2.0%, Inert ingredients 98.0% (including non-ionic surfactant and fragance).
Borax: Mule 20team® Borax	Caution	Sodium, boron, oxygen and water.
Cleanser: Comet® Disinfectant Cleanser with Chlorinol®	Caution	Sodium dichloro-s-triazinetrione dihydrate 0.9%, Inert ingredients: calcium carbonate, sodium carbonate, anionic surfactants, quality control agents, perfume, color.
Dishwashing detergent Ivory®	—	Cleaning and sudsing agents (anionic, nonionic and amphoteric surfactants), water, stabilizing agents (ethyl alcohol), and aesthetic agents.
Household ammonia Parsons® Ammonia	Caution	Ammonium hydroxide solution, nonionic surfactant, perfume, color, clarifying agent, salts (inert). Contains no phosphorous.
Lemon juice Borden ReaLemon®	—	Water, lemon juice concentrate lemon oil, 1/40th of 1% sodium benzoate (preservative), 1/40th of 1% sodium bisulfate (preservative).
Liquid cleaner Spic and Span Pine Cleaner®	—	Cleaning agents (anionic surfactant and pine oil), water softening agents (sodium citrate), quality control agents, water, color and perfume.
Vinegar Heinz Distilled White Vinegar®	—	Sun-ripened grain, diluted with water to a uniform pickling and table strength of 5% (50 grains) acidity.

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Nonchemical methods of pest control in and around homes[1]

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Abstract

Insects and insect relatives are the most commonly encountered pests in and around homes. Several simple nonchemical methods can be used for control of these pests. Nonchemical methods such as sanitation and exclusion are effective in eliminating or significantly reducing incidence of a wide variety of pests. The use of bacterial insecticides, horticultural oils, insecticidal soaps, baits, and traps are effective against a limited number of pests. An understanding of the pest biology, ecology, and behavior is essential for effective use of nonchemical control methods. An overview of nonchemical methods and the pests impacted by each method are discussed.

Introduction

Pesticides are substances or a mixture of substances used for destroying, preventing, repelling or mitigating pests. Pesticides also include substances intended for use as plant growth regulators, defoliants, or desiccants. Substances derived from living (e.g., plants, bacteria, and fungi) and nonliving entities (elements) are included under the definition of pesticides. Pesticides used against insects are called insecticides, and those used against weeds, fungi, rodents, and birds are called herbicides, fungicides, rodenticides, and avicides, respectively.

Pesticides are commonly used for pest control in and around homes, because they are easy to apply, fast-acting, and effective against a wide variety of pests. A recent survey estimated that nationally 85% of homeowners store at least one or more household pesticide products (Whitmore et al. 1992). A 1979 United States Environmental Protection Agency survey estimated that annually about 87 million pounds of pesticides are used in and around homes (U. S. Environmental Protection Agency 1979). About 43 and 32% of the 87 million pounds used were insecticides and herbicides, respectively; the remaining 25% constituted fungicides, rodenticides, disinfectants, and other chemicals. Insecticides are commonly used in and around homes, because most homeowners consider insects and insect relatives (e.g., mites, spiders, centipedes, and millipedes) (see Fig. 1) as pests or as a nuisance, especially if they occur indoors. Of the 440 home dwellers surveyed in Minnesota, about 65% indicated that they tolerated insects found outdoors, and 26% indicated that they disliked insects (Hahn and Ascerno 1991). Conversely, about 81% of the same home dwellers surveyed disliked indoor insects, and only 13% indicated any tolerance toward insects inside their homes.

The information presented here is for educational purposes only. Mention of product or trade names does not imply recommendation for use by the University of Minnesota.

[1]Homes includes rented or owned dwellings. In this article, the terms "homeowners", "home dwellers", "residents", and "public" are used synonymously.

Pests found in and around homes

Insects and insect relatives that are frequently encountered outdoors in Minnesota are: ants, mosquitoes, spiders, bees, wasps, flies, black flies, centipedes, carpenter ants, millipedes, sowbugs, pillbugs, boxelder bugs, ticks, crickets, aphids, daddy-long-legs, and mites (Hahn and Ascerno 1991). Some of these same organisms (e.g., daddy-long-legs, spiders, sowbugs, millipedes, and centipedes) become pests when they seek harborage indoors and cause concern to residents. In addition to the invertebrates listed above (including fleas and pantry pests [sawtoothed grain beetle, red flour beetle, rice weevil, and Indianmeal moth]), vertebrates such as rodents, bats, and birds (Fig. 2) also become pests when they seek refuge indoors. Information on identification and biology of the invertebrate and vertebrate pests can be obtained from Ware (1988).

Both the invertebrate and vertebrate pests enter homes through openings in foundations and walls, and through open, unscreened or broken doors and windows. Some invertebrates are brought indoors on infested plant or food materials. If environmental and nutritional requirements for these pests are not met indoors, they may perish. Other species may thrive well indoors because of stable and suitable environmental conditions, abundant availability of food, and absence of natural enemies. Some species enter homes to escape unfavorable environmental conditions outdoors. For instance, boxelder bugs, cluster flies, and elm leaf beetles overwinter indoors until conditions outdoors become conducive for their survival.

Reasons for pest control

Homeowners apply control measures against outdoor and indoor pests because they dislike presence of pests, prefer to maintain a pest-free property, and want to eliminate pests that transmit diseases (e.g., cockroaches, ticks, flies, etc.). Several chemical and nonchemical approaches are effective in controlling pests outdoors and indoors. However, nonchemical methods are now becoming popular because of the public's concern regarding effects of pesticides on humans, animals, and the environment. The use of pesticides also leads to development of resistance in pests, resulting in ineffective control at recommended label rates. Several simple nonchemical methods, if used properly, can effectively reduce pest incidence and abundance in and around homes. In this article, we give an overview of the main nonchemical strategies and pests affected by the strategies. Additional information on nonchemical strategies for control of individual pests can be obtained from Olkowski et al. (1991) and Lifton (1991).

Nonchemical methods of pest control

Several nonchemical methods exist for control of pests in and around homes (see Olkowski et al. 1991, Lifton 1991). The range of nonchemical options available may vary with the pest, pest intensity or severity, and effectiveness of the option. Here, we discuss several key nonchemical options that may help reduce the amount of pesticides used in and around homes. However, it is important to realize that for effective use of nonchemical methods, an understanding of pest biology, ecology, and behavior is essential. Such an understanding is not always required when using synthetic pesticides.

Exclusion: Any measure used to prevent entry of organisms indoors through openings in the building structure, doors, windows, or on infested plant or food materials. Some techniques include screening openings to prevent entry of flies, mosquitoes, and beetles; caulking cracks and crevices to remove harborages of pantry pests and cockroaches; and sealing or repairing openings to prevent entry of bats, mice, bees, and

wasps. Plants and food products must be carefully inspected for infestations at the time of purchase and before they are brought indoors.

Sanitation: Maintaining clean surroundings both outdoors and indoors removes potential areas where pests can feed, breed, and hide. Sanitary measures include, disposing garbage on a weekly basis during warm weather to control filth flies and cockroaches; discarding overripe fruits to control fruit flies and fungus beetles; removing bird nests as these harbor dermestids and clothes moths; and vacuuming to reduce populations of fleas, carpet beetles, and several ground-dwelling insects and insect relatives. It is also important to keep kitchen areas clean to cut down incidence of pantry pests and cockroaches.

Habitat modification: Includes any method used to eliminate or disrupt areas where pests reside. For example, removing weeds and keeping well-mowed lawns reduces incidence of crickets and ticks. Removing debris and fallen leaves near foundations reduces sowbug and centipede populations. Wood or wooden piles, where carpenter ants and ground beetles seek harborage, must be stored away from structures. Creating a vegetation-free barrier around the perimeter of the building will reduce incidence of many ground-dwelling pests such as clover mites. The use of dehumidifiers is recommended, especially in basements, to create an unfavorable environment (dry environment) for sowbugs, centipedes, firebrats, and dust mites.

Temperature control: Artificially manipulating the temperature of substrates infested by pests or areas where pests residue, is an inexpensive nonchemical strategy. Pantry pests, clothes moths, and carpet beetles can be eliminated by subjecting infested foods, clothes, and carpets, respectively, to extremely hot or cold temperatures. In general, to kill all developmental stages of pantry pests, clothes moths, and carpet beetles, exposure to temperatures below 0°C and above 40°C for several hours to several days are needed.

Physical and mechanical control: A rolled newspaper or magazine and fly swatters are some tools used for killing visible pests. On infested plants, hand-picking insects is a partially effective means of control (e.g., tomato hornworm). Infested leaves must be excised from plants, bagged, and discarded.

Bacterial insecticides: To control larvae of moths and butterflies (caterpillars), larvae of mosquitoes and black flies (maggots), and larvae of beetles (grubs), three different varieties of the bacteria, *Bacillus thuringiensis*, are available. The varieties *kurstaki*, *israelensis*, and *san diego* are effective against caterpillars, maggots, and grubs, respectively. The larvae succumb to the bacterial toxin after ingesting the treated substrate. For controlling Japanese beetle grubs on lawns, the use of *Bacillus popillae* may offer some control. Recent evidence suggests that caterpillars can develop resistance to the *B. thuringiensis* endotoxin(s).

Baits: Consist of one or more food materials baited with a selective insecticide to kill pests attracted to the bait. Boric acid (2 parts to 98 parts bait [jelly, peanut butter]) is effective in killing ants. For pantry pests, the use of wheat germ plus mineral oil bait is effective in drawing insects out of their hiding places into the bait. The bait must be presented in a small shallow cup or a dispenser. The oil kills trapped insects by suffocation (by clogging spiracles or exterior openings along sides of the insect body that facilitate breathing).

Traps: Traps are escape-proof devices that capture highly mobile and active pests. Live traps can be used for rabbits, pocket gophers, and squirrels. Unbaited sticky traps such as red spheres, resembling apples, are useful for trapping apple maggot adults. Sticky traps can be baited with commercial lures (pheromones and food attractants) to enhance trap catch. For example, there are sticky traps baited with lures available for pantry pests, wasps, and flies. Colored sticky traps are effective in capturing whiteflies and aphids. Traps are useful in early detection and continuous monitoring of infestations. They are not effective in reducing populations unless the trapped population is isolated or confined to a small area. Pests must be active or mobile to be captured in traps. Therefore, any environmental or biological factor that affects pest activity affects trap catch. Consequently, absence of pests in traps does not imply that the pests are absent in the area sampled with traps.

Diatomaceous earth: Several diatomaceous earth formulations are commercially available. These formulations contain dead skeletons of sea diatoms of various shapes and sizes (<5 to 15 microns). Diatomaceous earth kills arthropods by absorbing lipids on the cuticle (integument or skin) and by lacerating the cuticle. Water loss through the cuticle resulting from lipid absorption and cuticular lacerations leads to death. It is also plausible that the small diatomaceous earth particles may suffocate arthropods by clogging their spiracles. Diatomaceous earth formulations are most effective on soft-bodied insects. Because the mode of action is physical, arthropods may not have the ability to develop resistance to this natural product.

Insecticidal soaps: Soaps are sodium or potassium salts of fatty acids combined with fish or vegetable oils. These soap solutions have insecticidal value, because when applied to soft-bodied insects, they penetrate the cuticle and dissolve cell membranes. As a result, the cells collapse and leak, leading to dehydration and death. Any commercial laundry detergent can be used at a rate of 1/2 cup per gallon of water on soft-bodied insects such as mealy bugs and aphids. Safers soap solution is a commercial formulation that is shown to be effective on aphids, caterpillars, fleas, mealybugs, scales, and whiteflies.

Horticultural oils: Horticultural oils are highly refined petroleum-based oils. When applied directly on insects, the oils kill insects by asphyxiation (i.e., by clogging spiracles). Oils are effective on soft-bodied insects such as aphids and mealy bugs.

Botanicals: Are essentially plant-derived chemicals. Some of the common botanicals are: pyrethrum, neem, ryania, red squill, derris, nicotine, rotenone, limonene, and sabadilla. Different botanicals have different modes of action, and some botanicals have multiple modes of action. For instance, the component most active against insects in neem is azadirachtin. Azadirachtin is an effective feeding or oviposition deterrent, and also disrupts normal development of insects. Some botanicals are highly toxic, and their toxicities are similar to some synthetic pesticides. The LD_{50s} (lethal dose that kills 50% of test animals) of ryania, nicotine, red squill, and pyrethrum range between 0.7 to 200 mg/kg (Olkowski et al. 1991).

Miscellaneous techniques: Pantry pests have the ability to puncture and penetrate paper and cardboard materials. Therefore, storing cereal and cereal products in tight plastic or tupperware containers instead of the original paper or cardboard holders prevents infestation by pantry pests. In order to avoid black fly bites, wear light-colored clothing that completely covers exposed areas of legs and hands. If mosquitoes are abundant outdoors, reduce activity to 1-2 hours. Dry cleaning clothes may eliminate clothes moth infestations.

Parasitic and predatory insects (Fig. 3) are now commercially available to control garden pests. For example, ladybird beetles are voracious predators of aphids. The degree of control achieved with the use of parasitic and predatory insects is variable, and the cost-effectiveness has not been well-documented.

Ultra sound devices and light traps are two nonchemical control measures that are not very effective in suppressing pest populations.

Keys to successful nonchemical pest control

Identifying the pest is the first step in controlling it, because information on the pest biology, ecology,and behavior can be easily obtained if the pest is correctly identified. Contact your local Cooperative Extension Service office if you need help in identifying a pest and for additional information on the pest. Most nonchemical controls work well at low pest population densities. Therefore, it is important to detect pest problems early. Careful visual inspections or the use of traps can help in early detection of infestations. Some stages of pests are most susceptible to nonchemical controls, and the nonchemical controls must be timed to target that stage. For instance, the bacterial insecticide, *B. thuringiensis* variety *kurstaki* is effective on younger caterpillars; the bacteria has no effect on eggs, pupae, and adults. Therefore, it is important to apply the bacteria when small-sized caterpillars are present on the foliage. Repeated applications may be necessary to obtain additional reductions in populations of the susceptible stage in the same or future generations. Pesticides must be used only as a last resort. Pesticides can complement nonchemical methods where needed. Please follow label directions and rates when applying pesticides. Parasitic and predatory insects can be used where pesticides are discontinued or were not previously used, because these beneficial insects are highly susceptible to pesticides.

The combined use of nonchemical and chemical control tactics, with favorable economic, social, and environmental consequences is called Integrated Pest Management (IPM). The use of IPM practices for controlling pests in and around homes is important if we are to reduce introduction of pesticides into the environment. If we better understand and appreciate the creatures that live in and around our homes, we may be able to reduce pesticide use by being content with the degree of control attained by using nonchemical pest control methods.

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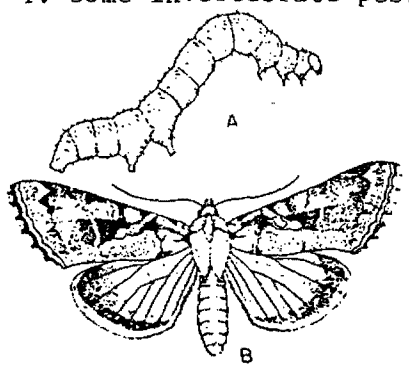
Fig. 1. Some invertebrate pests found in and around homes.



Cabbage Looper. A — Mature larva; B — Adult.

Tomato Hornworm

Elm leaf beetle

Young Larva

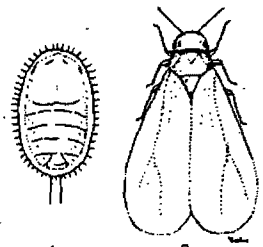
Pupa

Adult

Adult

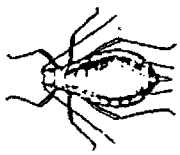
Larva

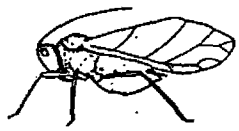
Japanese Beetle (*Popillia japonica*)



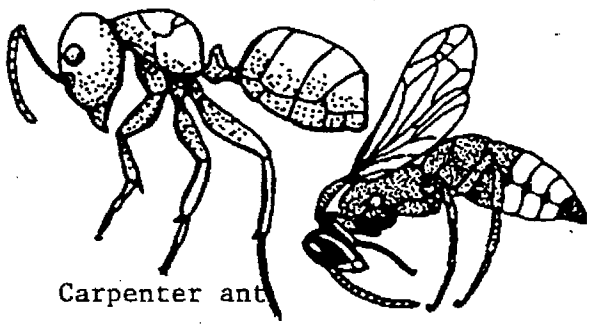
Whitefly. *A* — Nymph; *B* — Adult.

Mealybug Adult Female





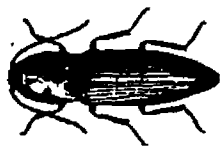
Aphids — Wingless and Winged



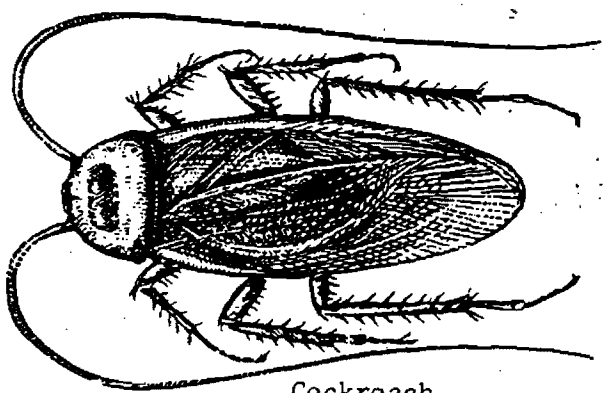
Carpenter ant

Bold-faced hornet

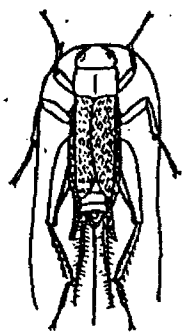
Honey bee



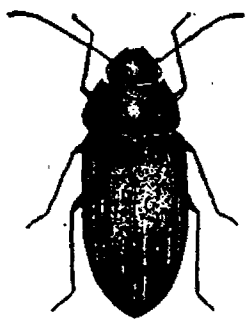
Click Beetle



Cockroach



Cricket



Darkling Beetle

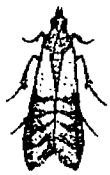
Musca domestica
House Fly

Firebrat

Fig. 1. (continued)

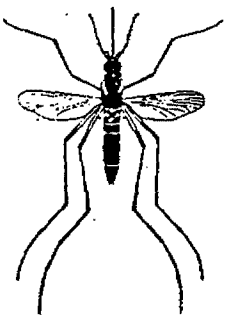
Rice Weevil

Saw-Toothed Grain Beetle



Indian Meal Moth

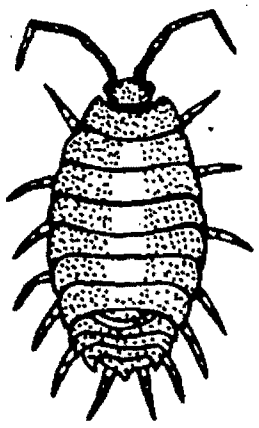
Pantry pests



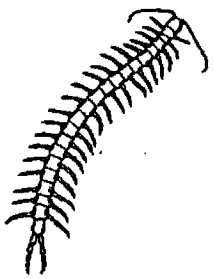
Mosquito

Webbing Clothes Moth
Tineola bisselliella

Insect relatives found in and around homes



Sowbug

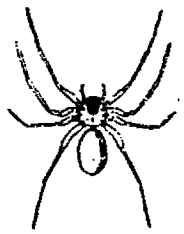


Common Centipede

House Centipede

A Spider Mite

Black Widow



Brown Recluse

Spiders

Fig. 2. Some vertebrate pests found in and around homes.

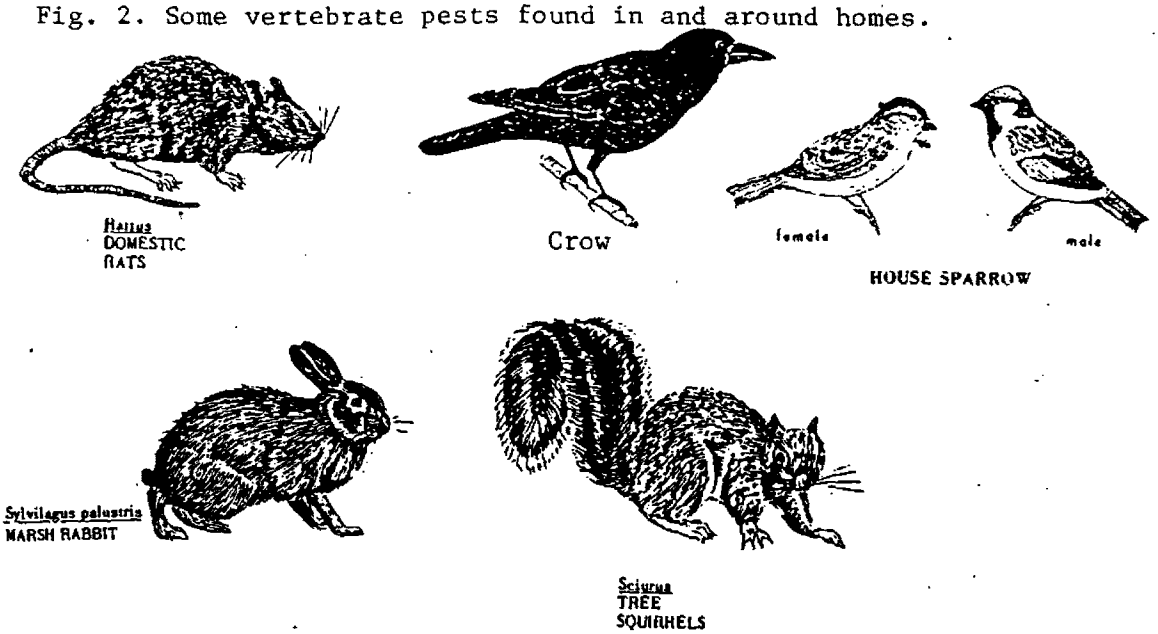
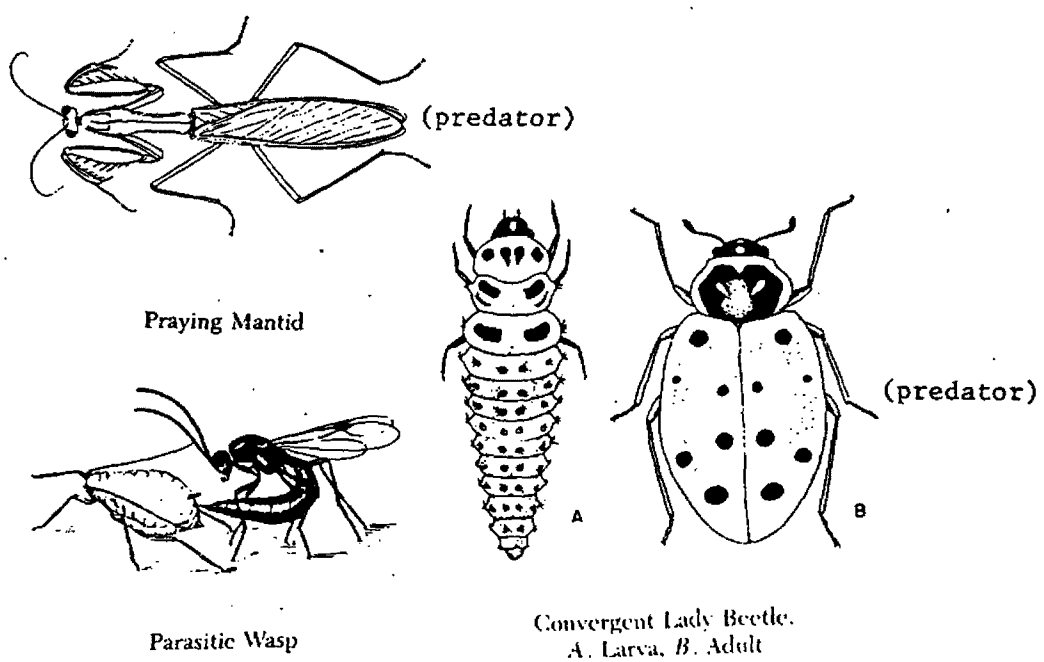


Fig. 3. Examples of some beneficial (parasitic and predatory) insects.



AVAILABILITY AND EFFECTIVENESS OF ALTERNATIVES: ARTISTS' MATERIALS

Angela Babin, M.S.
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Introduction

The Art Hazards Information Center answers about 12,000 inquiries per year from artists, performers, teachers, parents, schools, museums, health professionals and government agencies. These questions range from firstly, the identification of chemical hazards of products - to secondly, recommendations for safety precautions such as ventilation - to finally, safe waste management options for unwanted or "used-up" artist waste.

Last year, I presented information on the hazardous constituents of artists' materials. Artists use a great variety of chemicals in many different processes. Most artists "use-up" the material they work with; but they can sometimes produce waste requiring some type of waste management.

The critical step in waste management options is understanding materials and the determination if the materials are indeed hazardous. To know what ingredients are in artists' materials, one must either read the label, or consult the manufacturer and get the Material Safety Data Sheet (MSDS). On October 9, 1992, the Consumer Product Safety Commission (CPSC) issued its final rule on labeling requirements for art materials presenting chronic hazards (Federal Register, pp. 46,626-46,674). The rule codifies the voluntary standard ASTM D-4236 with some changes as a CPSC rule [16 CFR 1500.14(b)(8)], as mandated by the Labeling of Hazardous Art Materials Act of 1988. While labels must now give information on materials with chronic as well as acute hazards, the MSDS provides the most information.

Types of Hazardous Waste

There are several categories of chemicals used by artists and schools that come under regulation as hazardous waste. These include:

Toxic Waste Chemicals: e.g. solvents, formaldehyde, lead compounds, mercury, chromates, etc.

Flammable Waste: e.g. flammable and combustible liquids with flashpoint < 140° F, solids that can cause fire through friction, absorption of moisture, or spontaneous combustion, ignitable compressed gases, and oxidizing substances like potassium chlorate and concentrated nitric acid.

Corrosive Waste: e.g. wastes with a pH < 2 or > 12.

Reactive Waste: e.g. cyanide or sulfide wastes which can generate dangerous amounts of toxic gases between pH 2 and 12.5, unstable compounds such as methyl ethyl ketone peroxide.

Acute Hazardous Waste: e.g. arsenic compounds, hydrogen cyanide and cyanide salts, many pesticides, vanadium pentoxide, etc.

Leachable Toxic Waste: e.g. materials that can leach into water more than specified levels of the following metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. In addition, leachable levels of other chemicals are regulated, including benzene, cresols, p-dichlorobenzene, methyl ethyl ketone, pentachlorophenol, perchloroethylene, trichloroethylene, and several pesticides.

Miscellaneous: Other classes of hazardous waste, not normally encountered by artists may include radioactive materials and pathological, e.g. viral or bacteriological waste.

Regulations

RCRA

In the United States, the Environmental Protection Agency (EPA) regulates the disposal of hazardous waste under the Resource Conservation and Recovery Act (RCRA). Industrial wastewater discharges are regulated under the EPA Clean Water Act. Subtitle C of RCRA regulates the

management of hazardous waste through its "cradle-to-grave" system of regulations for the identification of hazardous waste and generators, amongst other requirements. This waste manifest system tracks hazardous waste through generation, transportation, and disposal.

The responsibility for administering RCRA rests with the individual states. While most of the states' hazardous waste programs directly resemble RCRA, contact individual state environmental offices to elucidate particular differences.

Hazardous Waste Generators

There are different categories of hazardous waste producers, under RCRA, *40 CFR Part 261*. The basic distinctions center around the amounts of hazardous waste produced. These categories are: Large Quantity Generators (LQGs); Small Quantity Generators (SQGs); Conditionally Exempt Small Quantity Generators (CESQGs); and those home artists considered Household Hazardous Waste Generators (HHW).

There is a grey area surrounding the boundaries that define artists and their working scenarios. For example, an artist who has a separate studio may not be eligible for disposal of unwanted materials at a household hazardous waste collection program. Likewise, homeowners, gardeners and artists who bring in suspiciously large amounts of materials to a household hazardous waste collection program may be turned away from services because their quantities resemble those of businesses, small farmers, and commercial art businesses.

CWA

The EPA has developed categorical and pretreatment regulations that establish the basis for wastewater management under the Clean Water Act of 1977. Each municipality develops and enforces programs regulating sewer and wastewater treatment. For specific information on local regulations, one must consult the local Public Works and own Department of Environmental Protection.

Most artists won't produce liquid wastes in amounts that are relevant to these regulations. In fact, to qualify for status as a "significant industrial user," one must discharge at least 25,000 gallons per day of wastewater (excluding sanitary wastewater), or contribute a waste stream that accounts for 5 or more percent of the hydraulic or organic capacity of a publicly owned treatment works (POTWs), or as especially designated by the municipality. Large photographic processing studios and large electroplating studios are examples of businesses that may need comply with this law. University arts programs or community arts facilities may produce amounts of aqueous waste that are covered in the pretreatment regulations discussed below.

There are categorical standards for 21 industries, including:

Part 413 - electroplating	Part 433 - metal finishing
Part 449 - paint manufacturing	Part 447 - ink manufacturing
Part 459 - photographics	Part 463 - plastics molding and forming
Part 464 - metal molding and casting	Part 466 - porcelain enameling

which are only relevant if there is direct discharge to a water body.

The federal Water Pollution Act of 1972, and the Clean Water Act were require that requires that POTWs (sewage treatment plants), establish local pretreatment programs to ensure compliance. There are also restrictions on the discharge of pollutants with certain characteristics into a sewage treatment plant:

Sewer Codes

It is impossible to present all the municipal sewage regulations here. Those concerned must contact their municipal Public Works Offices for details on the regulations.

DOT and Transportation

Shipments of hazardous wastes off-site are regulated by both the EPA and Department of

Transportation (DOT). DOT requires that wastes be segregated by hazard class.

EPA requires that off-site shipments of hazardous waste must be accompanied by a "Uniform Hazardous Waste Manifest", which is a shipping paper used to track the waste. The manifest documents the "cradle-to-grave" requirements, and contains the name and address of the generator, the receiving facility site, and all transporters, along with a listing of all hazardous wastes in the shipments. All personnel handling the wastes must sign the manifest. Large quantity generators must have certification regarding waste minimization including programs to reduce the volume, quantity and the toxicity of the wastes. Similarly, small quantity generators must sign such a statement.

Containers used for transporting wastes over public streets and highways must meet DOT requirements for construction, compatibility with contained material, and tightness.

Methods of Waste Management

A hierarchical arrangement of the waste management options - starting with the most desirable is as follows:

1. waste elimination or reduction at the source;
2. waste separation and concentration;
3. waste exchange;
4. energy and material recovery;
5. incineration or treatment;
6. secure land disposal.

I have slides of actual artworks, that demonstrate these waste management efforts.

Waste Elimination or Reduction

The best way of managing hazardous waste is to actually eliminate or minimize its production. Artists, and even schools and teachers, can substitute lesser toxic materials. Waste elimination and minimization often correlate with the reduction in the environmental and occupational toxicity. Substituting lead-free glazes instead of leaded glazes results in the elimination of lead that enters the environment, via kiln fumes (health and air hazard), and also in discarding unwanted or waste material (as hazardous waste). Since lead-glazed pottery is not foodsafe, lead glazes cannot be donated because of the hazards involved. The following slides show: a vase glazed with red lead, a bowl (not foodsafe) glazed with a barium glaze, and a mug glazed with manganese and cobalt. Another way to eliminate waste is to alter process. The next two slides show small brass and copper sculptures that have been riveted together with miniature bolts, rather than using solders. Under the RCRA regulations, if one discards materials made with toxic solders, they are not regulated, but scraps inevitably generated in working the pieces are. This artist has eliminated the generation of scrap solder.

The next three slides show a similar landscape painted with three different palettes. The first painting uses typically seventeenth- and eighteenth-century colors, including: lead white; vermillion (mercuric sulfate); gamboge (tree resin); red lake; red iron oxide; and smalt (blue). The painter chose not to work with samples of realgar, a popular color of that time that is a sulfide of arsenic.

The second painting of this series utilizes nineteenth- and early twentieth-century colors, including: cadmium reds; cadmium yellows; cobalt blue; cobalt green; and Prussian blue. The third painting shows twentieth-century synthetic organic colors, that are generally much safer including: naphthol reds; Hansa yellows; new phthalcyanine greens; new phthalcyanine blues; and dioxazine purple. Also shown is an abstract painting done with synthetic organic pigments showing different qualities of these water-based paints.

Waste Separation and Concentration

If one cannot reduce the actual amount of hazardous waste being produced, the next step is to keep hazardous waste from "contaminating" regular garbage. In this way, the waste streams remain

separated. An example of this is keeping separate used and unwanted solvent-based and water-based paint. Sometimes wastes can be combined in an advantageous manner. For example, mixing dilute solutions of spent photographic developer (basic pH) with dilute solutions of spent photographic stop baths (acidic pH) can result in neutralization of both.

Waste Exchange and Recycling

There are two types of recycling methods, which can be described as internal or external approaches. Internal recycling involves individual re-use of material. Mineral spirits and other solvents used for thinning, washes, and cleanup in oil painting can be allowed to settle, strained and decanted through a cheesecloth (to remove the solids), and finally, be re-used. Internal recycling is usually going to be extremely cost-effective.

External recycling involves actually passing unwanted materials on to someone else who can use them. What is refuse to one may be sustenance to another. For example, leftover art materials can be donated to an art center or secondary school. Note that hazardous materials should never be donated to elementary schools, and highly toxic materials like lead glazes should not be recycled. The next slide shows a large-scale installation, placed at an abandoned site of an iron ore factory. This environmental piece consists of the construction of red-hued mounds, of iron-rich and unwanted earth that visually contrast and complement with the green mountainous surroundings.

Many Household Hazardous Waste Collection Programs (HHWCPs) have set up paint and other material collection and exchanges from HHW generators and sometimes for CESQGs too. For example, an HHWCP in Santa Monica, California operates a materials exchange service in which the participants can take usable products that have been collected, such as paints, thinners, adhesives, etchants, etc., for free. The environmental coordinator reports that individual artists, art cooperatives and performance art groups "clean out the city facility weekly." The next slide depicts a facility that has been totally repainted with spray paints that have been donated to that program.

Recommendations for Treatment or Disposal

Thanks to a grant from the United States Environmental Protection Agency (EPA), the Center for Safety in the Arts Has produced a twelve page data sheet called Waste Management and Disposal for Artists and Schools. The next overheads are excerpts from this publication on recommendations for the actual treatment or disposal of art materials. If possible, leftover or waste art materials should be recycled or handled by other methods as discussed earlier, especially since recycling of hazardous waste materials exempts waste generators from EPA regulations.

Overheads

1. Waste Management Methods
2. Acids - Dilute Acid Solutions, Concentrated Acid Solutions, and Solid Acids.
3. Aerosol Spray Cans, ♦ Glues and Cements.
4. Alkalis - Dilute Alkaline Solutions, Concentrated Alkaline Solutions, and Chlorine Bleach
5. Clay, ♦ Glazes and Glaze Chemicals.
6. Dyes - Powders and Dye Solutions.
7. Etches and Pickling Solutions.
8. Metals, ♦ Metal Compounds.
9. Minerals, ♦ Organic Oils, ♦ Plaster.
10. Organic Peroxides, ♦ Oxidizing Agents.
11. Paints and Other Coatings - Water-based Coatings, Solvent-based Coatings, ♦ Patinas, ♦ Pigments.
12. Pesticides.
13. Photochemicals.
14. Solvents.
15. Plastics ♦ Plastic Resins, ♦ Wood

Safety Precautions

Whenever pouring or neutralizing chemicals, wear proper, approved personal protective equipment. This includes:

- chemical splash goggles approved by the American National Standards Institute (ANSI);
- protective clothing (impermeable gloves, aprons, etc.);
- exhaust ventilation for volatile gases or solvents or;
- appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH).

In addition, all routine chemical handling should be done in areas that are equipped with:

- emergency spill control kits for large amounts of liquids;
- fire extinguishers for flammable and combustible materials;
- eyewash fountains in case of splashes in the eyes;
- emergency showers for concentrated acids and alkalis.

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DEVELOPING AN R.F.Q./R.F.P. FOR ACQUIRING AN OUTSIDE CONTRACTOR TO ASSIST WITH A COMMUNITY'S HOUSEHOLD HAZARDOUS WASTE PROGRAM

by James S. Gruber

There have been excellent presentations and papers presented on this topic at this and previous E.P.A. Household Hazardous Waste Management Conferences. I will direct you to the paper by Elizabeth M. McCormick, included in the 1990 proceedings, and the paper by Lee Ann Merashoff, which will be included in the 1992 proceedings.

The McCormick paper provides an excellent detailed guide for both an administrator and a local attorney in drafting a bid document. My comments in this paper will be from the perspective of a local administrator and will not duplicate excellent information provided in the previously cited papers, but will attempt to point out a few "tricks of the trade" that may be practiced by some firms that are over-zealous to gain market share, a few sample techniques to compare apples to apples, and considerations in determining who should receive the contract award.

R.F.Q and R.F.P.

As any experienced administrator will know, the "lowest cost bid", may end up being the most expensive bid if the bidding, awarding, and contract supervision is not properly executed. I have always taken the approach that a contract with a licensed hazardous waste management firm is both a type of contract with a contractor and with a professional. Therefore, the bidding process should mirror both an R.F.Q. (Request For Qualifications used for consulting/engineering services) and an R.F.P. (Request for Proposal used for construction or trucking type services).

This translates into developing a set of criteria for awarding the contract that carefully measures a firm's quality of professional service as well as the contractor's price. This will be discussed further under developing the "Basis of Award" component of the R.F.Q./R.F.P.

DRAFT R.F.Q./R.F.P. TO SERVE AS THE BASIS OF FINAL CONTRACT

Nothing can be more exasperating than trying to negotiate every line of a contract when it could have been simply written by the administrator before within the bid R.F.Q./R.F.P., and then referenced to by a simple, one-page contract. Save yourself many hours of needless toil and draft a thorough bid document, with adequate legal review, that will clearly state "this bid document shall be the basis for, and incorporated into, the contract for services."

Apples to Apples? How can a bid document be written so that if you specified a "Golden Delicious" you don't end up with a "Crab Apple"? Once you receive your bids, how do you determine which one is actually lower in price?

These are by far the most difficult questions to answer. A few thoughts on how to avoid the "Crab Apple" are as follows:

1. Watch out for a bidder that allows for "short-packing", e.g. partial drums charged at full price, without a very good explanation.
2. Be aware of limitations of what can be consolidated. For example, if the bid says only full gallon cans of paint can be consolidated, and smaller or partial cans are lab-packed, your costs will skyrocket.
3. A bidder could give a very low unit price for set-up (a figure that those reviewing the bid can easily understand and be influenced by) and then provide a low bulking effort. Since you usually pay by the drum, this could lead to a large per-gallon or per-pound cost. The apparent "low bidder" could become the most expensive contractor.
4. Scrutinize the bid for "surcharges", "contingency charges" or "off-spec charges", and ask for full explanations in writing or prohibit these charges in the R.F.Q./R.F.P.
5. Beware of a charge for "unknown testing" that could be levied on consumer container quantities. For example, if a test for an unmarked container is $50, you may deplete

your entire budget for test charges on every container delivered to a program that does not have a readable label.

6. Poor control of bulking could easily lead to more drums contaminated with P.C.B.'s. For example, it is our experience that marine paints and varnishes, along with concrete floor sealers, appear more likely to contain P.C.B.'s. Therefore, an experienced contractor will bulk these together. Note: A 55 gallon drum of consolidated paint may cost you $350, if contaminated, $1000.

Methods of Cost Comparisons

To help compare cost data provided by each bidder, I suggest two different approaches. The first approach requires all bidders to complete a prepared table that is very specifically laid out. One example (*Table 1*) requires for each product type: a cost per gallon or pound, the number of gallons or pounds in each drum, size of drum, and the management method for each (such as blended fuel, incinerated, consolidated for re-use, stabilization, land disposal, etc.).

TABLE 1 — ***Sample Bid Form***

Product Type	Cost/lb. or gal.	Conversion Factor	Size of Drum	Mgmt. Method
(1)	(2)	(3)	(4)	(5)
A. Flammables				
1. Paints				
a. Consolidated SBP	_____	_____	_____	_____
b. Non-reusable SBP	_____	_____	_____	_____
c. Consolidated LP	not included in this program			
d. Other	_____	_____	_____	_____
2. Solvents, thinners, stains	_____	_____	_____	_____
3. Putty, adhesives, asphalt type coatings	_____	_____	_____	_____
4. Gasoline, fuels	_____	_____	_____	_____
5. Waste oil	to be accepted and consolidated by Town			
a. To be reprocessed	_____	_____	_____	_____
b. To be rerefined	_____	_____	_____	_____
c. To be incinerated	_____	_____	_____	_____
6. Aerosols/compressed gas containers (excluding pesticides)	_____	_____	_____	_____
7. Flammable pesticides	_____	_____	_____	_____
8. Other	_____	_____	_____	_____
B. Poisons				
1. Pesticides or herbicides				
a. aerosols	_____	_____	_____	_____
b. w/dioxin	_____	_____	_____	_____
c. w/o dioxin	_____	_____	_____	_____

2. Organics
   a. consolidated _____ _____ _____ _____
   b. not consolidated _____ _____ _____ _____

3. Other (not including mercury) _____ _____ _____ _____

C. Corrosives
1. Acids
   a. oxidizing _____ _____ _____ _____
   b. non-oxidizing _____ _____ _____ _____

2. Alkalines _____ _____ _____ _____

D. Oxidizers (excluding acids) _____ _____ _____ _____

E. Miscellaneous
1. Car batteries to be handled by Town

2. Household batteries
   a. alkaline _____ _____ _____ _____
   b. button types _____ _____ _____ _____
   c. lithium _____ _____ _____ _____
   d. Ni-Cd _____ _____ _____ _____
   e. other _____ _____ _____ _____

3. Mercury (other than batteries) _____ _____ _____ _____

4. Other _____ _____ _____ _____

(1) Additional product types may be identified if they are to be handled differently. For products that can be consolidated with others, please indicate with which other products they are combined.
(2) Please include costs for packing or consolidating as well as the cost of the management option and transportation.
(3) Please indicate how many pounds or gallons can be put into the size of drum indicated in the next column.
(4) Please indicate the size of the container to be used for storage.
(5) Management methods codes:

Ru Re-Used	C Consolidated for Re-Use	Rc Recycled
S Stabilization	Bf Blended fuel	LD Land Disposal
I Incinerated	AT Aqueous Treatment	

Another approach that will help compliment the cost tables just described is to require all bidders to provide a quotation for consolidation, transportation, and waste management costs for a sample one-day collection or one-year period of operation, including all labor, expendable costs (packaging materials, etc.) based upon a described scenario of wastes collected from participants. A sample scenario is shown in *Figure 1*.

You should develop a scenario that will be typical of your waste stream.

And, lastly, you should require your bidders to state any and all additional costs that may be incurred that were not already given in the bid proposal. This may raise issues such as permit costs, insurance, etc.

Proposal Information

The R.F.Q./R.F.P. should provide a specific list of information that each bidder must provide.

This should be tailored to your own program needs. An example for bidding services to operate a permanent facility and manage all waste collected is provided here in *Figure 2* as a general guide.

Figure 1 ***Sample Scenario***

Consolidated organic liquids	4 55-gallon drums
Lab-packed Chemicals	19 55-gallon drums
Aerosols	5 30-gallon drums
Polychlorinated Pesticides	1 55-gallon drum
Other Pesticides	9 30-gallon drums
Consolidated, non-reusable paint	4 55-gallon drums
Household button batteries	1 5-gallon pail
Oil needing reprocessing	2000 gallons
Oil needing incineration	2000 gallons
Consolidation of reusable paint and repackaging into 5 gallon pails	5 55-gallon drums

Figure 2 ***Example of Proposal Information Requirements***

PROPOSAL INFORMATION

Proposals shall provide the following information:

1. Qualification and licensing of Contractor: Evidence that the Contractor is a hazardous waste transporter or waste collection firm licensed under State of Vermont.
2. Experience in operating similar facilities: Description of any recent experience in managing or operating permanent household hazardous waste collection centers or comparable facilities, with appropriate references. For each of these facilities, the following data must be provided:
   (a) number of participants;
   (b) amount of wastes transported by number of drums of each type of waste;
   (c) total transportation and waste management costs by product not by waste characteristic categories;
   (d) description of consolidation and reuse and recycling options used for each.
3. Experience in conducting one-day collections: Description of recent experience as contractor for local or regional household hazardous waste collection events, with a minimum of three references for collections conducted in 1990. For each of these references, the following data must be provided:
   (a) number of participants;
   (b) amount of wastes transported by number of drums of each type of waste;
   (c) total transportation and waste management costs by product not by waste characteristic categories;
   (d) description of consolidation and reuse and recycling options used for each.
4. Personnel Qualifications: Detailed information on the experience, education, licensing and certification and project function of all personnel who would have significant responsibility for this project. Substitutions of personnel shall be made only with the approval of the town.
5. Work Plan: A draft of proposed operation and management plan for the Center and a description of the proposed recordkeeping system.
6. Waste Handling: Indication of the type and extent of consolidation of wastes, with a list of wastes that will not be accepted for transportation and disposal.
7. Waste Management Methods: Indication of proposed methods of waste management for each type of waste (by major product type as in *Table 1*) and the unit cost per method.

8. Training and Utilization of Local Personnel: Description of a hazardous waste training program for chemists and technicians, including qualifications and experience of training staff, format and materials, location of training, hours of training required including supervised on-the-job training, and prerequisite qualifications for trainees. Indicate whether the firm is willing to employ trained chemists and technicians from the local area on a part-time basis to assist with Center operations.
9. Liability: Evidence of liability coverage to the indicated limits of one million dollars.
10. Examples: Examples of training materials, public educational materials, and other relevant information developed by the firm may be submitted in support of proposals.

Basis of Award

The last major component of an R.F.Q./R.F.P. that I would like to briefly review is the need to clearly state the "Basis of Award". If you don't state it, every firm will call requesting that you verbally provide this information. This could easily lead to litigation. One sample "Basis of Award" is provided in *Figure 3*.

Figure 3 ***Example Basis of Award***

BASIS OF AWARD

The contract will be awarded to the hazardous waste management firm which, in the sole judgement of the town best meets the project objectives of well-managed, environmentally sound, cost-effective operation and flexibility in working with municipalities to improve operational efficiency. Criteria used to evaluate proposals and to select a Contractor will include but not be restricted to the following:

1. Capability to perform all aspects of the project;
2. Recent experience relevant to the project, especially with permanent facilities;
3. Professional background and qualifications of key personnel assigned to the project;
4. Cost of services, including extent to which consolidation is used to reduce transportation costs;
5. Flexibility and willingness to work with the Project Coordinator to reduce project costs;
6. Use of environmentally sound waste management methods, including recycling and reuse where appropriate.
7. Ability to post a performance and payroll bond equivalent to 100% of the amount of the contract.

Proposal should clearly indicate any exceptions to the specifications of this R.F.P. Such exceptions may be cause to reject the proposal.

As a final note, I always add a disclaimer, "The City/Town retains the right to reject any and all quotations and to waive any formality or technicality.

I hope these thoughts and examples will be helpful to assist a community in bidding, reviewing and awarding a contract. Involving the legal department and those that have the authority to award and sign the final contract, should help avoid unpleasant surprises, and assist in acquiring quality services at a reasonable, fair price.

CONTROLLING THE DESTINY OF YOUR WASTE
WRITING A REQUEST FOR PROPOSAL
CONTRACTOR'S PERSPECTIVE

SUBMITTED BY:
ERIC LAUT, PROJECT DEVELOPMENT MANAGER
CHEMICAL WASTE MANAGEMENT, INC. - GENEVA, ILLINOIS

Chemical Waste Management, Inc. (CWM) Technical Services Division has performed over 500 household hazardous waste (HHW) collection programs nationwide. Many of the HHW programs required that CWM respond to a Request for Proposal (RFP). A significant number of RFPs received by CWM were not structured adequately to elicit a response to which a community could compare contractors' pricing on an "apples to apples" basis. The majority of the documents received were Requests for Bid (RFB) where only price was a consideration. The following is an outline and discussion of a RFP format which allows the community to compare contractors on a parallel pricing basis and incorporates quintessential elements of contractor comparisons on technical expertise, experience, insurance, liability protection, health and safety procedures, ability to expedite the collection process and disposal option comparison. The RFP section will be followed by a synopsis of contract elements.

REQUEST FOR PROPOSALS

I. The Introduction

The introduction to an RFP should acquaint the proposer with the community, the type of program, demographics and population (household number) information, the number of collection sites, the time and site of the collection event and general mechanics of the event. Following is a sample introduction for a RFP:

Sample Introduction In a RFP

This is a Request for Proposal from ___(Insert Community)___ for the collection transportation and disposal of household hazardous waste throughout _____. The successful Proposer shall assist the _(Insert Community)___ Staff in the planning and development of the projects, staff collection projects sites and shall be responsible for the packaging, transportation and disposal of household hazardous waste collected.

It is anticipated that the project will take place at approximately (Insert #) sites. The sites will be open on (Insert Date), from (Insert Time).

The household chemicals will be transported to the collection sites by the individual residents. The collection projects will use a drive-up system. Cars with chemicals transported in their trunks will be directed to sorting tables under tents, where they will be unloaded.

The project will be advertised through publicity; local newspapers, radio, telephone, posters, and flyers. The purpose of this project is to insure _____ residents a safe disposal option for household hazardous chemicals as well as educate them to the risk of storing, handling, and disposing of these materials privately.

II. Proposal Evaluation Criteria

There exists the potential for personal and financial liability to a community as a result of a HHW collection program. The ability of a contractor to reduce disposal liabilities from CERCLA (Superfund) action, the experience of a contractor in performing requisite HHW services, the adherence to safe work practices and abilities to reduce waiting time and appear professional in front of community officials and the press are all factors which outweigh the bottom line costs for the event. The following is a sample proposal evaluation criteria for emphasizing and evaluating contractors on other factors besides price:

Sample Evaluation Criteria Section

The experience of the HHW collection process, the experience of the proposer in the HHW field, the detail to sound health and safety policies during the performance of the HHW event and the ability of the proposer to financially and legally protect the Community are critical elements in the evaluation process. The proposal submitted, therefore, will be evaluated on the following proposal criteria:

Technical Proposal	60%
Liability Protection	25%
Cost Factors	15%

III. Insurance

The ability of a HHW contractor to insure a community against general, automobile and pollution control liabilities should be part of the liability protection evaluation criteria. Contractors should be given a minimum insurance limit by the community and asked to provide their insurance limits if greater than the minimum criteria listed. Contractors offering the highest insurance limits (particularly on pollution control liability) should receive the highest evaluation:

Sample Insurance Section

		Proposer's Insurance	
A.	General Liability Including:	$5,000,000.00	_____
	1. Personal		
	2. Fire		
	3. Medical Expense		
B.	Automobile Liability Including:	$5,000,000.00	_____
	1. CSL		
	2. Bodily Injury		
	3. Property Damage		
C.	Pollution Control Liability:	$3,000,000 Annual Aggregate	_____
D.	Workmen's Compensation:	Statutory	

Contractor shall not commence work until Contractor has obtained the required insurance, and has filed an acceptable Certificate of Insurance with the _____. All Insurance Policies shall be open to inspection by the _____, and copies of the policy shall be submitted to the _____ upon written request.

*The proposer should indicate insurance limits that can be provided (if different from limit provided). Do not indicate limits lower than those indicated; these are to be considered the minimum insurance requirements.

IV. The Technical Proposal

The technical proposal is the core of the RFP. The technical proposal will allow communities to gain an understanding of the contractor's ability to perform a HHW program in a professional manner and evaluate the contractor's comprehension of the collection process and ability to process participants in an expedient manner. The health and safety aspects of the HHW collection program are highlighted in the contractor's responses to their spill and fire prevention plan, contingency plan and flammable bulking procedures (these aspects should be reviewed and evaluated by health and safety professionals, local fire police and hazmat representatives). The contractor's internal employee training and training that can be provided to the community is also an important consideration. The following is a sample technical proposal section in a RFP:

Sample Technical Proposal Section

In order for _____ to technically qualify a Contractor, all Proposers are requested to submit the following information:

A. Site Set-up - Proposers are requested to submit a diagram of the proposed household hazardous waste site collection activities. The diagram should include traffic flow, positioning of tent, fire, spill, and other safety equipment and the minimum area required to perform the project. A detailed description of site activities including receipt, segregation, packaging, testing, and loading etc. should be attached to the diagram.

B. On-site Equipment List - Proposers are requested to provide a list of on-site equipment that will be available at the collection facility. The list should include all fire prevention, safety, personal protective equipment, and other equipment as the Proposer deems suitable or necessary for this project.

C. Spill and Fire Prevention Plan - The Proposers are requested to provide spill prevention and fire prevention plan tailored to on-site activities at the collection facility.

D. Contingency Plan - Proposers are requested to provide a format for a contingency plan and provide a description of notification procedures to the participants of on-site emergencies and evacuation of the participants in case of an emergency on-site.

E. Flammable Bulking Procedures - Since flammable solvents and/or paints will most likely be bulked on one or more collection facility location, the Proposer is requested to submit Standard Operating Procedure for bulking of flammable liquids on-site at the collection facility.

F. Employee Training - Proposers are requested to provide a detailed training outline and to differentiate between the training required for Chemists versus the training required for Technicians. The role of each position during on-site collection activities should be outlined.

G. Employee Experience - Proposers are requested to provide a listing of the names of employees that will be involved in the project, their Degree, and approximate number of hours field work that each of the employees has performed.

H. Related Project Experience - All Proposers are requested to provide at least ten household hazardous waste projects that were performed by your company. The list should include names, contact names, and telephone numbers of the contacts.

I. Reference Letters - Proposers are requested to provide at least three (3) letters of reference from household hazardous waste projects, and/or other cleansweep type projects performed.

J. Transportation and Disposal Facility Lists - Proposer is requested to provide a complete listing of storage/transfer/transportation and disposal facilities which may be utilized throughout the course of this project. The transportation and disposal facilities should list the location, contact, phone, and Federal I.D. Number of each facility.

V. Delegation of Duties

It is important that the community outline the specific responsibilities and duties of the community versus those of the contractor. Some communities may want to supply labor to offload and presegregate HHW materials. (This lowers the cost but increases the community exposure and financial liability.) Whatever the case may be, the duties and responsibilities directly affect program costs and should be outlined clearly. Following is a sample delegation of duties section of a RFP:

Sample Delegation of Duties Section

Delegation of Duties
The following responsibilities will be applicable, as indicated, for the contractor and the community.

Contractor Responsibilities

1. Planning and Assistance - provide experienced and trained staff to assist the community in the organization and training of volunteers for the project.

2. Mobilize/demobilize labor and equipment necessary to perform the project.

3. Provide labor to offload, shuttle, segregate, classify, package, label, bulk, manifest, load, transport and dispose of HHW collected at the event.

4. Provide supplies and equipment necessary to perform the project including, but not limited to, personal protective equipment, trucks, safety equipment, drums, absorbent, tables and chairs for packaging areas.

5. Site cleanup.

Community Responsibilities

1. Traffic control
2. Surveys
3. Tents
4. Roll-off boxes
5. Provide suitable site location.
6. Provide volunteers to presort and remove paints.
7. Movement of paints to a central location.
8. Operate paint give-away program.

VI. Process Expediency

In this section of the RFP, communities should outline the time and date wastes must be removed from the collection site. In addition, the community's expectation of the number of participants can be indicated (if historical or comparative data is available). The contractor's staffing levels will be directly affected by the waste removal time frame, the expected number of participants and the responsibilities of the contractor versus the community. Contractors who can expediently remove the waste should be favored in the evaluation process. Following is a sample RFP section on process expediency.

Sample Process Expediency Section

The Contractor is expected to have packaged and removed waste offsite at the following times and dates:

Site	Time	Date
Site #1		
Site #2		
Site #3		
Site #4		

Since events may be planned or for other reasons the waste may not remain onsite, the proposer should indicate staffing necessary to accomplish the task in the time frame indicated.

The following indicates the number of participants expected at each site:

Site	Expected Participants
Site #1	
Site #2	
Site #3	
Site #4	

Please Note: The proposed Contractor staffing and ideas for expediting the movement and removal of the HHW in the time frames indicated will be a major component of the evaluation in the technical proposal.

VII. Proposal Conditions

This section of the RFP can contain any conditions that a community corporation counsel has directed. The section can also be used to outline requirements of contractors that will protect the community from CERCLA liabilities by prescribing and directing the means of disposal, the disposal method, etc. Of particular importance is a requirement that packaged wastes be disposed of directly at the disposal site instead of mixing HHW's with RCRA wastes at secondary facilities, thereby creating a hazardous waste. Following is a sample section on proposal conditions:

Sample Proposal Condition Section

1. **Proposers who own all disposal facilities at which wastes will be disposed/treated will be favored.**

2. The preferred method of waste disposal is RCRA incineration. The Contractor must RCRA incinerate or fuels blend greater than 90% of the waste. Wastes that are incinerated must be incinerated at a RCRA Part B incinerator.

3. Lab-pack wastes (those in containers of 5 gallons or less) must be removed immediately after packaging is completed.

4. Lab-pack wastes may not be taken to an intermediary storage facility for the purposes of bulking or consolidation. Combining household hazardous waste and RCRA regulated waste at an intermediary facility is prohibited.

5. In order to protect __(Insert Community)__ from liabilities associated with on-site activities, transportation and inherent CERCLA liabilities involving disposal, the Proposers should supply their own labor, transportation, and dispose of the waste at their own EPA permitted disposal facilities. Companies which can internalize all labor, packaging, transportation and disposal services will be highly favored in the Proposal Evaluation Process.

VIII. Cost Proposal

The primary objective of the cost proposal section is to compare contractors on an equivalent basis. This is accomplished by requiring "net lb." pricing on all packaged wastes (labpacks). The net lb. is the actual weight of the HHW material in its original container and excludes disposal costs for outer drum and inner absorbent. The waste is weighed and the community pays only for the waste weight. The net lb. pricing method is the only true way to compare contractors on an "apples to apples" basis.

The following outlines a sample cost proposal section in a RFP:

Sample Cost Proposal

Proposers are requested to complete the attached cost proposal as outlined. The services that shall be requested from the Proposer, in order to give the Contractor a more comprehensive idea of how the Proposer's quote should be established, are outlined following:

Scope of Proposal:

1. Planning and Assistance - The Contractor shall, at the request of the Community, provide staff experienced or trained to the satisfaction of the Community to attend meetings with the Community to review proposed collection site procedures, or otherwise assist Community staff in planning the collection projects.

2. Mobilization and Demobilization - The cost of this section should include the movement of your projected team size per site plus supplies and equipment to and from the collection facility.

3. On-Site Labor - Contractors should provide the costs of on-site labor on a per hour basis for Chemists and Technicians.

4. Transportation, Disposal and Supplies - Proposer should provide a price per net pound (unless otherwise indicated) for transportation and disposal of the household hazardous waste. This price should include supplies such as drums, absorbent, labels, manifests, etc.

   All lab-pack waste will be weighed by the Contractor prior to packaging. The resultant weight will be considered the "net weight". (This excludes the drum and absorbent weight.) Please keep this in mind when formulating your bid prices.

Each waste type has at least one disposal option listed. Proposers will provide a bid price for one or all options listed. On a separate sheet of paper Proposers may provide bid prices for alternative options under their notes on pricing. Where disposal options exist, the Community will select the option to be utilized prior to collection.

Item	Unit	Unit Cost
1. Planning and assistance	Lump sum (est. 150 hrs.)	_____
2. Mobilization/Demobilization/Site:		
	Site #1	_____
	Site #2	_____
	Site #3	_____
	Site #4	_____
3. On-Site Labor		
A. Chemist	Per person/hour	_____
B. Technician	Per person/hour	_____
C. Per Diem	Per person/night	_____
4. On-Site Equipment		
A. Personal Protective Equipment	Per person/day	_____
B. Vehicle Rental	Per person/day	_____
C. Tents (assume 20' x 20')	Per tent/day	_____
D. Safety station equipment	Per site/day	_____
5. Analysis		
A. Per unknown lab-pack container (Less than or equal to 5 gallons)	Per test	_____
B. Fuel Blend Analysis	Per waste stream	_____
C. Full Analysis	Per waste stream	_____
D. TCLP Analysis	Per waste stream	_____
6. Transportation/Disposal/Supplies	Price Net Pound Unless otherwise specified	
A. Non-halogenated Flammables		
1. Bulk - Incinerated (liquids)	Per gal.	_____
2. Bulk - Incinerated (sludge)	Per gal.	_____
3. Lab-packed - Incinerated		_____
4. Bulk - Fuel Blended	Per gal.	_____
5. Other (describe)		_____
B. Inorganic Poisonous Liquid		
1. Lab-packed - Landfilled		_____
2. Other (describe)		_____
C. Organic Poisonous Liquid (Halogenated Solvents and Pesticides)		
1. Lab-packed - Incinerated		_____
2. Other (describe)		_____

D. Aerosol Containers
   1. Lab-packed - Incinerated _____

E. Corrosives
   1. Lab-packed - Incinerated _____
   2. Lab-packed - Treatment _____
   3. Other (describe) _____

F. Hazardous Waste Liquid or Solid N.O.S.
   1. Lab-packed - Incinerated _____
   2. Lab-packed - Landfilled _____

G. Waste Paints
   1. Oil based paints (liquid)
      a) Bulk - Incinerated Per gal. _____
      b) Bulk - Fuel Blended Per gal. _____
      c) Lab-packed - Incinerated _____
      d) Other (describe) _____

   2. Latex Paint
      a) Bulk - Incinerated Per gal. _____
      b) Lab-packed - Incinerated _____
      c) Other (describe) _____

Contracts

The contract developed by a community should contain the following elements.

1. Standard terms and conditions developed by the community's corporate counsel as mutually agreed to by contractor.

2. Identification of principal parties and authorized representatives.

3. Scope of work as outlined in the technical proposal and as mutually agreed.

4. Pricing as contained in the RFP.

5. Transport and disposal facilities to be utilized during the contract.

6. The contract term - period of time the contract will be in effect.

7. Unacceptable wastes.

8. Insurance.

9. Payment terms.

The contract will basically outline, in legal terms, the relationship between the two parties. A majority of the contract will envelope the proposal of the contractor in response to the communities RFP and will incorporate legal language, as modified, requisite to both parties.

WASTE TRACKING

George Kinney, Environmental Supervisor, Dakota County, Minnesota

In Minnesota, our HHW becomes regulated hazardous waste as soon as it is collected. As such, all our HHW is handled in existing hazardous waste systems, using manifests and permitted hazardous waste facilities. Exceptions are latex paint (not hazardous), wastes exchanged on site, used oil and lead-acid batteries moved into recycling network.

In the rest of the country, where HHW is exempt from regulation, how is the waste tracked? This must be included in the contracts with the firms handling the HHW. A shipping paper or bill of lading will not suffice to give adequate information on the fate of the HHW.

The wastes from Minnesota are sent to hazardous waste incinerators, fuel blended and used in lime kilns, recycled, or landfilled after treatment. In many other parts of the country, similar fates are used for the HHW.

Oil-based paints and flammable liquids are sent for fuel blending, first being mixed with other high BTU hazardous wastes in large tanks, and then transported and fed into lime kilns. The fuel value of the HHW is used to heat the limestone in the making of portland cement, replacing other fuels that would have been used.

All of the lab-packed wastes, and the sludge bottoms from the oil-based paints, are sent to hazardous waste incinerators, where the HHW is burned very completely, with any emissions captured. Our lead-acid batteries are recycled at a secondary lead smelter located in Eagan, MN, a HHW permanent collection site. Latex paint from Dakota County will be recycled at a site in Ohio, EPI, in which the paint will be dried and the latex reused in a number of industrial applications, such as roofing compounds. We also recycle the latex driveway sealers we receive by removing the separated water and placing the solids on a local bituminous company's rework pile. We have recently begun collecting fluorescent tubes for reclamation.

Some lab packed wastes must be treated and landfilled, as there is no other method of disposing of the waste. An example would be lead arsenate pesticides.

If you are exempted from using a hazardous waste manifest, you may elect to use one, in order to track your waste. This would have to be written into your contract, but the HHW management firm will be familiar with the manifests use, and may not object. The manifest consists of several copies (5-8, depending on the state), and you, as generator of the waste will receive a copy signed by the hazardous waste facility after your waste arrives. You may call the hazardous waste facility to check that your drums of HHW arrived and were managed by the facility.

All firms handling HHW should be willing to verify where your HHW will eventually be used, recycled, incinerated or buried, and should put it in writing. I had an unpleasant experience with a company representative several years ago who told me, during bidding on my HHW work, not to worry about where my waste went, as it was exempt. His firm's prices were very competitive, but I disqualified his firm for not submitting bid documents completed as required, and refusing the chance to amend them.

Many large businesses use facility audits to determine if the hazardous waste facility meets their needs. The audit will check on the facility's compliance record with county, state and federal regulations, actual facility operations, usually an inspection of the facility by a company representative or consultant, and questions of other clients. You may not have the ability to conduct audits of the facilities, but you may be able to question others who have knowledge of the facilities in question.

Do you have liability for exempt waste? If your HHW, with hazardous characteristics, is going to a sanitary landfill, you may have some liability. Recently, one of our County's small private sanitary landfills closed and the owner declared bankruptcy. The Minnesota Pollution Control Agency sent notices to all identified users of the landfill that, under CERCLA, they would be named as responsible parties if they could not identify their wastes as having no hazardous characteristics.

HHW that is fuel blended, recycled or incinerated loses its long-term CERCLA liability. The resulting ash or still bottoms from the facility operations were generated by the facility, and it is highly unlikely that the HHW sent by your program will be named if any cleanup of the facility is necessary.

An Overview of State and Local Technical Assistance Efforts

Robert G. Style
Staff/National Roundtable of State Pollution Prevention Programs, Minneapolis, MN

Good morning. I am here today speaking to you today as a representative of the National Roundtable of State Pollution Prevention Programs.

I make that clarification because I actually wear two hats in my work life. Under one hat I am on staff at the Waste Reduction Institute for Training and Applications Research (WRITAR), a private, non-profit organization that provides training and applied research on waste reduction issues. Under my other hat I am acting staff for the National Roundtable of State Pollution Prevention. In September of 1990, WRITAR secured a grant from the USEPA to establish and formalize the Roundtable as an organization. Until that time, the Roundtable had been meeting informally since around 1985. WRITAR is in the process of completing our grant responsibilities and turning over the day-to-day operations of the Roundtable to its new Executive Director.

The Roundtable is an association of public sector programs that attempts, and I'm quoting from the group's Mission Statement here, "to promote the development, implementation and evaluation of efforts to avoid, eliminate or reduce waste generation to all media." There are somewhere in the neighborhood of 89 state and local pollution prevention programs affiliated with the Roundtable and another 200 or so businesses, consultants, non-profit organizations, federal employees, and interested individuals who have participated in Roundtable activities in the last year. Although the focus of Roundtable activities is the facilitation of the flow of information between public sector pollution prevention programs, it remains open to the participation of any and all groups interested in pollution prevention issues.

Technical Assistance Programs

The pollution prevention programs that are members of the Roundtable can be seen as having two distinct missions. One mission is to develop state and local policy initiatives and coordinate the activity of existing environmental programs in such a way as to focus these efforts on preventing the generation of waste at the source. This policy focus is played out inside the government structure through policy formation efforts, the training and coordination of government staff, and the development or revision of rules to reflect a prevention focus. The other mission is to collect information about source reduction techniques and technologies and provide it free or at minimal cost to businesses and local governments in their jurisdiction. This mission is played out by reaching outside the structure of government to the private sector and offering the cooperation and assistance of a pollution prevention experts. Although a number of programs combine these functions, many of the Roundtable's members operate with one or the other of these missions as the sole focus of their activities. Today we will be looking at state and local efforts to assist businesses and others discover and adopt pollution prevention options.

Help is something we all need every now and then. And with the myriad of technologies and regulations involved in the generation and handling of hazardous waste, it is not surprising that the idea of providing assistance to businesses is an attractive one to state legislatures and city councils. Recognizing the burden complex environmental regulations place on businesses in general, and how particularly onerous this burden is on smaller businesses, state and local governments have attempted to provide the kind of assistance that helps these businesses proactively address their waste generating practices. This not only protects the environment, but also improves a businesses competitive position by

helping insure regulatory compliance (thereby protecting against the imposition of fines for permit or discharge violations) and encouraging the adoption of sustainable business practices. And in today's competitive marketplace, healthy sustainable business give states and municipalities the kind of reliable tax base they need to survive.

(Overhead 1)
At last count there were fifty eight (58) state and locally sponsored programs that offer some kind of technical assistance to businesses and local governments. As you can see on the overhead, these programs operate from a variety of administrative bases. The administrative base of a program is important to the extent that it can condition the way these programs are viewed by potential clients and thereby affect a clients willingness to work with the programs. It is generally accepted that programs housed in a regulatory agency, be it environmental or health based, tend to scare off potential clients. We all know how sensitive industry people are to contact with regulatory personnel. Therefore, the majority (38 out of 58) of these programs operate from an expressed non-regulatory base.

My co-panelists, Donna Peterson of the Minnesota Technical Assistance Program and Grace Caner of the Massachusetts Office of Technical Assistance, represent two of the best technical assistance programs in the nation. What I hope to do now is provide you with a quick overview of the types of services available from programs like theirs and leave them to speak in greater detail regarding the type of technical assistance available to groups or individuals concerned with household hazardous waste.

TAP Services

(Overhead 2)
The principle function of a technical assistance program is to gather and disseminate information on pollution prevention techniques and technologies. And although good information is available, in many cases free of charge, it is scattered about in data bases and libraries in research centers, universities, state agencies and the federal government. It can take a good deal of time just of find out what's out there, much less collect it, and make judgements about its quality. It is unrealistic to think that a business with limited resources would be able to collect and make use of this information in a cost effective fashion.

Information Clearinghouse

Most technical assistance programs operating today have developed a library of pollution prevention literature. These libraries, or information clearinghouses, make up the base from which all the information and technical transfer functions proceed. Nearly all new programs spend a great deal of their start-up time gathering and indexing these resources.

The volume and degree of technical sophistication of the documents in these clearinghouses varies according to the age of the program, the sophistication of its staff, and the financial resources available to it. A program with little funding or a limited mission is unlikely to acquire a volume of documents it has little space and less staff time to properly maintain. Often these programs do not collect documents at all. A limited program can function just as well collecting bibliographies of pollution prevention information rather than collecting the complete set of documents.

The type of documents available also varies. Naturally, these program have access to all the applicable state and federal legislation having anything to do with their mission. Articles published in scholastic and industrial journals (which often carry copyright restrictions), as well as documents developed and distributed by state and local programs, trade associations, and the USEPA related to pollution prevention efforts may also be made available. The fact sheets, manuals and guides, and case studies published by these public

entities are public record documents which can be made distributed through the clearinghouse free or at a reduced cost.

Fact sheets are designed to transfer information to fairly specific audiences. They are usually short, three or four pages in length, and often describe the best available techniques and technologies for pollution prevention in one specific industry, industrial process, or waste stream. Fact sheets, because of their limited length, function well as summaries of available pollution prevention options but do not contain the level of detail necessary to deal with site specific issues.

Manuals and guides examine pollution prevention options in much greater detail than fact sheets. Also industry or process specific, manuals and guides go beyond the highlighting of options to actually describing the processes involved in option evaluation and detailed site-specific analysis. These documents expand on the options outlined in fact sheets, often examining the technical details and relative value of a variety of pollution prevention options in an effort to guide a waste generators develop and implement their own, in-house, pollution prevention programs.

Many programs that have a history in technical assistance have recorded their efforts in the form of *case studies* and make these available to the public. Case studies are generally considered valuable by waste generators in that they help them move from the theoretical aspects of pollution prevention to the nuts and bolts of implementation. The published results of a technical assistance effort (particularly when the effort is demonstrably successful) not only gives some real-world grounding to what is often presented in theoretical terms, but also provides the sort of materials use and hard financial information that can help a company rationalize the adoption of pollution prevention options. Being able to see how a real company making real changes can have a real effect, financially or environmentally, goes a long way to convincing waste generators that there may be benefits to the adoption of pollution prevention techniques.

State and local programs will often sponsor basic and applied research by professional researchers. The published results of these studies may also be made available through these clearinghouses.

Telephone Hotlines

Many programs have an immediate information dissemination and referral service available through a telephone hotline, often with a toll-free "800" number that is limited to its state or regional jurisdiction. These hotlines serve as the "first call for help" on a wide variety of waste management questions. Hotline calls can often deal with issues other that pollution prevention, such as questions on regulations, recycling, or treatment and disposal methods. However, technical assistance personnel still have the opportunity to suggest pollution prevention options to individuals who they might not normally reach.

Requests for process-specific and regulatory information dominate hotline traffic. In most cases, program staff can handle the call in-house or refer the client to another organization that is better equipped to handle the question. Programs that have extensive libraries (often university-based programs) may use those resources to conduct elaborate information searches for a client. However, telephone assistance is not the most efficient way fore program staff to provide information on complex questions.

On-Site Technical Assistance

Of the state and local pollution prevention programs that say they provide technical assistance, a high percentage (over 80%) provide some type of on-site assistance. When it comes to the more experienced programs (those with 4 years of experience or more), all provide for some sort of on-site technical assistance. Since the start-up time and financial resources necessary for an on-site component of technical assistance place a relatively

heavy burden on a program's infrastructure, it normally takes some time for such a component to become operative in an emerging program.

By far the most common form of on-site technical assistance is the waste audit or assessment. Assessments are designed to further a generator's pollution prevention efforts by analyzing their waste producing processes, developing a clear picture of their waste streams, and isolating pollution prevention options. These audits are generally performed free of charge by one of the technical assistance program staff.

Programs also make their staff available for more involved, longer term consultations. Consultations of this type often involve assisting the client uncover site-specific pollution prevention options and providing support for the development of those options. Technical assistance program staff are able to pull together case studies and other documentation from the program's resource center, review available technologies, and analyze the client's current production processes as they work with the client's employees to develop a set of realizable pollution prevention options. Programs usually provide these kinds of consultations in instances when the techniques developed by the effort are easily transferred to other similar industries and the client is willing to publicize this cooperative effort. Such efforts not only help develop possibly new and innovative technologies, but by publicizing these efforts, the program is also able to promote its services and the positive outcome of the adoption of pollution prevention options. Insurance and liability considerations prevent program staff from recommending specific technologies.

Staff of technical assistance programs come from a variety of backgrounds and levels of expertise vary from program to program. The abilities and expertise of program staff is one of the main conditioning factors in the quality of assistance programs are able to provide.

Many technical assistance programs try to develop some sort of targeting mechanism to make the most effective use of their resources. For example, the Massachusetts Blackstone Project, considered by many to be the best example of effective pollution prevention technical assistance, targeted an small industrial sector (metal finishing) in a limited geographical area (Blackstone River basin) to receive direct, on-site assistance. Other programs have followed a similar strategy, targeting specific industrial sectors in order to develop an information base or set of effective pollution prevention options that can be easily be transferred to other similar industries. Still others have targeted their have targeted their services at larger generators, or small and medium sized businesses.

Some technical assistance programs have approached this issue from an entirely different point of view. Rather than targeting industries, these programs survey waste generators to find out what services the would be likely use. These programs then use the responses to the survey to prioritize their technical assistance activities. The Washington State Department of Ecology recently collected responses to just such a survey and believe it will help them set up their pollution prevention technical assistance program.

CESQGs and Household Hazardous Waste Generators

Although CESQGs and household hazardous waste generators have not traditionally been targeted for pollution prevention technical assistance by state and local programs, a number of programs have begun to make information available to these groups. Information on the processes that generate small quantities of waste has become increasing available and the state programs are starting to make this available. And with increasing concern on the part of the general public relative to toxic and hazardous materials, state and local technical assistance programs will find increasing pressure to make information on pollution prevention options available to the small generators of hazardous waste.

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Providing Technical Assistance for Small Business

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Background

The Minnesota Technical Assistance Program (MnTap) has been providing technical assistance to small businesses, often referred to as conditionally exempt small quantity generators (CESQG) since 1985. When MnTap was created, part of its charge was to reach out and help generators of the state, particularly smaller businesses with inadequate technical and financial resources. In Minnesota, any business producing hazardous waste has been required to manage that waste according to the hazardous waste rules since they first became effective in 1980. Hence the CESQGs have always been a part of the small businesses that MnTap has addressed.

MnTap provides free technical assistance to any Minnesota business. This assistance includes help in waste management, and pollution prevention. The funding for the program is mostly from the Minnesota Office of Waste Management. The program is in the School of Public Health at the University of Minnesota.

MnTap has always had a two-fold focus; helping companies achieve compliance with hazardous waste regulations and assisting companies in pollution prevention. Prior to 1990, assistance was provided mostly for small and medium-sized companies. Often for the small company (CESQG), the assistance focuses on proper management and regulatory requirements. For the medium-sized company, assistance is primarily for waste reduction.

In 1990, the Minnesota Toxic Pollution Prevention Act was passed. With that, MnTAP was provided increased funding for an expanded effort to help large companies achieve pollution prevention.

Outreach for the small Minnesota business

Before a program can help any one, the clients you seek to serve must know you exist. During the first year of MnTAP's existence, a lot of effort went into reaching the clients we wanted to serve. One key strategy was to identify associations whose members are primarily small businesses. We then offered to come to an association meeting with a presentation about the assistance we could offer. In addition to associations, promotional mailings were made to several business and outreach organizations. This included Chambers of Commerce, University of Minnesota Extension and county solid waste officers. We also developed a display board which we could easily set up at meetings where the opportunity existed to reach out to business with information about our service.

When the Minnesota Pollution Control Agency (MPCA) targeted certain kinds of small businesses for compliance on hazardous waste regulations, MnTAP worked with the Small Business Development Centers in greater Minnesota to schedule and advertise workshops for these targeted industry groups. At the same time as we were engaged in these activities, we also worked with the MPCA to develop fact sheets for business, often targeted to the smaller business. We also started a newsletter.

More recently, we have contacted all the county Solid Waste Officers in the state again. We sent them a basic fact sheet outlining our services and a checklist they could use to get fact sheets or other materials. It seemed they were a key audience to target because they obviously get calls from small businesses wondering about disposal requirements.

At meetings scheduled for very small businesses in the Duluth area recently, MnTAP set up our display table and had the opportunity to provide information on our service along with basic waste management information.

There are at least two other items to note as part of our ongoing effort to respond effectively to the very small business. We have staff assigned to keep abreast of regulatory programs and rules affecting

these small companies. We also work closely with the MPCA to coordinate the development and revision of fact sheets and lists useful to these businesses.

Observations for other programs

Providing technical assistance to the very small generator (CESQG) works well if there is a management system in place that allows them to dispose of the waste easily. This means someone will come to their business if they call, or there is a site to which materials can be taken. Most businesses seem willing to pay some fee.

Providing the technical assistance works well also if it's very clear what paper work and reporting is required. It's easiest too, if the paper work and requirements are not too burdensome. Hopefully, it's less for a CESQG than for the small quantity generator (SQG).

Regulations do play a role in the proper management of the hazardous waste from the very small business. Proper management and disposal begins to happen when either some requirements are imposed, or it's accepted free at a collection site. If it can be accepted free, as that from a household, and if it's convenient, then small companies will voluntarily bring their wastes to these sites.

It should be noted however that "free" disposal for the small business at a collection site will not provide an incentive to reduce even the small quantities of hazardous waste generated. For a householder, free disposal for unused paint does not provide the incentive to bring less the next time. In other words, for a householder a gallon of paint is bought for a job which requires two quarts because a gallon is cheap. The incentive to buy only two quarts is not high because disposal of the unused two quarts is "free". It's my opinion that this would not be different for the small business.

Coordination of technical assistance and collection for the CESQG

The collection site needs information that's easy to follow, in order to give it to CESQG's which make inquiries. Information in the form of fact sheets is needed to talk about requirements or suggested management practices. A small business also needs help even knowing what wastes are hazardous. For a CESQG that is a printer, there is the need to tell the person who calls with questions about solvent wastes that there may also be concerns about other wastes they generate. Even a small company needs information on not just proper handling but also ways their waste can be reduced.

Technical assistance will work best with a collection network to which companies can easily be referred for satisfactory disposal. It's very difficult to provide satisfactory technical assistance if the outlets for proper management of the small quantities of waste are essentially nonexistent. Companies with 1-5 gallons per year don't respond well when told to label a drum, fill it and then contact a transporter. Storing the waste over 10 years in order to fill a drum is just not easily accepted!

A collection site or sites without the resources for the education needed by the small businesses in terms of environmental consequences, waste reduction, or putting good practices into play may also not fare well by itself.

What household hazardous waste collection sites should think about

Do sources of hazardous waste technical assistance operate in the same region or state as that of a household hazardous waste site -- allowing the site to take advantage of this resource. Not only might this technical assistance program be a place where more comprehensive questions could be addressed, but it might also have printed materials that could be distributed.

Another source of information may be other states. Many states have engaged in activities that have targeted one specific small industry and out of that have developed resources useful to that industry. For instance I can recall an excellent video prepared for use with small platers after a concentrated effort targeting platers in that state. The EPA Pollution Prevention Information Clearinghouse (PPIC) has been funded to specifically help in the transfer of information from one state to another in this area. The resources of the Clearinghouse are identified through the use of the Pollution Prevention Electronic Information Exchange System (PIES).

An awareness campaign for the small businesses will be needed. Think about what you have done for the householder in your area to get their attention and knowledge. A similar effort will be required for small businesses. Small businesses are accustomed to using lots of chemical products, but have had minimal training about hazardous risks from use and disposal. Therefore, they do not easily recognize that environmental damage can result from the disposal practices they use.

Associations for similar kinds of businesses may very well provide a good mechanism for efficiently reaching a group of these businesses. More and more trade associations are becoming interested in seeing their members improve their waste management practices and are eager to work with a program that can provide the regulatory and management information needed.

Where household hazardous waste sites might find good help

There are household hazardous waste sites that have already taken waste from the very small businesses. People at these sites have lots of history of what works and doesn't work, both in the way of giving instructions for bringing waste to their sites, and in making small businesses aware of the hazards which result from the wastes they produce.

It is advisable to look to sites in other areas of your state, or in adjacent states. Sometimes the information gained closest to home seems the most relevant and easiest to use. I have often sought out the experience of people at the Iowa Waste Reduction Center, in Cedar Falls, Iowa because there is a lot in common between the waste management issues for small businesses in northern Iowa and those in southern Minnesota.

Some states have been offering technical assistance to small businesses, and again may have materials easily adapted for your area. In our office, we have on occasion used the EPA PIES effectively to learn where knowledge and information may already exist because of special projects in other states, or regions.

Concluding observations

- Small businesses awareness of hazardous waste issues is still generally in an embryonic level. An effort will be needed similar to what's been required for household waste to raise the awareness of the issues and then get business to change practices so that hazardous waste is routinely segregated and managed properly.
- For a certain percentage of small businesses, proper management will result once the realization of the potential costs and liabilities associated with improper management. This percentage will vary depending upon the good will of the companies, the value the company places on environmental protection, the convenience of disposal options and the cost. The percentage will also be higher where regulations and enforcement are part of the equation.
- Waste reduction will be easier to achieve once the small businesses realize how much hazardous waste they produce. The incentive to reduce waste is often tied to a realization of the quantities generated. Once businesses see the possible cost savings, sometimes in just new material alone, the incentive is there to identify ways to reduce the waste produced.

Given the variety of resources and experience available to support an initiative in this area, it is within reason to assert that service to the small business (CESQG) can be provided more easily knowing resources already exist.

MINNESOTA TECHNICAL ASSISTANCE PROGRAM

Checklist of Resources for Minnesota Businesses

The following publications are provided free of charge by the Minnesota Technical Assistance Program (MnTAP), a nonregulatory program at the University of Minnesota that assists Minnesota businesses with their waste management problems. Publications listed in *italics* are current publications produced by the Minnesota Pollution Control Agency, the environmental regulatory agency in charge of enforcing state and federal hazardous waste laws.

Check any number of items you feel would be useful to you. Complete the information on the back and mail this form to MnTAP's address listed below. **Publications listed in boldface type are either newly developed or revised (creation/revision date in parenthesis).**

Equipment and Supplies

___Aqueous Cleaning Equipment Manufacturers (4/92)
___Aqueous and Semi-Aqueous Cleaners for Metal Parts Degreasing (3/92)
___Centrifuges (4/91)
___Coolant Maintenance & Treatment (4/91)
___Drums, Labels, Storage Equipment (3/91)
___Filter Presses (10/91)
___Filtration Equipment (11/91)
___Filtration Equipment; Considerations for Selecting (7/90)
___Oil Skimmers (4/91)
___Refrigerant Processing Equip./Services (10/92)*
___Silver; Small Recovery Equipment (9/91)
___Small Ovens; Heat-Cleaning (9/91)
___Solvent Reclamation Units (7/91)
___Wastewater Recycling Systems (12/91)

Off-site Services for Minnesota Generators

___*Battery Recyclers; Household-Type (3/92)**
___Empty Container Outlets (2/91)*
___Hazardous Waste; Brokers, Transporters, Disposal (3/92)*
___Industrial Scrap Plastics Outlets (8/92)
___Laboratories (5/91)
___*Lead-Acid Battery Recyclers/Haulers (1/92)**
___Nonferrous Metal Waste Recyclers (10/92)*
___Pollution Prevention Consulting Firms (5/92)
___***Silver Recycling (10/92)****
___Solvent Recyclers/Fuel Blenders (2/92)*
___*Used Oil Filter Crushers, Haulers, Recyclers (12/91)**
___*Used Oil Transporters (1/92)**

Managing Hazardous Waste

___Auto Body Repair (8/91)*
___**Auto Service Industry: Alternatives to Septic System Disposal (9/92)**
___Dental Clinics (6/91)*
___Educational Institutions (10/86)*
___Furniture/Wood Manufacturing, Refinishing (10/86)*
___Hazardous Waste Facilities; Choosing (10/86)*
___Labs as Generators (10/86)*
___Metal Manufacturing & Finishing (10/86)*
___MSDS; Using to Evaluate Wastes (10/86)*
___Oil Spill Clean-Up Guidance (7/91)
___Paint & Related Materials; Management (4/91)
___Printer's Shop Towels/Disposable Wipes; Removing Solvent and Ink (8/91)*
___**Septic Systems and Other Disposal Wells (9/92)**
___*Transporters; Choosing (1/92)**
___*Used Oil Filters; Managing (1/92)**
___Vehicle Maintenance/Equipment Repair (10/86)*
___*Waste Exchange Information and Services (4/90)**

Regulatory

___*Antifreeze Management (3/92)**
___*Generator Requirements (4/92)**
___*Labeling Hazardous Waste (3/92)**
___*Manifesting Hazardous Waste (4/87)**
___*Phone Contacts for Minnesota Generators (3/92)**
___*Storage of Hazardous Waste (8/91)**
___*Storage/Transportation of Lead Acid Batteries (2/92)**
___*Underground Storage Tanks (9/90)**

*NOTE: **Items with asterisks are distributed both by MnTAP and MPCA. Please request these items from only one agency.**

(continued on back)

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FAX (612) 627-4769

The Minnesota Office of Waste Management's Mn TAP program is supported with a grant to the School of Public Health, Division of Environmental and Occupational Health, at the University of Minnesota.

Printed on recycled paper

Waste Reduction Information

___Commercial Food Producers; Source Reduction & Disposal Alternatives (4/91)
___Commercial Food Wastes; Composting & Landspeading (4/91)
___Cooling Towers; for Water-Use Reduction (8/91)
___Empty Container Management (10/91)
___Fiberglass Fabrication; Volatile Emission Reduction (4/91)
___Food By-products; Feeding to Livestock (4/91)
___Herkules Gun Washer Maintenance (11/91)*
___Machine Coolant; Prolonging Use (6/91)
___Metals Recycling for Platers (9/91)*
___Radiator Repair/Engine Rebuilding (3/89)*
___Solvent Recycling; On-Site (5/91)*
___Vapor Degreasers; Emissions Reduction (7/91)*
___Vapor Degreasing/Cold Dip Processes; Alternatives (2/92)
___Waste Minimization; Fact Sheet
___Waste Reduction; What Makes It Happen? (6/91)

Waste Reduction Checklists

These are process-specific checklists for use in identifying waste reduction opportunities.

___Cleaning
___Coating/Painting
___Formulating
___Machining
___Operating Procedures
___Plating/Metal Finishing

Waste Streams

___Acids, Bases*
___Paints, Inks*
___Solvents*
___*Used Oil; Managing (12/91)**

General Information

___**Glossary of Hazardous Waste Terms (10/92)**
___MnTAP Program Overview (4/91)
___Selecting a Consultant (1/91)

Case Studies

___Pollution Prevention; One Company's Organizational Strategy (3/91)
___Replacement of Vapor Degreasing Operation with Deburring Process for Cleaning Metal Parts (5/92)
___Soak Step Reduces Solvent Waste from Cleaning Paint Straining Equipment (7/91)
___Solid Waste Management and Reduction in the Restaurant Industry (12/91)
___Spray Nozzle Selection Reduces Solvent Waste Volume when Cleaning Paint Straining Equipment (6/91)
___**Wastewater Recycling System Used in Paper Manufacturing Reduces Wastewater Discharge (9/92)**

Intern Project Summaries

1991
___Evaluation of Aqueous Cleaners to Replace TCA Degreasing in a Hydraulic Pump Manufacturing Operation (12/91)
___Evaluation of Aqueous Cleaners to Replace TCA Degreasing in a Refrigeration and Air Conditioning Manufacturing Operation (12/91)
___Water-Based Substitutes for Wood Finishing Lacquers (12/91)

1990
___Reducing Shingle Waste at a Manufacturing Facility
___Alternatives to CFC-113 Use in Cleaning Circuit Boards
___Reducing Chlorinated Solvent Emission from Three Vapor Degreasers

1989
___Reduction of Solvent Emissions from Vapor Degreasing
___Trichloroethylene and Stoddard Solvent Reduction Alternatives in a Small Shop
___Process Water Reduction in a Wire Milling Operation

Intern project summaries from previous years are available upon request.

Please send items checked to:

Name: _____

Company: _____

Address: _____

_____

Phone: _____

___ Please send me a sample copy of MnTAP's quarterly newsletter *Source*

___ Please send me a sample copy of a waste exchange bulletin

(10/92)

TECHNICAL ASSISTANCE FOR CESQGs
The Massachusetts Program
Grace Caner, Massachusetts Office of Technical Assistance

Today I'll cover a number of items. These are CESQG needs, technical assistance efforts of my office, recommendations for a program, actual technical assistance you can provide, and outreach.

Dave Galvin of Seattle Metro gave a great overview of CESQGs. Another reason small sources are significant is that they are more likely to mismanage their waste than are larger sources. In Massachusetts there is at least one case of a CESQG inadvertently ruining a town's drinking water, and due to stricter limits on discharge to air and water, this group will be increasingly scrutinized by those regulations.

If you are new to CESQGs, remember that hazardous waste regulations were developed primarily for LQGs. Thus, these regulations and the expense of transport and disposal are burdens for CESQGs.

Important roles for government are 1) converting regulatory and technical information into laypersons' terms, 2) researching alternative inputs and equipment, and 3) identifying and reaching VSQGs. This third challenge requires some creative detective work and reliance on local advice on ways to reach the audience.

The technical Assistance program of my office is a continuation of a safe waste management effort begun in the mid-eighties. OTA staff have worked with auto body shops, hospitals, schools at all levels, businesses with photographic waste and commercial laboratories.

Types of technical assistance offered are on-site visits, workshops, recycling forums where vendors present information, and recently, the establishment of a permanent drop-off center for a few VSQG wastes. Within these types both regulatory and pollution prevention information is provided.

A Massachusetts VSQG is the same as a CESQG in terms of waste generation rate. Massachusetts regulates hazardous waste down to zero. We estimate having 15,000 VSQGs with only four thousand registered with the state. In comparison, SQGS number 3,000 and LQGs 640. A VSQG generates less than 100 kilograms or 25 to 27 gallons of hazardous waste per month.

Some ways in which VSQG regulation is more relaxed than for larger sources are that accumulation time if unlimited, allowing for more economical amounts of waste to be shipped; receipts and logs of waste shipments are used instead of manifests and most important, VSQGs may self-transport their waste to disposal or recycling facilities. VSQGs are required to register with the state. If a VSQG doesn't register it will be treated as a SQG. Because of this and the simpler regulatory framework, there is some incentive for VSQGs to identify themselves to the state.

Key points to remember when creating a program for CESQG technical assistance are to be prepared to offer extensive education, extensive and customized outreach, to be patient (this is a difficult group to reach), and to be prepared for anti-government sentiment. People don't want to hear that are in the hazardous waste system.

Some general recommendations for your programs follow. Never underestimate how much outreach and education is needed by the very small source. Technical assistance must be basic. Assume most VSQGs don't believe that they are covered by the hazardous waste regulatory system. Keep in mind that most VSQGs don't know common terms such as RCRA, MSDS, listed chemicals, or toxicity. You must

educate them in these areas as well as in regulations. Technical assistance should entail technology transfer. In many occupations where source reduction options are scarce, discussions and brainstorming between similar small generators is in valuable. Such discussions meet two goals: generating practical solutions and showing VSQGs in the same occupation that they can learn from each other.

Resources you can provide to VSQGs are contact names, phone numbers and addresses of relevant agencies such as the board of health, DPW, state environmental, occupational health and public health agencies. Include readable guides to regulations, waste management and reduction, and information on what appropriate services or products are available.

Now I'll mention OTA's specific experiences dealing with labs, hospitals, schools and businesses with photograph or silver waste.
First, labs. An American Chemical Society study showed 40% of chemical waste results from allowing chemicals to expire. Expiration can be avoided through a centralized system of chemical purchasing and inventorying. Such systems can flag orders of toxic chemicals. One university uses bar-coding to track items.

Labs offer relatively many opportunities for input substitution and recycling. The main barrier is getting people to change daily work habits. In labs the micro-scale technique has a lot of advantages, not just environmental ones. This technique reduces the quantities of chemicals used to the point needed for detection by sensitive instruments. It requires using tiny vials in place of beakers. Benefits include faster reactions, the low costs of the vials compared to beakers, and greater safety due to the small amount of chemicals used and stored. Also, switching to microscale is not expensive. It will save money over time in fewer chemical purchases. OTA can refer lab staff to training in this technique.

Other substitutions are available for lab chemicals like solvents, glass cleaners (traditionally chromic acid is used), carcinogenic dyes, and for mercury used in instruments and for tagging. Additionally, recycling options exist for silver nitrate and gold solutions.

Hospitals, like labs and schools, usually lack an inventory and purchasing system. A hospital may be the largest discharger to a waste water treatment plant, so question what is poured in the drain. Formaldehyde is often disposed of this way. A substitute named Omnifax consists of alcohols and organic acids. Sterilizing machines are also sources of waste which should be investigated.

Schools generate some of the same institutional wastes as a hospital. Wastes shared by both schools and hospitals are those generated through custodial work, vehicle maintenance, grounds and lawn maintenance, office activities, laboratories, photograph developing, and in schools, from art, and shop departments. Examples of alternatives available in these areas include water or citrus-based cleaners, integrated pest management, synthetic motor oil, and recycling of antifreeze.

Silver solution generators include a broad range of VSQG types from veterinarians to phototypesetters to chiropractors. In Massachusetts, many silver recovery services exist as do a range of in-house recovery devices. However, VSQGs that use the popular canister with steel wool often don't maintain them. This results in inadequate silver removal. Thus, sources should be informed about how to maintain their units.

A persistent problem for VSQGs is the proportionally higher price they pay for waste management services. Attempts to create a cooperative transportation arrangement (a milk run) usually fade due to fears of entering Superfund liability. These fears exists because there has not been a clear decision from EPA on whether a coordinating agency assumes liability if it organizes a milk run with a hazardous waste hauler. The Printing Industries of New England and the Cape Cod Commission both abandoned the milk

run idea when legal counsel advised against it. One successful model by an association was not aware that it was potentially exposed to Superfund liability. Another service OTA helped provide is a drop-off recycling center for three wastes from VSQGS as well as households. VSQGs have brought 55-gallon drums to the center which had to be pumped out for transfer. Must users didn't know they should bring their state registration number and must pay for the service. This showed they were not aware of the regulatory requirements covering them.

Regarding outreach, identifying and reaching VSQGs requires creativity. VSQGs may not belong to any trade association because membership fees can be higher than a VSQG will pay. This means you must do some research into the characteristics of your targeted occupation. Then you can customize your outreach for each target and locality. Don't assume that outreach which worked for one community or VSQG type will work for all.

Effective mediums to reach VSQGs are local newspapers, direct mailings, the Chambers of Commerce, trade associations, planning commissions and cooperative university extensions. Make presentations during regularly scheduled meetings. Include civic groups with business people. Seek these captive audiences.

Effective trade associations in my state are those of dentists, dry cleaners, science teachers, and photographers and photomarketers. Their newsletters allow you to provide information continually. One of these, the dental association, became very active because some members had been parties to large liability suits due to mismanaging their silver waste. To help its members, the association rated the available silver recovery devices and recommended one type of in-house recovery system. This of course made OTA's job much easier.

In any community small generators appreciate being brought together for informational forums tailored to their needs. OTA organized an event at which small autobody shop owners shared problems and solutions over Kentucky Fried Chicken in an autobody shop. Other formats were a night presentation at a school and an American Foreign Legion Hall. Local groups suggested these formats, times and locations.

An indirect way to reach VSQGs is to train health agents and waste water treatment staffs in VSQG issues and basic source reduction concepts. These local agents can then identify, assist and refer VSQGs to OTA. Among the health agents OTA is training are some which have hazardous materials bylaws to enforce, a motivating factor in the participation.

Financial reasons to motivate VSQGs to reduce and comply are at least twofold. First, if they want a bank loan they may face a strict property inspection before being considered. Second, even a small amount of waste being mismanaged over time can result in fines or lawsuits large enough to bankrupt a VSQG. In addition, VSQGs will be coming to the attention of waste water treatment plan, stormwater and clean air regulators as the regulations become tightened.

To summarize, Massachusetts has regulations which give VSQGs more economical ways to handle and transport their wastes. This is a step in the right direction. Technical assistance for VSQGs needs to include assistance with both compliance and source reduction. VSQGs don't know they're covered by hazardous waste law or what to do to comply and reduce.

Lastly, a number of fairly simple source reduction options exist from improved housekeeping practices to recycling or substitutions. In some cases, a substitution you identify can even get the VSQG out of the hazardous waste system altogether.

INTRODUCTION
(Jim Pfaff)

By now we've all probably had the opportunity to see some of the local sights of this beautiful State and wishing we could take home some of the ambiance.

Like this carefully designed city which caters to almost every possible human desire, the key to design success is planning...something many Household Hazardous Waste Collection Programs have experimented with and found through a careful and ongoing assessment of public and environmental needs.

Today, I'd like to share with you the success of our Household Hazardous Waste Program in the County of Orange, California. But first, we've designed our presentation in such a way that it will afford you the opportunity to listen, to take notes on copies of the overheads provided in portfolios you can pick up in the back of the room, and for you to have a packet of materials which provides you with additional information we will be discussing or could not include during the time allotted for our presentation.

◂ DEMOGRAPHICS: [slide 1 - OC day]

WITHIN ITS 786 SQUARE MILES . . . THE COUNTY OF ORANGE SUPPORTS A DIVERSE POPULATION OF APPROXIMATELY **2.5** MILLION PEOPLE . THE COUNTY IS COMPRISED OF 31 CITIES AND SEVERAL POCKETS OF UNINCORPORATED AREA.

◂ PROGRAM HISTORY:

• IN 1984, THE BOARD OF SUPERVISORS RECOGNIZED THE NEED TO PROVIDE RESIDENTS WITH A SAFE WAY TO DISPOSE OF THE HAZARDOUS MATERIALS FOUND IN THE HOME AND AUTHORIZED A SERIES OF THIRTEEN TOXIC ROUNDUPS **[Slide 2 -long lines & slide 3 -drop point]** WHICH WERE CONDUCTED IN VARIOUS LOCATIONS WITHIN THE COUNTY FROM 1985 TO 1990. APPROXIMATELY TEN THOUSAND RESIDENTS WERE SERVED BY THE TOXIC ROUNDUP PROGRAM.

WITH EACH CONSECUTIVE ROUNDUP THE NUMBER OF PARTICIPANTS . . . THE AMOUNT OF WASTE COLLECTED AND THE COSTS ASSOCIATED WITH THE PROGRAM INCREASED TREMENDOUSLY.

- THUS . . . IN MARCH OF 1989 . . . THE BOARD APPROVED A PILOT PROJECT TO ESTABLISH PERMANENT COLLECTION CENTERS.

PERMANENT COLLECTION CENTERS:

- THERE WERE MANY REASONS FOR CHANGING FROM ONE-DAY COLLECTION EVENTS TO PERMANENT CENTERS.

  1) PROJECT ADMINISTRATORS FELT THAT PERMANENT CENTERS WOULD NOT ONLY PROVIDE A SAFER AND MORE CONTROLLED ENVIRONMENT TO COLLECT MATERIALS, BUT

  2) PERMANENT CENTERS WOULD BE MORE CONVENIENT FOR RESIDENTS AND WOULD ENCOURAGE RESIDENTS TO PROPERLY DISPOSE OF THE HAZARDOUS WASTES THEY HAVE BEEN STORING IN THEIR HOMES.

- CURRENTLY, THE COUNTY OF ORANGE HAS THREE PERMANENT COLLECTION CENTERS - **[OH2 - MAP OF COUNTY W/CENTER ID]**

- ONE IN THE NORTHERN END OF THE COUNTY (Opened 7/90)
- ONE IN THE WEST PORTION OF THE COUNTY (Opened 2/91)
- ONE IN THE SOUTH PART OF THE COUNTY (Opened 8/91)

A FOURTH CENTER IS SCHEDULED TO OPEN IN THE CENTRAL PORTION OF THE COUNTY WITHIN THE NEXT YEAR OR SO.

- THE CENTERS ARE CURRENTLY OPEN TUESDAY THROUGH SATURDAY 9:00 TO 1:00 PM - IN THE FIRST PART OF JANUARY FIRST, CENTER HOURS WILL BE INCREASED TO MONDAY THROUGH SATURDAY 9:00 AM TO 2:00 PM

- THE CENTERS RANGE FROM 2,000 - 3,000 SQUARE FEET
- TWO OF THE THREE CENTERS HAVE ROOFS, HOWEVER, THEY ARE NOT FULLY ENCLOSED BUILDINGS - THEY ARE MORE LIKE CARPORTS
- EACH CENTER HAS TWO OR MORE PREFABRICATED HAZARDOUS WASTE STORAGE UNITS WHERE MATERIALS ARE STORED FOR UP TO TWO WEEKS

FISCAL YEAR 1990/91	FISCAL YEAR 1991/92	FISCAL YEAR 1992/93
1 Center full year & 1 center 4 months	3 Centers full year	3 centers first 4 months of the year
21,859	35,265	15,378

TOTAL PARTICIPATION JULY 1990 – OCT. 1992

72,500

NOTE: If existing Fiscal Year 1992/93 statistics are indicators for the remainder of the year, the County expects to service approximately 46,134 participants, a 31% increase over FY 1991/92.

OVERHEAD - 3
PARTICIPATION

PARTICIPANT PROFILE

* READ THE FOLLOWING RESULTS FROM 19952 SURVEYS TAKEN: (In decending order)		% Participation	
MALES PARTICIPATING	15,121	80%	
FEMALES PARTICIPATING	3,874	20%	
AMOUNT OF TIME MATERIALS ARE STORED:			
1) 2 YEARS OR MORE	9,167	45%	
2) 1-6 MONTHS	4,393	25%	
3) 1-2 YEARS	3,682	18%	
4) 6-12 MONTHS	2,487	12%	
AGE OF THE HEAD OF HOUSEHOLD:			
1) OVER 61 YEARS OF AGE	4,947	25%	**Note: 50% of populatio frequenting centers is age 40 and above**
2) 41-50 YEARS OF AGE	4,880	25%	
3) 31-40 YEARS OF AGE	4,342	23%	
4) 51-60 YEARS OF AGE	4,237	21%	
5) 21-30 YEARS OF AGE	1,176	6%	
6) UNDER 20 YEARS OF AGE	47	.2%	
EDUCATION LEVEL OF HEAD OF HOUSEHOLD:			
1) COLLEGE DEGREE	7,064	37%	
2) SOME COLLEGE EDUCATION	5,444	28%	
3) GRADUATE DEGREE	4,671	24%	
4) THROUGH HIGHSCHOOL	2,169	11%	
HOMEOWNERS 17,422		91%	
RENTERS 1,738		9%	

OVERHEAD - 4
WASTE MANAGEMENT

◂ FULL SERVICE CONTRACT:

• THE HAZARDOUS WASTE CONTRACTOR CURRENTLY USED . . . PROVIDES THE COUNTY WITH COMPLETE WASTE MANAGEMENT SERVICES INCLUDING STAFFING FOR COLLECTION CENTERS. DUTIES:

- COLLECTION OF WASTES FROM PARTICIPANTS
- SEGREGATION
- PACKAGING AND PREPARATION OF MATERIALS FOR TRANSPORTATION
- TRANSPORTATION
- AND ALL ADDITIONAL DAILY ACTIVITIES

• THE COUNTY OVERSEES ALL OPERATIONS ACTIVITIES INCLUDING CONTRACT MONITORING, AND VERIFICATION OF MANIFESTS AND OTHER RELATED PAPERWORK.

◂ DISPOSAL COSTS = CONTRACT COSTS: LABOR, MATERIALS, DISPOSAL, TRANSPORTATION

CONTRACT COSTS		AVERAGE COST PER VEHICLE PER MONTH	
Tipping fee = $1.59 p/ton			
FY 90/91	$1.7 Million	$76	(Costs do not include inhouse County costs for services, supplies & manpower charged to this section of budget
FY 91/92	$2.1 Million	$68	
FY 92/93 (July 92 - Oct 92)	$ 648,914 ($4 million ceiling, with estimated $2.1 million cost this yr.)	$46	

Reasons for decrease:

- changes in waste management - paint box allowed on site instead of being shipped off which saved significant amounts of $ on transportation
- careful contract negotiation with specific service and costs outlined

	FISCAL YEAR 1990/91 (1 center full year) 1 center 5 months	FISCAL YEAR 1991/92 (2 centers full year)	FISCAL YEAR 1992/93 (3 centers 4 months)
TOTAL GALLONS COLLECTED	130,360	164,790	72,642
Motor Oil	45,000	68,635	28,991
Aerosols - # of cans	35,150	52,170	23,680
Paint (Latex & Oil)	78,000	87,149	34,375
Latex Paint - Recycled	0	2,363 *	2,092

* COMMENCED 12/91 - 7 MONTHS OF DATA ONLY

NOTE: Only select quantities of waste collected are included here. The County expects to receive approximately 218,000 gallons of HHW for FY 1992/93. Recycled Latex Paint quantities are expected to remain constant, depending on effective marketing of paint and demand for it.

- MOTOR OIL AND ANTIFREEZE IS BULKED AT EACH COLLECTION CENTER
- EACH MONTH . . . 10 DRUMS OF LATEX PAINT FROM THE HUNTINGTON BEACH CENTER ARE BULKED AND SENT TO A LOCAL LATEX PAINT RECYCLER
- THE PAINT IS DISTRIBUTED TO CITIES, NON-PROFIT GROUPS/CLUBS ETC - FREE OF CHARGE BECAUSE IT IS CHEAPER THAN DISPOSING OF THE MATERIAL
- THE REMAINDER OF LATEX AND OIL BASE PAINTS AND THINNERS ARE COLLECTED IN A 40-YARD COLLECTION/TRANSPORTATION ROLL-OFF BOX. EACH ROLL-OFF CONTAINS APPROXIMATELY 1,500 GALLONS OF PAINT

WHEN THE ROLL-OFF BOX IS FULL, THE ENTIRE BOX IS TRANSPORTED TO THE TSDF FOR PROCESSING (FUELS BLENDING)

*** RECAP INFORMATION ON THE OVERHEAD**

ENDING:

Moving right along, I will now turn over this presentation to my colleague, Jaimy Jackson, to share with you Orange County approaches to siting our permanent collection centers, the challenges we experienced, as well as the advantages and disadvantages of siting collection centers.

SITING CENTERS ON PRIVATE PROPERTY:

- THE PLANNING AND DESIGN PROCESS PRECEDING THE OPENING OF THE FIRST CENTER TOOK ABOUT 16 MONTHS
- A LAST MINUTE CHALLENGE SURFACED ABOUT TWO MONTHS BEFORE THE FIRST CENTER WAS SCHEDULED TO OPEN, WHICH DELAYED THE PROJECT FOR FOUR MONTHS.

THE CHALLENGE:

- THE COUNTY CONTACTED SEVERAL SOLID WASTE TRANSFER STATIONS OWNERS WITH THE PROPOSAL TO SITE COLLECTION CENTERS ON THEIR PROPERTY. FROM THE BEGINNING, THE TRANSFER STATION OWNERS WERE SUPPORTIVE OF DEVELOPING OF A PUBLIC/PRIVATE PARTNERSHIP WITH THE COUNTY.
- THE ORIGINAL PLAN WAS FOR THE COUNTY TO PROVIDE TRANSFER STATION STAFF WITH THE REQUIRED 40 HOUR TRAINING. THE TRANSFER STATION STAFF WOULD COLLECT WASTE FROM PARTICIPANTS, AS NEEDED, IN ADDITION TO OTHER ASSIGNED DUTIES.
- THE TRANSFER STATION OWNERS AGREED WITH THE PROPOSED STAFFING IDEA UNTIL THE TRANSFER STATION OWNERS SPOKE WITH THEIR INSURANCE CARRIERS.
- THE INSURANCE CARRIERS WERE CONCERNED ABOUT THE LIABILITY PLACED UPON THE TRANSFER STATIONS AND INSISTED THAT TRANSFER STATION STAFF BE EXCLUDED FROM ANY INVOLVEMENT IN OPERATING THE COLLECTION CENTERS

- THE INSURANCE AGENTS ALONG WITH THE TRANSFER STATIONS OWNERS REQUESTED A LICENSE AGREEMENT STATING THAT THE COUNTY ASSUMED COMPLETE LIABILITY FOR ALL COLLECTION CENTER ACTIVITIES AND . . . THE COUNTY WOULD PAY THE TRANSFER STATION RESTITUTION SHOULD ANYTHING OCCUR AT THE COLLECTION CENTER THAT WOULD CAUSE AN INTERRUPTION TO THE BUSINESS OF THE TRANSFER STATION.
- BASED UPON THESE PROBLEMS, IT WAS DETERMINED THAT THE COUNTY WOULD HAVE TO HIRE STAFF TO OPERATE THE COLLECTION CENTERS. THUS, IT WAS DETERMINED THAT A FULL SERVICE CONTRACTOR WOULD BE NECESSARY TO ADEQUATELY OPERATE THE CENTERS.
- IN THE LONG RUN . . . USING CONTRACT STAFF TO OPERATE THE CENTERS INSTEAD OF USING TRANSFER STATION STAFF TO WORK THE CENTERS, AS ORIGINALLY PROPOSED, WORKED OUT FOR THE BEST. SINCE THE ACTUAL PARTICIPATION RATE IS THREE TIMES THE ESTIMATED NUMBER OF PARTICIPANTS, STAFFING THE CENTER HAS BECOME A FULL TIME JOB. IT WOULD HAVE BEEN A MATTER OF TIME BEFORE THE TRANSFER STATION OWNERS REQUESTED THE COUNTY FIND OTHER PERSONNEL TO CARRY OUT COLLECTION CENTER DUTIES

ADVANTAGES

1) MANY CITIES AND COUNTY'S, WHOM TYPICALLY ARE RESPONSIBLE FOR HHW COLLECTION ACTIVITIES, DO NOT OWN LARGE VACANT PARCELS OF LAND UPON WHICH TO PLACE A HHW CENTER. OFTEN TIMES A PRIVATE COMPANY HAS THE SPACE AVAILABLE AND IS WILLING TO ENTER INTO A LAND USAGE AGREEMENT.

2) THE PRIVATE COMPANY MAY BE WILLING TO PROVIDE MONETARY OR IN-KIND CONTRIBUTIONS TO YOUR EFFORTS. THEY MAY ALSO HAVE EQUIPMENT THAT CAN BE UTILIZED - DON'T FORGET, THEY WILL BE RECEIVING LOTS OF FREE "POSITIVE" PUBLICITY FOR THE COMPANY. PLUS, THEY MAY INCREASE THEIR REVANUE BECAUSE PEOPLE WITH HHW MAY BRING OTHER MATERIALS FOR DISPOSAL.

3) IF THE LAND USE OR ZONING OF THE PROPERTY IS CONDUCIVE TO SITING A HHW CENTER ON THE PROPERTY AS PART OF AN ONGOING SIMILAR

OPERATION, SUCH AS THE CASE WITH TWO OF OUR CENTERS THAT ARE LOCATED ON SOLID WASTE TRANSFER STATION PROPERTY, THE SITING PROCESS MAY BE A BIT EASIER. THE TRANSFER STATION MAY TAKE THE LEAD IN THE CUP PROCESS.

*IT WAS A PLUS FOR US THAT WE LOCATED TWO OF THREE CENTERS AT TRANSFER STATION BECAUSE THE SURROUNDING COMMUNITY KNEW WHERE THE SITE WAS LOCATED DUE TO RECYCLING ACTIVITIES AT THE TRANSFER STATION

4) THIS TYPE OF COOPERATIVE SPIRIT MAY OPEN THE DOOR TO FUTURE ENDEAVORS BETWEEN COUNTY/CITY GOVERNMENT AND PRIVATE INDUSTRY - THE PUBLIC MAY VIEW THIS JOINT GOVERNMENT/PRIVATE INDUSTRY EFFORT POSITIVELY.

<u>DISADVANTAGES:</u>

1) ADDITIONAL LAYER OF APPROVAL - THE LAND OWNER WILL WANT PARTIAL CONTROL OR INPUT AS TO HOW THE CENTER WILL LOOK, HOW TRAFFIC WILL FLOW AND OTHER SIMILAR ISSUES. BEING THAT THE LAND DOES NOT BELONG TO YOU, INTERACTIONS WITH THE LANDOWNER MUST BE DIPLOMATIC AND ACCOMMODATING.

2) DUE TO THE RIGHTS OF THE LANDOWNER, EXPECT CHANGES TO YOUR PROJECT PLAN DURING ANY PHASE OF THE PROJECT.

3) THE LAND OWNER MAY CHOSE TO ELIMINATE THE PROGRAM FROM THE PROPERTY, THUS LEAVING THE PROGRAM WITHOUT A HOME. PROBLEMS MAY STEM FROM LOCATING A NEW SITE AND THE INCONVENIENCE OF DISASSEMBLING AND RELOCATING THE CENTER.

4) THE BOTTOM LINE NEEDS OF THE PROGRAM MAY BE IN CONFLICT WITH THE DESIRES OF THE PRIVATE COMPANY (I.E. CADILLAC VS. HYUNDAI)

SITING COLLECTION CENTERS ON PUBLIC OWNED LANDFILLS

ADVANTAGES:

1) YOU HAVE THE FREEDOM TO DESIGN THE CENTER ACCORDING TO YOUR NEEDS. YOU WILL BE ABLE TO PLAN FOR LONG RANGE GOALS AND FUTURE LAND USE NEEDS AND CAN BUILD THE CENTER ACCORDINGLY. YOU WILL ELIMINATE A LAYER OF APPROVAL.

2) SITING OF A CENTER ON A PUBLIC OWNED LANDFILL MAY BE EASIER DUE TO THE ISSUES OF SIMILAR LAND USE

3) AS LAND OWNER, LIABILITY MAY NOT BE A HALTING ISSUE AS YOU WILL ALREADY HAVE SOME LIABILITY COVERAGE, AND IN SOME CASES, BE SELF INSURED.

4) MOST RESIDENTS ALREADY KNOW WHERE THE LANDFILL IS LOCATED THUS THEY WILL KNOW WHERE TO GO TO DROP OFF HHW

5) COUNTY STAFF IS ON SITE AT ALL TIMES FOR CONTRACT MONITORING AND CONDUCTING HHW ACTIVITIES

6) IF A SPILL OCCURS, YOU CAN CLOSE THE LANDFILL WITHOUT SERIOUS REPERCUSSIONS, SUCH AS A LOSS OF REVENUE.

7) MANY CONSTRUCTION ACTIVITIES MAY BE ACCOMPLISHED IN-HOUSE (IE. ARCHITECTURE, ENGINEERING, CONSTRUCTION), WHICH COULD REDUCE THE COST OF BUILDING THE CENTER

DISADVANTAGES:

1) OFTEN TIMES LANDFILLS ARE PLACED IN OUT OF THE WAY LOCATIONS WHICH MAY DISCOURAGE PEOPLE FROM USING THE CENTER DUE TO THE TRAVEL INCONVENIENCE. OBTAINING UTILITIES SUCH A PHONE, WATER AND ELECTRICITY CAN BE DIFFICULT.

2) MANY PEOPLE HAVE A NEGATIVE ATTITUDE ABOUT LANDFILLS IE, DIRTY, DUSTY, ETC AND MAY NOT PARTICIPATE

3) COMPLETING THE PROJECT COULD BE A TIME CONSUMING EFFORT DUE TO GOVERNMENT REQUIREMENTS TO OBTAIN BIDS ON SERVICES, ETC. GOVERNMENT INTERNAL PROCESSES CAN BE QUITE LENGTHY, WHILE PRIVATE FIRMS CAN HIRE WHOM THEY WISH TO BUILD THE SITE.

GOVERNMENT TO GOVERNMENT SITING

EXPLAIN IRVINE PROJECT

ADVANTAGES:

1) COSTS FOR CENTER MAY BE SHARED AMONG AGENCIES; INCLUDING FUNDS FOR PUBLICITY & EDUCATION

2) THE WORKING RELATIONSHIP BETWEEN GOVERNMENT AGENCIES PROVIDES RESIDENTS WITH A POSITIVE IMAGE OF GOVERNMENT WORKING TOGETHER FOR THE BENEFIT OF THE COMMUNITY

3) PROVIDES ADDITIONAL SITING OPPORTUNITIES AS THE COUNTY MAY NOT HAVE A LOCATION AVAILABLE TO SITE A CENTER, WHILE THE CITY HAS PROPERTY AVAILABLE.

DISADVANTAGES:

1) IF THE PROJECT IS CITY GOVERNMENT TO COUNTY GOVERNMENT, THE ISSUE OF LOCAL GOVERNMENT CONTROL OF LAND USE MAY BE AN OBSTACLE. (IE THE CITY MAY WANT TO HAVE EQUAL, OR MORE, AUTHORITY AS TO HOW THE PROJECT WILL BE ACCOMPLISHED.)

2) THERE WILL BE AN ADDITIONAL LAYER OF APPROVAL NEEDED(IE CITY COUNCIL, CITY RESIDENTS, BUSINESSES IN THE AREA)

3) IT IS POSSIBLE TO HAVE ADDITIONAL ENVIRONMENTAL RESTRICTIONS, DEPENDING ON THE CITY AND THEIR INTERNAL ENVIRONMENTAL REQUIREMENTS

4) BUDGETS MAY BE LIMITED, PROHIBITING ANYTHING BUT THE NECESSITIES

COMMUNITY AWARENESS

ORANGE COUNTY IS HOME TO SOME 75 ENVIRONMENTAL GROUPS AND ASSOCIATIONS. DUE TO OUR PROLIFIC COAST LINE, ORANGE COUNTIANS ARE, ON THE AVERAGE, ENVIRONMENTALLY AWARE AND PARTICIPATE IN PRO-ENVIRONMENT ACTIVITIES. AS EVIDENCED EARLIER BY PARTICIPATION FIGURES FROM THE TOXIC ROUNDUPS, ORANGE COUNTIANS ARE USING THE PERMANENT COLLECTION CENTERS.

HOWEVER, ACCORDING TO SURVEY STATISTICS THERE IS A NEED TO FOCUS EDUCATION CAMPAIGN EFFORTS OF THOSE PEOPLE BELOW THE AGE OF 30.

ADVERTISING:

- THE OPENING OF THE FIRST REGIONAL CENTER IN ANAHEIM WAS A LEARNING EXPERIENCE FOR THE "POWER OF NEWSPAPERS".
- MANAGEMENT DETERMINED TO OPEN THE CENTER IN A LOW KEY FASHION WITHOUT PAID ADVERTISING. THEY DID NOT WANT A "ROUNDUP" TYPE SITUATION, IN FACT, THEY DID NOT WANT THE NEWSPAPERS TO RUN ARTICLES UNTIL AFTER THE FIRST COUPLE OF WEEKS.
- HOWEVER, THE LOCAL NEWSPAPERS INSISTED ON RUNNING ARTICLES ABOUT THE CENTER. IT WAS DUE TO THESE ARTICLES THAT THE FIRST FEW WEEKS AFTER OPENING THE FIRST CENTER WAS LIKE HAVING A MINI-TOXIC ROUNDUP EVERY DAY. CARS WERE LINED UP ALL DAY FOR SEVERAL WEEKS.
- SINCE THAT TIME, PARTICIPATION HAS BEEN STEADY AND PAID ADVERTISING HAS NOT BEEN INITIATED. BASED UPON THE COLLECTION CENTER SURVEY RESULTS OF THE 20,000 RESPONSES, 7,700 PARTICIPANTS SAY THEY HEARD ABOUT THE COLLECTION CENTERS THROUGH THE NEWSPAPER - WORD OF MOUTH IS ALSO A POWERFUL TOOL WITH 2,700 PEOPLE LEARNING ABOUT THE CENTERS THROUGH A FRIEND - THE HAZARDOUS MATERIALS HOTLINE, WHICH PROVIDES INFORMATION ABOUT THE COLLECTION CENTERS, INFORMED ABOUT 2,700 RESIDENTS OF THE CENTERS AVAILABILITY

- NEWSPAPER ARTICLES WERE ALSO PRINTED PRIOR TO OPENING THE OTHER TWO CENTERS. EACH TIME AN ARTICLE IS RUN ABOUT ANY OF THE CENTERS, PARTICIPATION INCREASES AT ALL CENTERS.
- THE ONLY FORMAL ADVERTISING INITIATED HAS BEEN THROUGH THE USE OF UTILITY BILL INSERTS ADVERTISING THE SOUTH COUNTY COLLECTION CENTER. THIS PARTICULAR CENTER IS NOT LOCATED AS CONVENIENTLY AS THE OTHER TWO CENTERS AND THUS HAS A LOWER PARTICIPATION RATE.

PROMOTIONAL ACTIVITIES:

PROMOTIONAL ACTIVITIES INCLUDE:

- PROVIDING EDUCATIONAL MATERIALS AT LOCAL FAIRS AND COMMUNITY FUNCTIONS
- PRESENTATIONS TO VARIOUS CLUBS, CIVIC ORGANIZATIONS AND ASSOCIATIONS

MATERIALS DEVELOPMENT & DISTRIBUTION:

- THE EDUCATIONAL MATERIALS YOU HAVE RECEIVED ARE THOSE DEVELOPED BY IWMD - (GO THROUGH THE PORT , QUICKLY)
- MATERIALS ARE DEVELOPED IN-HOUSE
- EDUCATIONAL MATERIALS ARE DISTRIBUTED AT THE COLLECTION CENTERS, CITY HALLS, FIRE DEPARTMENT, OTHER COUNTY AGENCIES AND AT PRESENTATIONS TO VARIOUS CIVIC ORGANIZATIONS AND CLUBS.

RECOGNITION

THE COUNTY OF ORANGE HAS BEEN RECOGNIZED BY MANY ORGANIZATIONS FOR THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM:

HONORABLE MENTION - SOLID WASTE ASSOCIATION OF NORTH AMERICA

PUBLIC/PRIVATE PARTNERSHIP AWARD - AMERICAN SOCIETY OF PUBLIC ADMINISTRATORS

FIRE SERVICE AWARD FOR EXCELLENCE - INTERNATIONAL ASSOCIATION OF FIRE CHIEFS

CHALLENGE AWARDS MERIT CERTIFICATE - CALIFORNIA STATE ASSOCIATION OF COUNTIES

SEVERAL LOCAL AWARDS

Six Month Report for the Metro South Transfer Station HHW Facility, Oregon City, Oregon
(Operated by Metropolitan Service District Portland, Oregon)

Sam Chandler

BACKGROUND

DEVELOPMENT OF THE FACILITY

The Metropolitan Service District has been involved with the management of household hazardous waste (HHW) since 1986, when a pilot HHW collection event was conducted. Between 1988 and 1991, Metro sponsored a series of collection events, generally held twice a year, and usually staged simultaneously at four different locations in the Metro area. These events each serviced between 1000 and 3600 participants. In 1989 the Oregon legislature mandated that Metro establish permanent depots for the collection of household hazardous waste.

Early planning for compliance with the legislature's mandate included several key decisions. It was decided that two facilities would be built, to be located at each of Metro's solid waste transfer stations; that the facilities would be designed and built from scratch, without using existing structures or prefabricated buildings; and that Metro would operate and staff the facility, using an outside contractor only for transportation and disposal of wastes.

The facility to be sited at the Metro South Transfer Station in Oregon City was designed first. An engineering firm experienced in the design of structures for handling and storage of hazardous materials was utilized for the project, with Metro engineering and operations staff closely involved in the design process. Because there was very little precedent for designing a full-service HHW facility from the ground up, the design team developed many original approaches. The entire design process took a considerable amount of time and effort. The cost of utilizing the engineering firm totaled more than $120,000, and this does not include the costs of considerable Metro staff time and support services needed during the design phase.

After the design was complete, funds for building the facility were authorized, and construction was initiated in June of 1991. The construction process took a total of seven months. While it was recognized that construction of a facility of this kind would be costly, the final $1,007,000 price tag was not anticipated during the planning process. This construction cost again does not include significant Metro staff time spent overseeing the construction.

DESIGN FEATURES

Three main factors determined the major design characteristics of the facility: the size, shape and grading of the site chosen for the facility; practical considerations regarding flow of materials during waste handling operations; and compliance with numerous recent fire code regulations for facilities handling hazardous chemicals.

The 1988 edition of the Uniform Fire Code, adopted as law by the State of Oregon, includes a greatly expanded Article 80, which addresses facilities handling hazardous materials. Article 80 imposes an array of new requirements on facilities built after the code change. Among the requirements are:

The ability to contain 20 minutes of flow from the facility fire suppression sprinkler system.
A variety of standards for the facility ventilation system.
Minimum standards for construction materials and fire containment properties of walls and doors.
Segregation and proper storage of various classes of hazardous materials.
Explosion-proof wiring and other types of hazard-resistant wiring in certain areas.
A standby generator capable of fully powering the facility in the event of power failure.

In addition to the statewide fire code requirements, the Oregon City Fire Department imposed conditions on facility design and operation during the local permitting process. The Oregon Department

of Environmental Quality (DEQ) also developed a set of design and operational standards for permanent HHW facilities in Oregon. The final facility design successfully incorporates all of these regulatory requirements.

A number of operational features were desired for the facility, and were incorporated into the design. It was decided that wastes would be received at the front of the facility, and move toward the rear as they were processed. The various steps were planned as follows :

First, customers are greeted and vehicles are unloaded in a drive-through canopied area

Wastes are then wheeled into the facility by facility staff into a receiving and sorting area, where they are staged, and then sorted either for lab-packing into drums located in the sorting area, or sent to other parts of the facility.

Unlabeled materials are brought into a laboratory for identification.

Paints and solvent-based materials are brought into a bulking room, where they are poured into 55-gallon drums.

Drummed materials are placed in segregated storage areas.

When a drum pick-up occurs, drums are brought to a loadout dock at the rear of the facility.

Overall, the operational concepts developed during the facility design have proven to be sound, and the facility generally functions quite well. Some aspects of the design were found to be unsatisfactory, however, and certain alterations have been necessary:

The ventilation in the bulking room was inadequate, and a retrofitted system of exhaust ducts and improved air flow is currently being designed and installed.

Space allocated for storage of supplies and for office and computer tasks was inadequate. A storage room has been converted into an office space, and storage cabinets are located in various corners throughout the facility, with some storage on the loading dock and outside of the facility as well.

The assignment of storage space to drummed acids, bases and oxidizers was greater than actually needed. A new arrangement for the segregated storage areas is in process. It will free up what is currently the acids bay for other uses, including storage of supplies.

An unexpectedly high volume of material is being received at the facility, and thus inadequate space is available for bulking of both solvent-based materials and latex paint. Fortunately, a large tunnel formerly housing a compactor was available adjacent to the facility, and is currently being utilized for latex operations.

PREPARATION FOR STARTUP

Concurrent with the construction of the facility, Metro obtained equipment to be used in facility operations, hired and trained staff to operate the facility, and researched some of the technical aspects of facility operation.

Expenditures totaling about $55,000 were made to outfit the facility with equipment including: a forklift, stainless steel tables, shelving and other furniture, a computer system, tools, carts, safety equipment, lab equipment, and a variety of other non-disposable supplies.

Most of the facility staff hired prior to the opening of the facility were Metro employees experienced in hazardous waste handling through the solid waste load checking program at Metro's transfer stations. Facility staff were given considerable additional training prior to the facility opening, some of which was provided by outside trainers, and some developed in-house. Standard training for all staff includes:

OSHA 40 hour hazardous waste
Emergency response team (ERT) 24 hour training

First aid/CPR
Hazard communication
Respiratory protection program
Chemical hygiene program
Identification of unknowns
Forklift operation

Training also includes thorough instruction on the specific operations of the HHW facility. Training is considered to be an ongoing effort, with additional in-house and outside training being provided to all staff on a regular basis.

The operating procedures for the facility were developed by drawing on a variety of resources: staff experience in the hazardous waste industry, consultation with the disposal contractor selected, observations and operation manuals from existing facilities, and staff experience with one day collection events. Two specific aspects of facility operation required considerable research prior to facility startup: the identification of unlabeled wastes, and recycling of latex paints.

Identification of unlabeled containers received at the facility is probably the most technically involved aspect of facility operation. Facility staff were trained by the developers of two existing identification schemes- HazCat, designed for identification of the 200 most commonly spilled hazardous substances, and WICT, developed by the staff of the San Francisco HHW facility. In the months since the facility opened, our staff has developed a customized system, utilizing some of the aspects of both existing systems, but more closely coordinating with the exact requirements of our disposal contractor.

Although some HHW programs do not accept latex paint, Metro decided to accept it because it is unacceptable as normal trash, and is a disposal problem. Upon researching the available options for latex paint, it was determined that careful sorting and quality control could result in recycling of a significant portion of the latex paint collected. The latex paint recycling program currently in place is patterned after other regional pilot programs. A sorting scheme was established and refined, with the assistance of a paint recycling consultant.

PARTICIPATION, DISPOSAL AND COST DATA

PARTICIPATION FIGURES

Metro's HHW collection events in 1988 through 1990 were held twice a year. In 1991, because of the impending opening of the first permanent facility, only one event was held. Apparently, the residents of the region have become quite conscientious about the potential problems associated with household hazardous waste, because the opening weeks of the facility brought out a massive turnout. The first two weeks alone over 850 participants showed up to dispose of the wastes they had collected. This is particularly significant since Metro did not publicize the opening nor has there been any major advertising to date. After the initial two weeks, the participation dropped off a bit, but it has remained quite steady in the months since the opening. The ongoing participation level is significantly higher than the estimated figures that were used during the planning process, which was projected to be under 50 customers per weekend. Nearly 40% of the facility customers are from neighborhoods within 3 miles of the site.

The facility received its first waste at the end of January, 1992. Metro employees were asked to bring any wastes that they had in order to give the facility staff a little hands on practice, and help fine tune some of the procedures. On Thursday February 6, 1992 the facility was opened to the general public. Since that time, the facility has been open every Thursday, Friday and Saturday, from 10 a.m. to 5 p.m. Through the end of June, 1992, a total of 5148 vehicles brought waste to the facility. (Note: During June through October, 1992, an additional 4,273 vehicles brought waste. The current weekly participation averages 230 vehicles.)

COSTS

The following is a summary of ongoing operational costs. In some places estimates were used, and data from portions of the time period were extrapolated to the whole time period.

The largest portion of operational expenses for the Metro South HHW facility was for transportation and disposal of drummed wastes. The total cost for disposal of all wastes collected through the end of June, 1992, was $277,770. A breakdown of this cost by type of waste follows in the disposal data section.

The second largest operational cost is labor. During the facility planning process, it was expected that three technicians and one supervisor would be sufficient to staff the facility. In actual practice, an unexpectedly high participation level, coupled with a higher-than expected proportion of labor-intensive wastes such as paints among the materials collected requires a staff of 12 persons to properly operate the facility. Personnel records for the first months of operation of the facility indicate that it takes an average of about 2.4 hours of labor per participant serviced.

It should be noted that the more labor intensive aspects of facility operation generally result in significant overall cost savings. Bulking of solvent-based materials, for example, allow for disposal costs that are greatly reduced compared to disposal of non-bulked materials through a hazardous waste contractor. During the first two months of operation, a total of 104 drums of non-bulked solvent-based materials were shipped out, because the sheer volume of incoming material was overwhelming. If facility staff had been able to bulk this material, a net savings of about $30,000 would have resulted. Sorting and bulking of latex paint, and on-site identification of unknowns are two other labor-intensive operations which result in a large net savings in operational costs.

In the course of a typical operating day, perhaps 140 unlabeled containers of waste are received at the facility. About 40% of these are paints, which are categorized quickly and inexpensively. Of the remaining unknowns, about two thirds can be identified sufficiently for disposal purposes in two or three minutes, consuming only twenty cents or so worth of test tubes and other disposable supplies. The remaining unknowns take more time, although rarely does it take more than fifteen minutes of work and a few dollars in supplies to identify even the most difficult items. Using the identification scheme developed at the facility, the equivalent of two staff persons working full time and the expenditure of about $800 in supplies each month is all that is required to identify all unlabeled containers received. This compares favorably to a typical charge of $50.00 per unknown levied by many hazardous waste firms, which would result in a monthly expenditure of $84,000.

Various other supplies are used on a regular basis in the course of facility operations. The most costly supply is empty drums for packaging of waste. Disposable personal protective clothing for facility staff is also a significant expense. Other items used on an ongoing basis include absorbent, drum liners, labels, and cleaning supplies. An estimated $11,500 per month is spent on all disposable supplies.

The operating costs for the facility break down as follows:

Disposal	$ 54.00
Labor	42.00
Supplies	13.00
Total	$109.00 per participant

(Note: as of October, 1992, it appears that the disposal portion of facility costs are coming down, and total costs are now just under $100 per participant).

The estimated total operating cost for January through June 1992 - $561,130.

RECYCLING AND DISPOSAL OF MATERIALS COLLECTED

In the following tables, information on types of materials collected, disposal methods, and amounts of materials collected is tabulated. Amounts were calculated using manifests of materials shipped through June 30, 1992, as well as an inventory of materials stored in the facility on that date.

Where "landfill" is indicated under disposal method, it refers to permitted hazardous waste landfill.

Where "energy recovery" is indicated, it refers to use as a fuel at an EPA-permitted cement kiln facility. "Treatment" refers to processing of liquids through an industrial water-treatment system to remove hazardous constituents, and monitored discharge of the cleaned-up water portion of the waste.

Bulked Materials

For these materials, each drum contains 55 gallons of material.

Material	Disposal Method	Quantity Generated (6 months)
Flammable liquids	Energy recovery	190 drums
Flammable solids	Energy recovery	82 drums
Antifreeze	Recycle	10 drums

Latex Paint

All drums are 55 gallon drums. The landfill category also contains other water-based wastes such as sheet-rock compound, adhesives, etc. During the opening weeks of facility operation, a relatively low percentage of the latex paint received was recycled. This was due in part to the inexperience of the facility staff, and in part because much of the paint received initially had been stored for long periods of time. The latex paint operation is now achieving a recycling rate of just below 50%.

Material	Disposal Method	Quantity Generated (6 months)
Latex paint	Reprocessing	27 drums
Latex paint	On-site recycling	91 drums
Latex paint	Landfill	170 drums

Lab Packs

Lab pack drums hold separate containers of solids and liquids. The amount of waste contained varies, but is typically 100 to 120 pounds net.

Material	Disposal Method	Quantity Generated (6 months)
Acids	Treatment	6.25 drums
Acids	Landfill	20 drums
Alkalis	Treatment	9 drums
Alkalis	Landfill	19.25 drums
Oxidizers	Treatment	2.1 drums
Oxidizers	Landfill	2.75 drums
Pesticides	Landfill	111 drums
Cleaners	Treatment	35.5 drums

Loose Packs

Drums of aerosols contain about 235 aerosol cans. Drums of asbestos tar contain about 20 gallons of tar. Currently we have no data on the quantity of batteries contained in loose pack drums.

The flammable materials category refers to loose packed cans of paints and other solvent-based materials that were shipped directly to our hazardous waste disposal contractor during the initial few weeks of facility operation when we were overloaded with waste and were unable to bulk all materials received. This method is no longer used.

Material	Disposal Method	Quantity Generated
Aerosols	Incineration	76.75 drums
Household batteries	Recycle	0.125 drums
Household batteries	Landfill	2.125 drums
Asbestos tars	Landfill	48 drums
Flammable materials, misc.	Energy recovery	104 drums

Miscellaneous

This includes various materials that are not collected in drums. The amounts indicated are

estimates from the volume, or extrapolations from three or four weeks of data.

Material	Disposal Method	Quantity Generated
Isocyanates	Landfill	120 pounds
PCB ballasts	Landfill	5 gallons
Organic peroxides	Incineration	15 pounds
Water reactives	Incineration	20 pounds
Propane	Recycle	12 cylinders (approx. 5 gal. size)
Fire extinguishers	Recycle	50 units
Motor oil	Recycle	1,400 gallons
Lead-acid batteries	Recycle	330 batteries
Radioactives	Landfill (via state health dept.)	2 pounds
Infectious waste (sharps)	Incineration	1 small container
Gas Cylinders	Treatment, recycle	4 cylinders
Explosives	Detonation (bomb squad)	100 pounds

REUSE PROGRAM

Approximately 1,500 pounds of fertilizers were used on the Metro South grounds, about five drums of usable cleaning products and related materials were collected for later giveaway, and 150 to 200 gallons of various materials were reused by employees and associates. Small propane cylinders with material remaining inside are utilized by the facility laboratory as fuel for a lab burner in tests requiring a flame.

NON-HAZARDOUS MATERIALS

A significant amount of packaging and other non-hazardous materials are collected along with household hazardous waste. All steel cans resulting from the latex paint bulking operations were recycled, totaling 25,060 pounds of metal. Two hundred yards of cardboard was also recycled (weight data is not available). One hundred tons of regular trash was generated in the course of facility operations.

SUMMARY

Various assumptions and estimates were used to convert all incoming wastes into pounds. An estimated total of 361,010 pounds of waste (180.5 tons) were collected through June 30, 1992. The average customer delivered 70 lbs. per trip.

Flammables	40%	Latex	35%
Aerosols	4%	Pesticides	3%
Acids, bases and oxidizers	2%	Cleaners	1%
Miscellaneous	14%		

The estimated average cost per pound was $1.55 (total operating cost $561,130 divided by 301,010 total pounds). Although not all materials were shipped out in drums, by using conversions we can estimate that 1,108 drums of material were collected. This amounts to approximately one-fifth of a drum per participant, and indicates an average cost per drum of $251.

As a portion of disposal costs:

Flammables	44%	Latex	18%
Aerosols	16%	Pesticides	10%
Acids, bases and oxidizers	5%	Cleaners	3%
Miscellaneous	4%		

By disposal method, it breaks down as follows:

Energy recovery	35%	Recycle	29%
Landfill	29%	Incineration	4%
Treatment	2%	Reuse	1%

The following table indicates the cost per pound for disposal for each of the above disposal

methods. These figures represent disposal costs only. Costs for labor and supplies differ only slightly among wastes destined for different disposal methods.

Disposal Method	Average cost per pound
Energy recovery	$0.96
Recycle	$0.02
Landfill	$0.93
Incineration	$3.02
Treatment	$1.93
Reuse	-none-

FUTURE PLANS

SECOND COLLECTION FACILITY

Metro's second HHW collection facility will be located at the Metro Central Transfer Station in northwest Portland. The design for the facility has been completed, although some modifications to the bulking room will be made based on what has been learned at the Metro South facility. A construction contractor to build the facility will be selected in August. Construction is scheduled for the fall of 1992, and is expected to be completed by early 1993. The Metro Central facility will have a configuration similar to the Metro south facility, but has a few different characteristics, so some details of the facility will differ. The floor plan is smaller in area than the Metro South facility, and no area equivalent to the latex operations area at Metro South is available, so space problems will be likely, requiring some outside staging of non-hazardous materials and supplies. It is difficult to predict the participation level at the new facility, but it is estimated that the total regional participation will be about one and two-thirds times the current participation levels when two facilities are available.

MOBILE COLLECTION

Metro is currently negotiating with Oregon Department of Environmental Quality (DEQ) regarding a DEQ-funded Metro-operated mobile collection program for the Metro region.

If approved, this would be a limited pilot program during the 1992-93 fiscal year to explore the viability of collecting various substreams of household hazardous waste in neighborhood locations distant from the two permanent facilities. Many of the details of this program have yet to be finalized.

COST-SAVING AND ENVIRONMENTALLY PREFERABLE INNOVATIONS

One of the advantages of using Metro staff to operate the HHW facility is the large degree of control that may be exercised over packaging and disposal of materials collected. Metro staff is continually searching for practices which can either reduce the cost of waste disposal or provide disposal methods which are higher on the waste reduction hierarchy, or ideally, do both simultaneously. Several innovations are currently under development.

Reuse Program

Facility staff are undertaking an ambitious program to find users for certain reusable items received at the facility. This will not involve a browseable collection of materials like some other facilities have developed, but will entail keeping potentially reusable materials at an off-site storage location, networking with local community and social service groups, and giving away materials by appointment. Specific procedural guidelines for the reuse program are currently under development.

Recycling of Paint Solids

A disposal facility has been located which will accept the solids generated in the course of bulking oil-based paints, burn off the organic portion in a rotary kiln, and sell the solids to a paint manufacturer. Once approved, this will result in lower costs for managing this waste stream, and will provide a disposal method that is higher on the waste management hierarchy. (Note: this arragement was approved in September, and has already resulted in savings of over $20,000).

Recycling of Aerosols

Facility staff are researching and designing equipment that can puncture spray cans, release the liquid contents into a drum, and route the hydrocarbon propellants into a state-of-the-art compost filtration system that will break down the propellant, emitting only carbon dioxide and water. This will allow the metal cans to be recycled, and significantly reduce disposal costs. This system may also be used for puncturing empty propane tanks (the type used in camping stoves), and treating the trace amounts of propane left in these tanks when "empty".

Bulking of Cleaners

Currently, items such as household detergents and cleaners are lab-packed in the facility receiving area, and shipped to the disposal contractor's site, where they are bulked and sent to a treatment facility for treatment and eventual discharge to the sewer. Soon facility staff will begin pouring these items into a 55-gallon drum on site, which will result in significant cost savings. This will include only items in the pH 3 to 11 range. All these materials are considered non-hazardous under most regulations, but are not acceptable for disposal as normal trash.

Solidification of Latex

The portion of latex paint that is collected that is not recyclable is currently being sent to a hazardous waste contractor for solidification and disposal in a hazardous waste landfill. Facility staff has found that the sorting scheme used for latex paint is able to exclude paints high in lead and mercury. Thus only the high heavy metal portion need be sent out as hazardous waste, while the remainder may be solidified on site and sent to a municipal landfill as a special waste. Once procedures are finalized and approval is obtained from the landfill, a substantial cost savings will result.

Barcode System

Facility staff will soon utilize a portable barcode reading system to inventory all lab-packed wastes. While this system required a capital investment for hardware and programming, it is expected to result in reduction of the amount of labor devoted to paperwork, as well as prevent costly and time-consuming packaging errors which if uncorrected could result in fines from regulatory agencies.

CONCLUSION

The first six months of operation of the Metro South Household Hazardous Waste Collection Facility have been a remarkable success. Some of the planning projections prior to the facility opening estimated that 2% of the households located within a 15 minute drive of the facility would bring wastes during the first year, which would have resulted in under fifty participants per week. The actual turnout has been five times that predicted level, and yet all residents who made use of the facility were serviced safely and efficiently. There were no long lines waiting for service, no significant spills or accidents, and all waste was processed in a safe manner and within the constraints of the facility permits.

If the participation rate achieved during the opening months continues through January of 1993, then a total of 12,342 households will be serviced during the first year of operation. This amounts to 2.6% of the households in the entire Metro region. Not only would this be an excellent accomplishment for a single facility in its first year of operation, it would signify the diversion of 420 tons of hazardous materials from the regional landfill and other potentially environmentally destructive resting places.

The fact that operating expenses of over one million dollars would be incurred in the course of servicing just one-fortieth of the population does however beg the question of the potential costs of servicing most or all households. While it probably wouldn't cost a full forty times as much, it certainly would run into many millions of dollars. This fact not only underscores the importance of efforts to find more efficient disposal methods, it also forcefully argues for a strong campaign to educate the region's population to buy only what they will use, find other users for their leftovers, and switch to less hazardous substitutes whenever they are available. An examination of the disposal and cost figures generated at the facility can help set priorities for both types of waste reduction efforts.

Wastes with a high per pound cost for example, are an obvious target for future reduction efforts, as are types of waste that are responsible for a relatively high proportion of disposal costs, but only constitute a small proportion of incoming materials. Aerosol cans, for example, are losers in both of these categories. For this reason disposal alternatives for aerosols are currently being actively pursued by facility staff. Another example is pesticides, which make up 3% of incoming materials, but account for 10% of disposal costs. There is very little that can be done with pesticides once they are received for disposal, suggesting that education efforts should focus on pesticide use habits as a high priority.

The first six months of operation of the Metro South HHW facility have been quite a challenge, and much has been learned in the course of successfully meeting that challenge. We are now in an excellent position to move forward with our plans for further improvements in operational methods, providing HHW collection in neighborhood locations, contributing to public education efforts, and startup of Metro's second HHW collection facility.

PERMANENT HOUSEHOLD HAZARDOUS WASTE FACILITY CASE STUDY: ROCHESTER, NEW YORK

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SINGLE COLLECTION DAY

Monroe County which has a population of 714,000 people with 230,000 households began its Household Hazardous Waste (HHW) Program in October 1989 when it held a single collection day at which fourteen hundred (1400) households participated. The collection was sponsored by Monroe County and co-sponsored by the City of Rochester and Eastman Kodak Company.

In order to raise funds for the collection the County solicited donations of money and in-kind services from the private sector to enhance the contribution by the County ($63,000) and the City ($5,000). $56,200 was raised from the private sector to create a budget of $124,200 with which to work with and services such as Kodak's hazardous waste disposal ($32,410), advertising, waste oil disposal, food, and empty container disposal valued at $13,500 was also donated. County staff time and attorney's fees were valued at $30,000.

An operations plan was required by the New York State Department of Environmental Conservation (NYSDEC).The plan was prepared with input from a number of organizations that included: the County's Division of Solid Waste, the Environmental Management Council, the Health Department, and the Planning Department; the City of Rochester's Environmental Services and the Fire Department (Hazmat team); Eastman Kodak Company; the League of Women Voters; the Cornell Cooperative Extension; the Adirondack Mountain Club; and some City neighborhood groups. The plan made sure that all safety precautions in regard to human health and the environment were addressed. The County also went out with a Request for Proposals to select a qualified firm that was licensed to transport and dispose of hazardous waste. Laidlaw Environmental Services (North East) Inc. was selected out of four firms.

Based on the amount of money budgeted the contractor was able to determine approximately how many participants could be served. The question that remained was how many people would show up to participate. There was no preregistration of participants so it was anyone's guess on what the response would be. The collection day was well publicized which is

directly related to the amount of participation.

The City of Rochester's Environmental Services garage was used for the collection. The building is used to park the City's fleet of garbage trucks and has overhead doors along the entire length of each side. This allowed for an indoor collection with plenty of queuing of vehicles off the street or so we thought (See Fig. 1). Vehicular flow was set up so that four (4) lines of cars could drive through the building at which all acceptable materials would be collected. A fifth line, our "express" line, was established outside the building at which only used motor oil and lead-acid batteries were accepted. The collection was scheduled to begin at 9:00 a.m. and end at 2:00 p.m. Cars began arriving at 8:20 a.m. By the time the first cars went through the line at 9:00 a.m. the cars were backed up a considerable distance, a situation that continued throughout the day.

Participation was so great that not everyone could be served. At 1:15 p.m. the police were instructed to allow no more cars to get in line. This resulted in some disgruntled residents and some abandoned waste along the roadside. The number of calls following the collection from those turned away and because of the media coverage demonstrated the need for an expanded program. The development of a permanent facility was felt to be the best answer to the problem.

SITING

With the need for a permanent facility established, a site had to be selected that would be centrally located to the general population in the county, on County property, and in a secure area. Sites that were considered included County sewage treatment plants, the Resource Recovery Facility/Transfer Station and the County's Iola Complex which is a County operations facility. An evaluation of the sites determined that the Iola Complex was the most suitable location.

The Neighborhood Association in the area was contacted to inform them of the County's intent and explain the project. This helped to alleviate the fear that often develops when the words hazardous waste are associated with a project. It should be emphasized that the facility is merely a transfer station for HHW and that nothing will be disposed of there. Since the materials are received from households, there should be more of a concern about what one's neighbor may have stored in their house than at a facility that is equipped to temporarily store the same materials.

FACILITY DESIGN

The County sent out a Request for Qualifications to select a consultant for the project. Malcolm Pirnie Inc. was chosen. In an effort to cut costs, the County assisted the consultant in

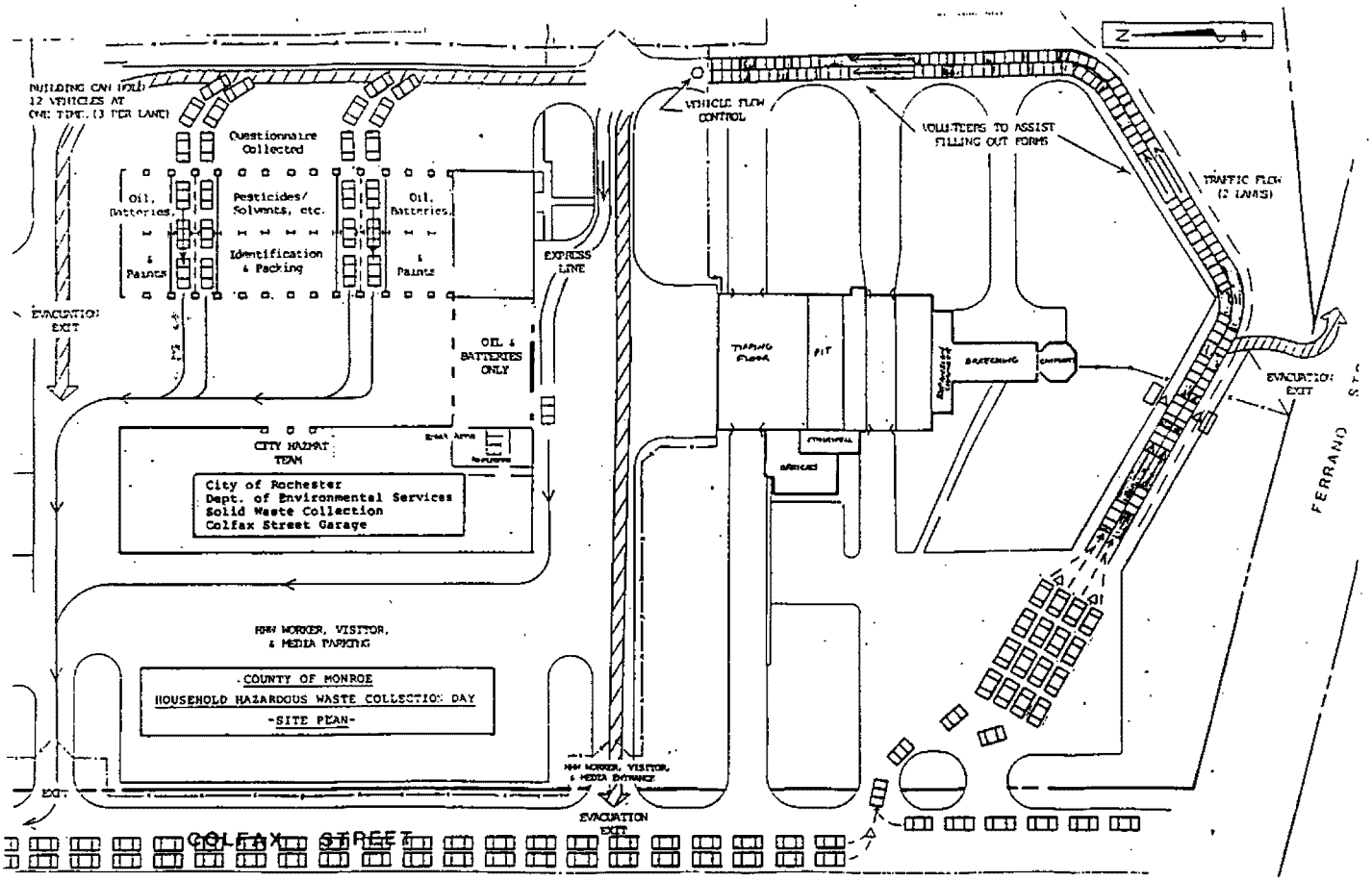
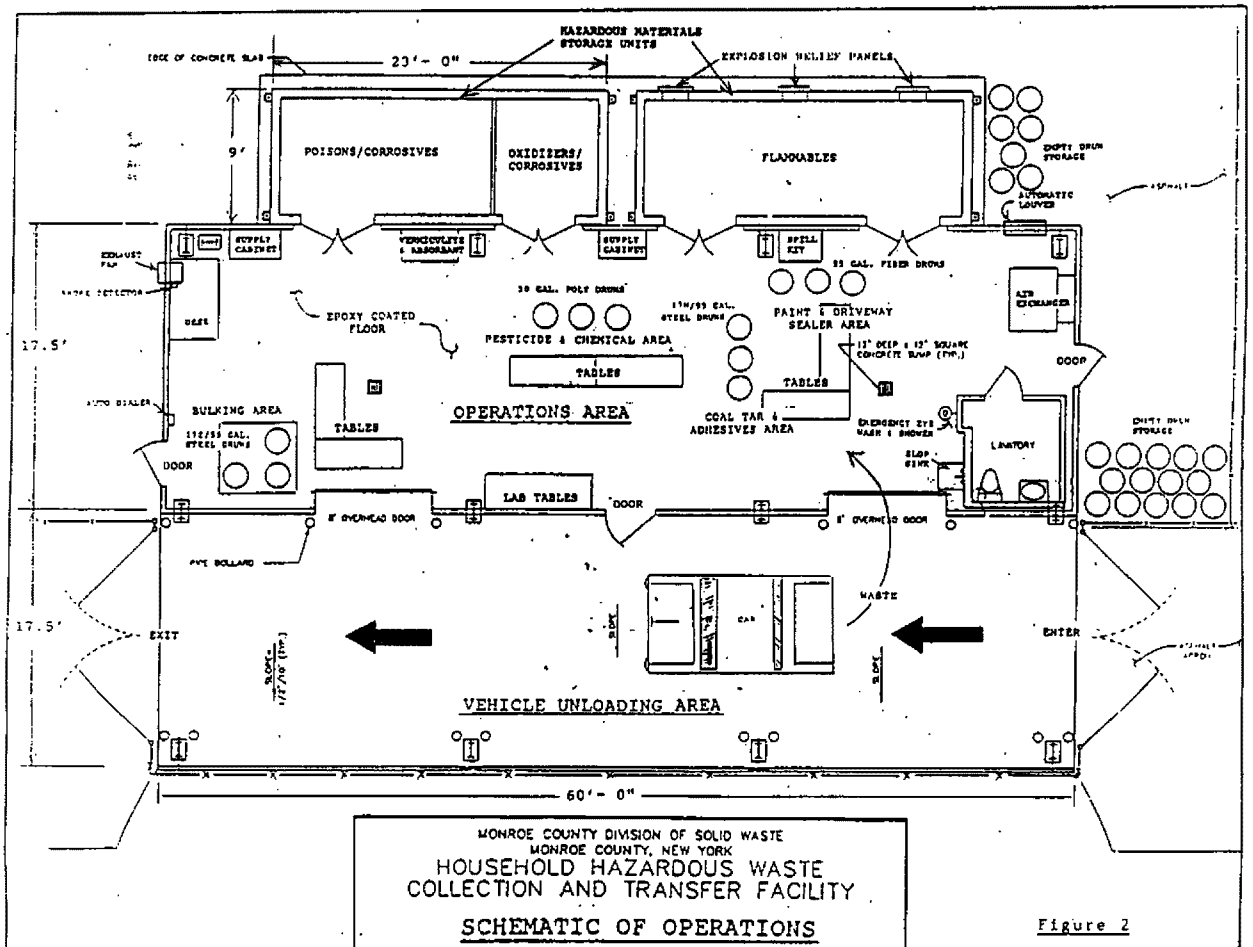


Figure 1



MONROE COUNTY DIVISION OF SOLID WASTE
MONROE COUNTY, NEW YORK

HOUSEHOLD HAZARDOUS WASTE
COLLECTION AND TRANSFER FACILITY

SCHEMATIC OF OPERATIONS

Figure 2

the design and preparation of the permit application. A Permit to Construct was obtained from the NYSDEC in six (6) months and the Permit to Operate was obtained in eight (8) months.

The facility is a prefabricated metal building (Butler) with an overall dimension of 35′ x 60′, half of which is the operations area for material classification and packaging and the other half is a roofed drive-thru for receiving and shipping waste materials (See Fig. 2). Both areas have concrete floors, the operations area is epoxy coated. Two prefabricated chemical storage units (Safety Storage Inc.) abut the back of the building so that they can be accessed from inside the operations area. The wall between the roofed drive-thru and the operations area contains two (2) overhead doors and a mandoor. The chemical storage units are connected to the exterior wall of the building opposite the overhead doors. The facility construction was also a joint effort between a private contractor and County work forces. The County performed all of the plumbing and electrical work while the contractor performed the rest. The cost for the building construction was as follows: $176,000 General Contractor, $79,000 County Work Forces, $45,000 2-Chemical Storage Units. The Building was constructed on an area of fill and required pilings and a reinforced slab/foundation that added to the general contractor's cost. The cost for engineering services was $71,000 which included preparation of the permit application, a bid specification, and construction inspection and certification.

The operations area, which is 17.5′ x 60′ contains the following safety features: epoxy-coated floor which slopes to two sump pits, ventilation fan that is connected to an automatic louver on the opposite side of the building from the fan, emergency eyewash and shower, smoke detector, wet sprinkler system, an automatic dialer, and power "shut down" buttons at each exit. The prefabricated chemical storage units have the following safety features: explosion-proof lighting, ventilation fan, spill containment, dry-chemical fire suppression system, air vents, and the flammable material storage unit has explosion-relief panels.Both units have shelves that are good for storing the smaller containers of materials.

OPERATIONS

The facility opened in September 1991 and is being operated by Laidlaw Environmental Services (North East) Inc. As part of the operation, Eastman Kodak Company of Rochester is donating its services to dispose of the oil-based paints, driveway sealers, and paint-related materials that are received. Laidlaw is responsible for the remainder of the materials that are received.

Materials accepted at the facility include: pesticides,

poisons, household cleaners, oil-based paint, solvents, pool chemicals, driveway sealers, photo chemicals, antifreeze, gasoline, brake fluid, and transmission fluid. Unacceptable materials include: radioactive materials, smoke detectors, infectious or biological wastes, propane cylinders, explosives, ammunition, shock sensitive materials, used motor oil, and latex paint. Used motor oil is not accepted because New York State law mandates its collection through service stations and retailers. Latex paint may be disposed of in the regular garbage collection as long as it is dry. While only household generated waste is accepted, it is not unusual to have lab chemicals brought in. There are many people who have chemicals that were brought home from work years ago and now want to dispose of them. Those materials can be considered household generated. Each participant must sign their registration form certifying that the materials they are disposing of are household generated.

It was the County's intention to hold collections twice per month throughout the year, but it was found that the use of the facility is directly related to the seasons experienced in Rochester. From late Spring through late Fall the demand for the facility is high so collections are held every two to three weeks. The Winter had a low participation rate so collections will be held once per month during that time period. The facility is operated by appointment only. This allows for control of traffic at the facility, the ability to work within a fixed budget, and as an indicator as whether to schedule collections every two or three weeks. Participants call the County's Recycling Hotline to schedule an appointment and preregister their waste. The preregistration allows for the ability to eliminate unacceptable materials from being brought in and being able to instruct the homeowner on alternative methods of disposal. Businesses attempting to dispose of materials through the program are usually identified at this time. Homeowners with unusually large quantities can be scheduled at the end of the day in order not to disrupt a smooth flow to vehicles through the facility.

Appointments are scheduled on half hour intervals from 9:00 a.m. to 12:30 p.m. for collection days, with twelve (12) to fifteen (15) appointments scheduled per half hour. The grouping of participants per half hour usually results in a smooth traffic flow because some are usually early, some on time, and some a little late. Those who are early remembered the collection day in October 1989 and expected to wait in line. In most cases cars can drive right up and unload. The longest line of cars experienced to date has been six. The majority of the people using the facility like the appointment system because they are in and out in minutes. There are some though that complain that it is inconvenient and will discourage people from disposing of materials. There is also a number of people who do not show up for their appointments. A "no show" rate of fourteen percent (14%) is currently being

experienced. This rate is generally consistent so the desired participation is achieved by overbooking by the "no show" rate. Those who do not show up for their appointments are usually the ones who have only one or two items to dispose of. Those who do not show up and have registered a lot of materials to dispose of are called from the facility to find out why they did not show up. In many cases they forgot about the appointment but are eager to get rid of their waste. They often come in later that day or reschedule. It should be noted that the weather can also affect participation. A snowstorm the day before or the day of a collection will decrease the participation rate as well as nice sunny weather will. The ideal weather for participation has been overcast days with a little rain.

Although collections are held every two or three weeks, there are some people who cannot make the collections. Orthodox Jews are not permitted to drive on Saturdays, some people work on Saturdays, and then there are the procrastinators who say they are moving before the next collection. Although these types of situations occur, it is not that often. When they do, a special arrangement is made in order to receive their waste. There are also some people who will abandon their waste at the facility when it is closed or leave it at an unmanned recycling drop off center. This contributed to the decision of siting the facility within a County complex.

The facility operator staffs the facility with two (2) field chemists and one (1) technician while the County provides a person to greet participants and obtain signatures on the registration forms certifying that the waste is generated from a household. During normal operation, one of the field chemists will inspect the waste as it comes in to verify that it is acceptable. It is then removed from the vehicle and brought into the operations area. Large loads may require inspection after it is brought into the operations area. Should a large load be received, one of the other staff members will assist in unloading the vehicle so that a line of cars does not develop. Once waste is brought into the facility the other field chemist will separate materials by hazard class and place them in the appropriate area for containerization. Materials are either placed in drums, container and all, some of the liquids are bulked, and some materials are labpacked into drums with detailed packing slips completed. In the event of unknown materials being received, field tests can usually determine its chemical characteristics.

Kodak's participation in this project has been very beneficial to the County. As the largest employer in the County, Kodak has shown a great interest in supporting the local community.The oil-based paint, driveway sealers, and paint-related material that Kodak disposes of is approximately two thirds (2/3) of the materials that are received at the

facility. It is estimated that this service saves the County approximately $80,000 annually. The paint cans and driveway sealers are placed in plastic lined fiber drums for shipment. Initially fifty-five (55) gallon fiber drums were filled completely with paint cans which equaled approximately fifteen (15) gallons of liquid paint, but due to operational problems Kodak requested that no more than five (5) gallons of liquid paint be placed in drums. This took affect on the August 22, 1992 collection and all those thereafter. Thirty (30) gallon fiber drums were then used to minimize storage space. The packing requirement for driveway sealers is two (2) five - (5) gallon pails per thirty (30) gallon fiber drum. Spray paint (aerosols) are also placed in a fiber drum. Paint-related materials are bulked into fifty-five (55) gallon steel drums. Kodak supplies fiber drums, drum liners and picks up their own materials for disposal. The County and Kodak are currently working on a plan to collect household generated syringes for disposal at Kodak.

PROGRAM COST

The following cost evaluation is based on the first twenty-four (24) collections that were held from September 1991 to November 1992 serving 1964 households. In all, nine hundred nineteen (919) containers of materials were generated, of which five hundred eight-eight (588) were disposed of by Kodak and three hundred thirty-one (331) were disposed of by Laidlaw.A detailed description of each collection day showing the number of participants and the materials generated can be found in Figure 3. The average number of participants per collection was eighty-two (82) and the cost to the County was approximately $172,000 with an average cost of $88 per household. Without Kodak's participation the cost to the County would have been an additional $80,000 with an average cost per household of $128.

The cost for operation of the facility is based on a flat fee of $2,500 per collection day which includes the cost of labor, drums, supplies, and safety equipment. The disposal of waste is on a per drum basis. The total cost of disposal for the first twenty-four collections was $109,000 for three hundred thirty-one (331) containers of waste. A flat rate of $250 per pickup is also included for the transportation of waste which occurs approximately once per month depending on the volume of materials received at collections.

Of the materials received by Kodak, three hundred thirty (330) were drums of paint cans (cans were placed directly into the drum). It is estimated that this equates to twenty-two hundred forty-five (2245) gallons of liquid paint. Two hundred thirty-four (234) driveway sealer drums were generated, each of which contained two (2) - 5 gallon pails for an estimated quantity of eleven hundred seventy (1170) gallons. In one collection,

MONROE COUNTY HOUSEHOLD HAZARDOUS WASTE FACILITY - COLLECTION SUMMARY

COLLECTION DATE	# OF PART.	KODAK				LAIDLAW												TOTAL DRUMS
		COMBUST. LIQUID Paint	COMBUST. LIQUID Coal Tar	FLAM. LIQUID Pet Dist	FLAM. LIQUID Aero-sols	CONSOL ORG. LIQ.	BULK FLAM LIQ.	CONSOL PAINTS ADHES	AERO-SOLS	CONSOL MISC. CHEM.	OXI-DIZERS	CORR. MAT'L	FLAM. LIQ. L.P.	POISON B	NON-REG. MAT'L.	ASBES-TOS	SPEC. WASTE	
09-21-91	137	15	11	1	0	1	3	4	0	4	1	5	3	10	1	1	4	64
10-05-91	80	9	4	1	0	1	2	4	0	2	1	4	0	9	0	2	1	40
10-12-91	79	11	5	0	0	0	1	2	0	2	1	1	0	4	0	0	1	28
11-02-91	81	6	9	0	1	1	1	1	1	0	0	3	0	5	0	1	1	30
11-16-91	85	10	11	0	1	1	4	2	0	0	1	0	0	6	1	1	0	38
12-07-91	80	4	1	1	0	1	1	3	0	0	1	2	0	4	0	5	0	23
12-14-91	53	5	3	0	0	0	0	1	0	0	0	0	0	1	0	0	0	10
7	595	60	44	3	2	5	12	17	1	8	5	15	3	39	2	10	7	233

COLLECTION DATE	# OF PART.	KODAK				LAIDLAW												TOTAL DRUMS
		COMBUST. LIQUID Paint	COMBUST. LIQUID Coal Tar	FLAM. LIQUID Pet Dist	FLAM. LIQUID Aero-sols	CONSOL ORG. LIQ.	BULK FLAM LIQ.	CONSOL PAINTS ADHES	AERO-SOLS	CONSOL MISC. CHEM.	OXI-DIZERS	CORR. MAT'L	FLAM. LIQ. L.P.	POISON B	NON-REG. MAT'L.	ASBES-TOS	SPEC. WASTE	
01-18-92	57	6	4	0	1	1	0	1	0	0	0	1	0	2	0	6	1	23
02-01-92	31	7	6	1	0	0	1	1	0	0	0	1	0	3	0	3	0	23
02-22-92	39	4	3	0	0	1	1	1	1	0	0	1	0	1	0	3	2	18
03-28-92	65	8	16	0	0	0	2	1	0	0	1	0	0	4	0	0	3	35
04-25-92	94	12	7	1	1	1	4	3	0	1	0	2	0	5	0	1	0	38
05-16-92	87	8	13	1	0	0	1	2	1	0	0	2	0	2	0	0	3	33
05-30-92	86	8	14	1	0	0	3	2	0	0	0	4	0	3	0	0	1	36
06-13-92	88	9	11	1	0	1	0	2	1	0	0	0	1	3	0	0	0	29
06-27-92	81	11	8	0	1	0	2	2	0	0	0	1	0	3	0	0	0	28
07-11-92	92	10	27	1	0	1	2	3	1	0	0	2	0	4	0	1	2	54
08-01-92	116	12	14	0	1	1	3	3	0	0	0	0	0	5	0	0	0	39
08-22-92	111	21	13	0	0	1	2	7	1	0	0	2	0	2	0	0	0	49
09-12-92	102	22	18	1	1	0	1	4	0	0	0	2	0	7	0	1	0	57
09-26-92	73	20	9	2	0	2	2	6	1	0	1	3	1	0	0	1	0	48
10-17-92	78	35	15	0	1	1	1	5	0	0	0	0	1	0	3	0	0	62
10-31-92	83	44	5	1	1	0	1	5	2	0	1	2	0	4	0	0	0	66
11-21-92	86	33	7	2	0	0	1	4	0	0	0	0	1	0	0	0	0	48
17	1369	270	190	12	7	10	27	52	8	1	3	23	4	48	3	16	12	686

MONROE COUNTY HOUSEHOLD HAZARDOUS WASTE FACILITY
COLLECTION SUMMARY KEY

This sheet describes in greater detail the information found on the collection summary sheet. Shipping containers and the method of packaging is described.

MATERIALS DISPOSED OF BY KODAK

Combustible Liquid (Oil-Based Paint) - 55 Gal. Fiber Drum - Cans of paint are placed directly into drum.

* (As of 8/22/92) (Oil-Based Paint) - 30 Gal. Fiber Drum - No more than five (5) Gals. of liquid paint per drum.

Combustible Liquid (Coal Tar/Driveway Sealer) - 55 Gal. or 30 Gal. Fiber Drum - Two 5 gal. pails are placed in drums.

Flammable Liquid (Petroleum Distillates) - 17E/55 Gal. Steel Drum - Bulked thinners.

Flammable Liquid (Aerosols) - 55 Gal. Fiber Drum - Cans of spray paint only are placed directly into drum.

MATERIALS DISPOSED OF BY LAIDLAW

Consolidated Organic Liquids - 17E/55 Gal Steel Drum (Ethylene Glycol, Soaps, Waxes)

Bulk Flammable Liquid (Petroleum Distillates) - 17E/55 Gal Steel Drum

Consolidated Paints/Resins/Adhesives - 17H/55 Gal Steel Drum

Aerosols - 17H/55 Gal Steel Drum

Consolidated Miscellaneous Chemicals - 5 Gal Pail - Labpacked

Oxidizers - 17H/55 Gal Steel Drum - Labpacked

Corrosive Materials - 30 Gal Poly Drum - Labpacked

Flammable Liquid - 5 Gal Pail - Labpacked

Poison B - 17H/55 Gal Steel Drum - Labpacked

Non-Regulated Materials - 17H/55 Gal Steel Drum

Asbestos - 17H/55 Gal Steel Drum

Special Waste - 5 Gal Pail - Labpacked

Figure 3

fifty-four (54) - 5 gallon pails of driveway sealer was received from ninety-two (92) participants. The large volume of driveway sealer received is attributed to the fact that it is left in garages over the winter where it freezes and separates, making it unusable. Fifteen (15) - 55 gallon drums of bulked paint-related materials and nine (9) - 55 gallon drums of aerosol spray paints were also sent to Kodak.

The largest volume of materials that are handled by Laidlaw include poisons/pesticides (87 - 55 gallon labpacked drums), consolidated paints/resins/adhesives (69 - 55 gallon drums), bulked flammable liquids (39 - 55 gallon drums), and corrosive materials (38 - 30 gallon labpacked drums).

CONCLUSION

With a year of operation completed, much has been learned of the character of household hazardous waste and the people that generate it. While a majority of the materials received are no longer useful, there is a portion that is useable. People are encouraged to find a user of their materials when scheduling an appointment, but often do not because it is felt that it is an inconvenience to them. When it shows up at the HHW facility it is either taken by one of the staff or ends up being disposed of if it is not being used for fuel blending. The County's goal for the upcoming year is to evaluate other programs and their experience with diverting materials from disposal. The County's Fleet Maintenance recently purchased an antifreeze recycler and is now taking antifreeze that is received at the HHW facility. A concern in the Northeast for the reuse of materials is the freeze/thaw cycle and its effects on the integrity of various products. Homeowners are often not aware if their material has frozen or not which makes it difficult in determining its useability.

It is interesting to see the many hazardous products that people have saved for so many years. It is not unusual for some people to have stored materials for 30 years or more. The most unusual material that was received to date has been a bottle of blue liquid labelled "Holy Water." Why the person felt it was hazardous is not known. The contractor could not find the proper method of disposal for it in any of the hazardous materials guides so the drum of consolidated organic liquids was blessed.

HOUSEHOLD BATTERIES

Terry Telzrow

There are two reasons one gets concerned about solid waste.
One: Volume
Two: Toxicity

VOLUME:

Every man, woman, and child in the U.S. uses and disposes of 8 batteries per year. The weight is 1.1 pounds and occupies a volume of 12 cubic inches. This calculates to 0.08% of MSW by weight and 0.014% of MSW by volume. Hardly a priority item in our effort to reduce MSW. But what about conservation of resources?

Why all the concern and attention to household batteries?

TOXICITY:

One can ask three questions about household batteries.

1. Is there a REAL problem?
2. Is there a PERCEIVED problem?
3. Does it make any difference?

The answers are:

1. No.
2. Yes.
3. No.

I am not here today to debate the issue--even though our track record shows we can do this very successfully. We are here to tell you how we responded to what you and our customers perceive is a problem.

The hierarchy of handling MSW concerns is SOURCE REDUCTION. It certainly is a much more efficient way of keeping an element of concern out of the MSW stream. In the case of household batteries, the elements of concern have been MERCURY and CADMIUM. Mercury is in the Alkaline batteries in small quantities. It has been removed from Carbon Zinc batteries. Mercury is the electrode in the Mercuric Oxide battery and can account for some 35% of the battery weight. These batteries are generally used as button cells for hearing aids, and in a lesser quantity, for some medical devices that require their unique properties.

Let's address the more common batteries first, i.e., the D, C, AA, AAA, and 9-Volt batteries. These are manufactured in three common systems:

1. Carbon Zinc - Least expensive, best value for frequently used flashlight.
2. Super Heavy Duty - Best value for table top radios and other intermediate drain/use appliances.
3. Alkaline - Best for heavy drain appliances and continuous drain applications.

Mercury was added to all three systems as a surface coating of the zinc electrode to prevent gassing. The zinc in the Carbon Zinc and Super Heavy Duty batteries is in strip form, while the zinc in the Alkaline battery is in powdered form. The powder form has 100+ times the surface area; therefore, more mercury is required in the Alkaline cell. Traditionally, the percentage of mercury by weight in all three systems was as follows:

	WAS	IS NOW
1. Carbon Zinc:	0.01% approx.	0.00%
2. Super Heavy Duty:	0.01% approx.	0.00%
3. Alkaline:	0.8% approx.	< 0.025%

In 1980, technology efforts started to develop batteries that used less mercury. This was even before the Europeans began to focus on household batteries as a potential mercury source.

Mercury reductions began to be implemented in 1984 and are continuing today as we speak. The industry in total has reduced the amount of mercury usage by more than 86% during the last 5 years and equally dramatic reductions are occurring daily. EVEREADY announced in April, 1990, the introduction into the U.S. of its Ultra Low Mercury Alkaline battery with 0.025% max of mercury by weight. This represents a 97% mercury reduction in this product. Mercury reduction is now a competitive issue in the market place.

What about the Carbon Zinc and Super Heavy Duty batteries? I am happy to tell you that "0" mercury-added batteries are currently being marketed in the U.S.A., Europe, and Asia. The technology for all zero-added mercury batteries is close and getting closer as we speak. Zero ("0") mercury Alkaline batteries are also in our future. The industry is committed to meeting this objective.

Mercuric Oxide batteries are being replaced by the new technology--much lower mercury--Zinc-Air batteries. Hearing aids and special medical devices are no longer being developed around the mercuric oxide system; however, the system will be around for a while to power some of those devices requiring its unique properties. The Mecuric-Oxide batteries can be targeted for recollection and mercury recovery, and the industry is ready to work with municipalities to accomplish this.

Let us address the cadmium issue now. The batteries that contain cadmium are the Nickel Cadmium Rechargeable batteries--the ones that power your Dustbuster and other portable power tools.

Once again, alternative technologies are being developed. The most likely candidate for success is the cadmium-free Nickel-Nickel Hydride system currently under development by many manufacturers in the U.S. and abroad. It appears unlikely, at this point in time, that it will totally replace the Ni Cd system, especially in the very "high rate" demand portable tools. The tool industry is currently redesigning its tools to make the built-in Ni Cd battery "easily" removable by the consumer to facilitate its recollection. These batteries, if collected as a homogeneous mixture of Ni Cd batteries, can be processed to reclaim the nickel and the cadmium by several off-shore facilities. The economics are such that this can usually be accomplished at no cost to the municipality.

WHAT ABOUT RECYCLING?

What about recycling for all common household batteries just to recover resources?

There are no recycling facilities for primary batteries currently operating anywhere in the world. The closest process to being operable is the Recymet plant in Acelens, Switzerland. It is now expected to be operational by January, 1992.

The projected cost to process one metric ton of batteries F.O.B. Acelens is 3630 Sfr. per ton or $2550. The energy required to get 1 kgm of zinc from this process is 3 to 6 times the energy required to get 1 kgm of zinc from current ore bodies.

We need to evaluate the wisdom of expending those quantities of energy to recover a resource that is so plentiful in our world. We need also to evaluate the possible environmental impact of these recycling technologies.

The battery industry is monitoring this closely and is supporting this effort.

Is battery recycling in our future? The answer is ?

TCLP TEST RESULTS

NOVEMBER, 1991
OUTSIDE INDEPENDENT LABORATORY
WADSWORTH LABORATORIES - CANTON, OHIO

D006 - CADMIUM (Cd)

EPA MAXIMUM 1.0 mg/l

COMPOSITE (n=6) EVEREADY ALKALINE "ENERGIZER"	$\bar{x}$	<0.10
	UCI	<0.10
COMPOSITE (n=9) EVEREADY "SUPER HEAVY DUTY"	$\bar{x}$	<0.36
	UCI	<0.55
EVEREADY "CLASSIC" GENERAL PURPOSE "AA" (n=3)	$\bar{x}$	<0.17
	UCI	<0.29

TCLP-Toxic Characteristic Leaching Procedure(40CFR-261)SW846
$\bar{x}$ - Average UCI - Upper Confidence Interval

D008 - LEAD (Pb)

EPA MAXIMUM 5.0 mg/l

COMPOSITE (n=6) EVEREADY ALKALINE "ENERGIZER"	$\bar{x}$	<0.13
	UCI	<0.16
COMPOSITE (n=9) EVEREADY "SUPER HEAVY DUTY"	$\bar{x}$	<0.10
	UCI	<0.10
EVEREADY "CLASSIC" GENERAL PURPOSE "AA" (n=3)	$\bar{x}$	<0.10
	UCI	<0.10

TCLP-Toxic Characteristic Leaching Procedure(40CFR-261)SW846
$\bar{x}$ - Average UCI - Upper Confidence Interval

D009 - MERCURY (Hg)

EPA MAXIMUM 0.2 mg/l

COMPOSITE (n=6) EVEREADY ALKALINE "ENERGIZER"	$\bar{x}$	<0.03
	UCI	<0.04
COMPOSITE (n=9) EVEREADY "SUPER HEAVY DUTY"	$\bar{x}$	<0.02
	UCI	<0.02
EVEREADY "CLASSIC" GENERAL PURPOSE "AA" (n=3)	$\bar{x}$	<0.02
	UCI	<0.03

TCLP-Toxic Characteristic Leaching Procedure(40CFR-261)SW846
$\bar{x}$ - Average UCI - Upper Confidence Interval

RECYCLING TECHNOLOGIES TO PROCESS MIXED BATTERIES

WHAT ARE THE PROCESSES?

COMPANY	PROCESS
1. NUOVA SAMIM (ITALY)	1. THERMAL - PYROLYSIS AT 600-700°C BY-PRODUCT GASES ARE BURNED AT 1100 C. BATTERIES ARE CONVERTED TO FEEDSTOCK FOR EXISTING METAL RECOVERY PLANTS.
2. RECYTEC(SWITZERLAND/ GERMANY)	2. THERMAL/PLATING - PYROLYSIS AT 450-650°C FOLLOWED BY ELECTROLYSIS
3. SUMITOMO(SWITZERLAND)	3. THERMAL - NO NICd OR Pb/ACID BATTERIES, SHAFT AND MELTING FURNACE >500°C. ZINC RECOVERED BY CARBOTHERMIC REDUCTION
4. TNO (NETHERLANDS)	4. HYDROMETALLURGICAL - LEACHATE FOLLOWED BY ELECTROLYSIS OR PRECIPITATION
5. VOEST-ALPINE(AUSTRIA)	5. THERMAL - ZINC PROBABLY RECOVERED BY CARBOTHERMIC REDUCTION IN PRESENCE OF Fe

RECYCLING TECHNOLOGIES TO PROCESS MIXED BATTERIES

PLANT STATUS

COMPANY	STATUS
1. NUOVA SAMIM (ITALY)	1. DESIGN/PURCHASE, START-UP SCHEDULED FOR MID-1992
2. RECYTEC (SWITZERLAND)	2. START-UP IN 4Q'91
3. RECYTEC (BERLIN)	3. AGREEMENT
4. SUMITOMO (SWITZERLAND)	4. BROKEN GROUND, START-UP SCHEDULED FOR LATE 1992
5. TNO (NETHERLANDS)	5. "PILOT PLANT" FOR NICd AND PRIMARY CELLS
6. VOEST-ALPINE (AUSTRIA)	6. LAB TRIALS ONLY

RECYCLING TECHNOLOGIES TO PROCESS MIXED BATTERIES

WHO ARE THEY?

COMPANY	LOCATION
1. NUOVA SAMIM	1. ITALY
2. RECYTEC	2. SWITZERLAND GERMANY (BERLIN)
3. SUMITOMO	3. SWITZERLAND
4. TNO	4. NETHERLANDS
5. VOEST-ALPINE	5. AUSTRIA

RECYCLING TECHNOLOGIES TO PROCESS MIXED BATTERIES

WHAT ARE THE COSTS?

COMPANY	CAPITAL IN MM US $*	REPORTED FEE IN US $/KG UDB
1. NUOVA SAMIM	18 - 20	0.85
2. RECYTEC	16	2.53
3. SUMITOMO	12 - 14	2.82

*Not Including Land

RECYCLING TECHNOLOGIES TO PROCESS MIXED BATTERIES

590

WHAT ARE THE MARKETABLE MATERIALS?

MATERIALS

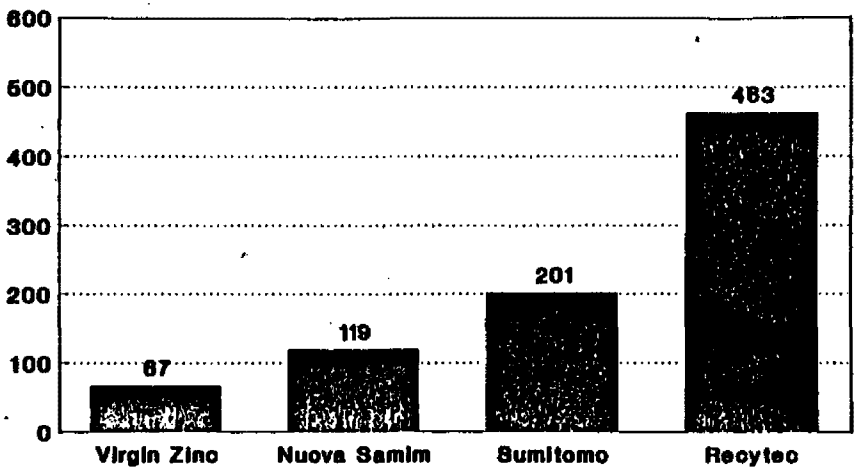
1. Mn(or MnO2) MANGANESE OR MANGANESE DIOXIDE - LOW GRADE
2. Fe IRON - FERRO METAL
3. Hg MERCURY - FOR DISTILLATION
4. Zn ZINC - LOW GRADE
5. Ag SILVER - ACCEPTABLE QUALITY
6. Ni NICKEL - ACCEPTABLE QUALITY
7. Cd CADMIUM - ACCEPTABLE QUALITY
8. Li LITHIUM - ??

CONVERSION OF UNITED STATES PRODUCTION OF ALKALINE MANGANESE BATTERIES TO 0.025% MAXIMUM MERCURY

SIZE	EVEREADY	DURACELL	RAYOVAC	PANASONIC/KODAK
D	12'89	8'90	7'90	1'91
C	12'89	8'90	7'90	12'90
AA	12'89	6'91	7'90	3'91
AAA	11'89	6'91	7'90	4'91
9V	8'89	5'91	7'90	2'91

BATTERY RECYCLING

Energy Requirements MJ/Kg Zn (Same Quality of Zinc)



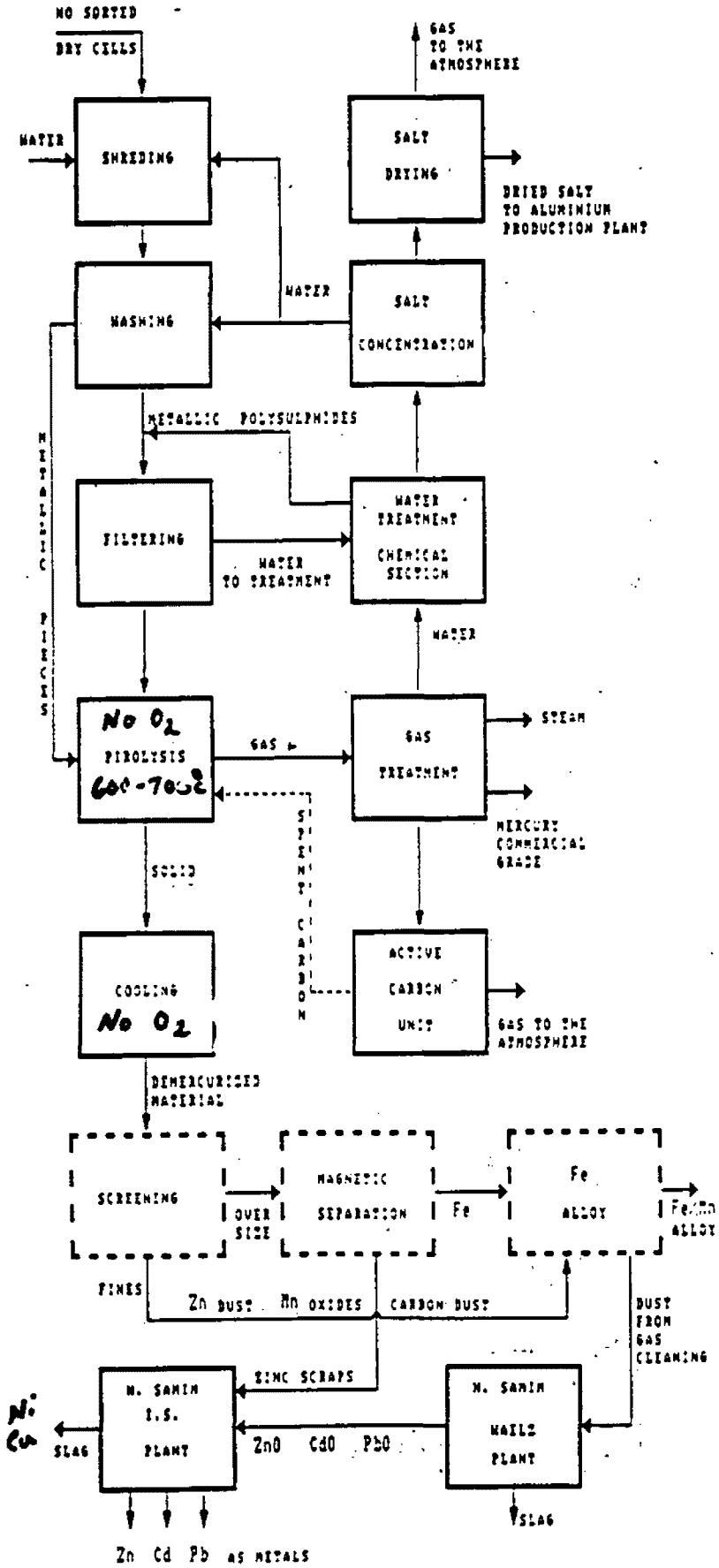
RECYCLING TECHNOLOGIES TO PROCESS MIXED BATTERIES

WHAT IS THE ENVIRONMENTAL IMPACT?

COMPANY	IMPACT
1. NUOVA SAMIM	1. CADMIUM IN SLAG
2. RECYTEC	2. PLATING SLUDGE
3. SUMITOMO	3. 5% GLASSY SLAG IS LANDFILLED DIOXINS
4. TNO	4. CHEMICAL PROCESS W/ATTENDANT CONCERNS
5. VOEST-ALPINE	5. LAB TRIALS - ??
6. GENERAL	6. BATTERY STOCKPILING

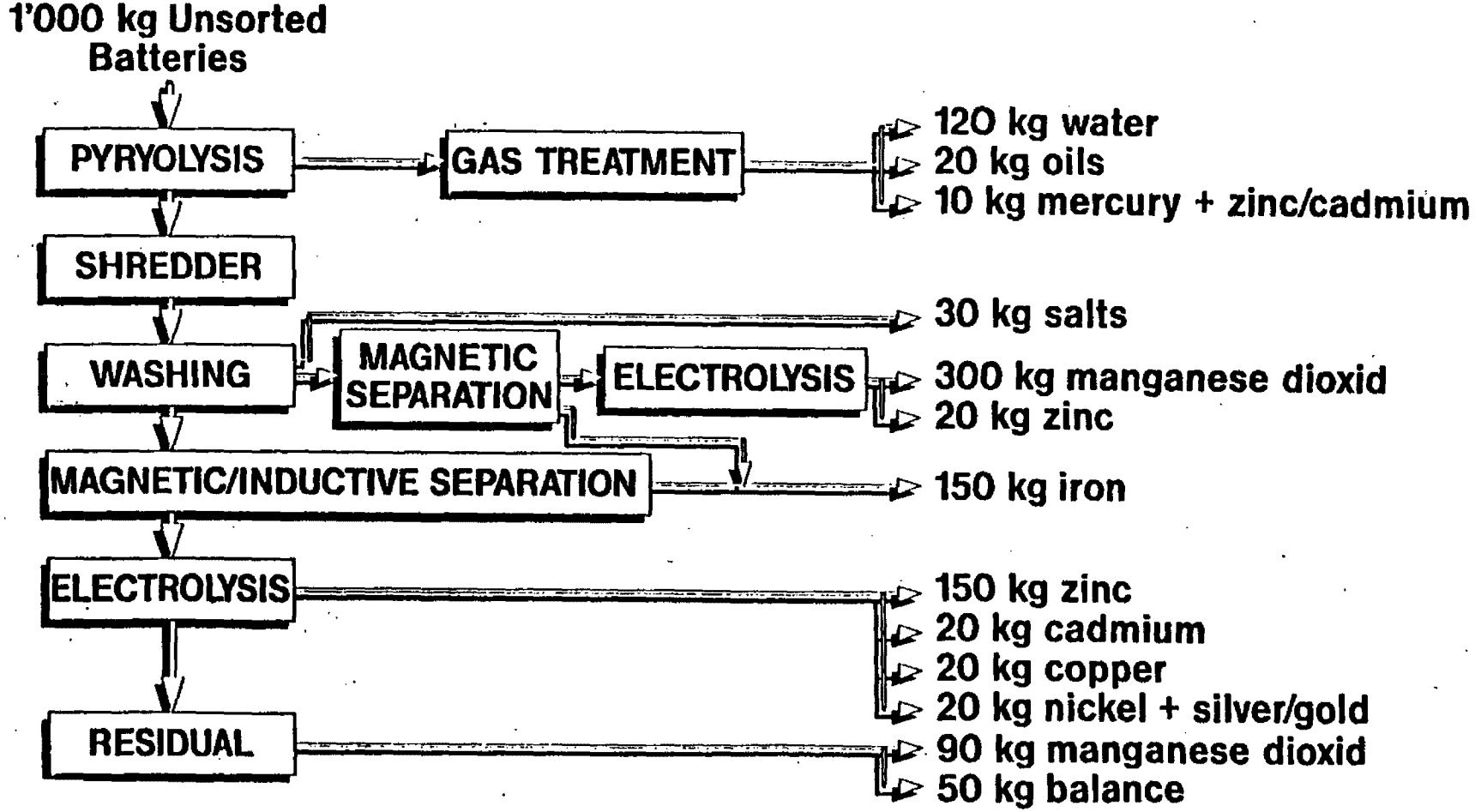
SPENT DRY CELLS OVERALL TREATMENT

PROCESS FLOW CHART



NUOVA SAMIM
E.N.I. group
ROME - ITALY

MATERIAL BALANCE AND FLOWSHEET DIAGRAM FOR THE RECYTEC BATTERY RECYCLING PROCESS



BASED ON STATISTICAL ANALYSIS OF SWISS MARKET
70% Zn-carbon/30% alkaline MnO_2

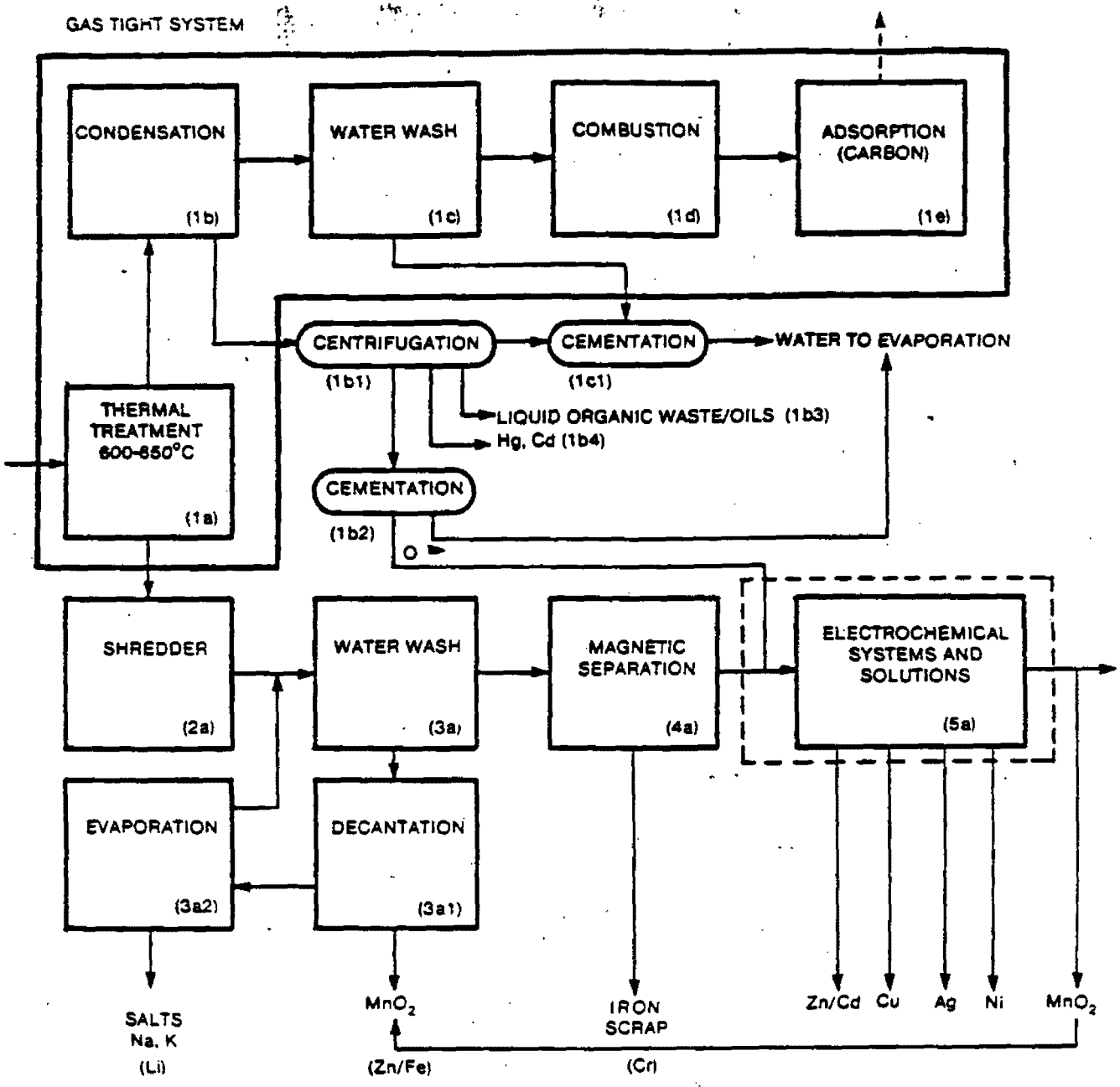
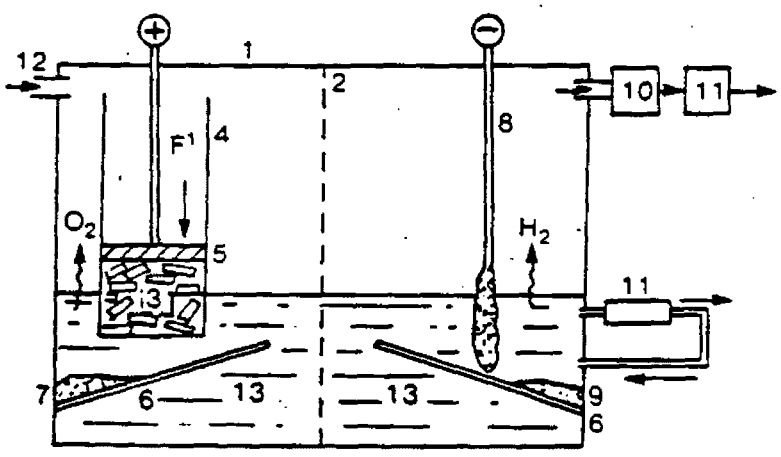


Fig. 10 The Recytec Process Flowsheet



1. SEALED ELECTROLYSIS CELL
2. PARTITION
3. BATTERIES
4. ANODE UNIT
5. ANODE PLATE
6. SLUDGE COLLECTOR
7. ANODE SLUDGE
8. CATHODE
9. CATHODE SLUDGE
10. EXTRACTOR FAN
11. FILTER
12. FRESH AIR
13. ELECTROLYTE

22250

Fig. 9 Recytec Process, Electrolysis Cell

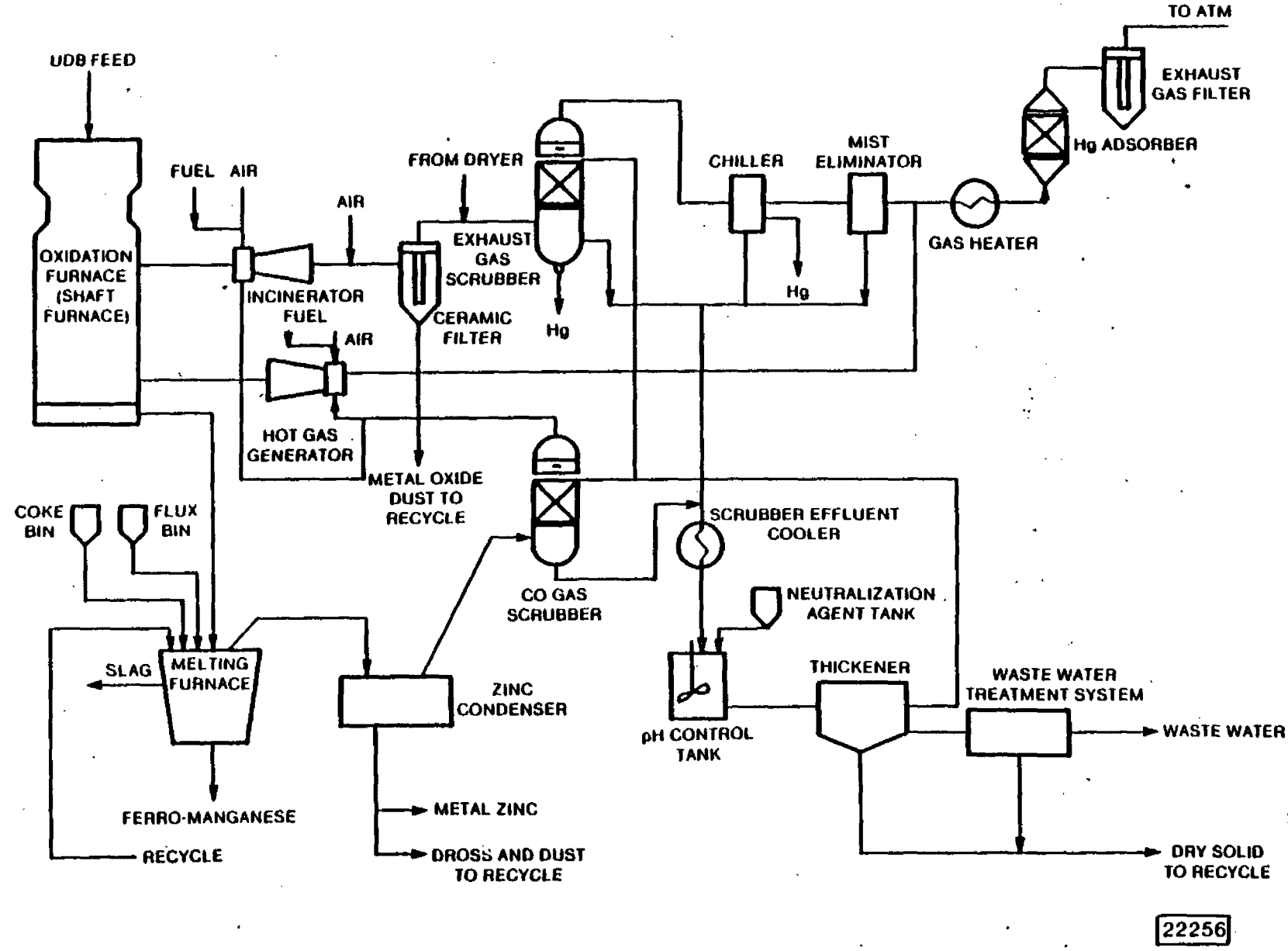


Fig. 8 Schematic Diagram of the Sumitomo Battery Recycling Plant

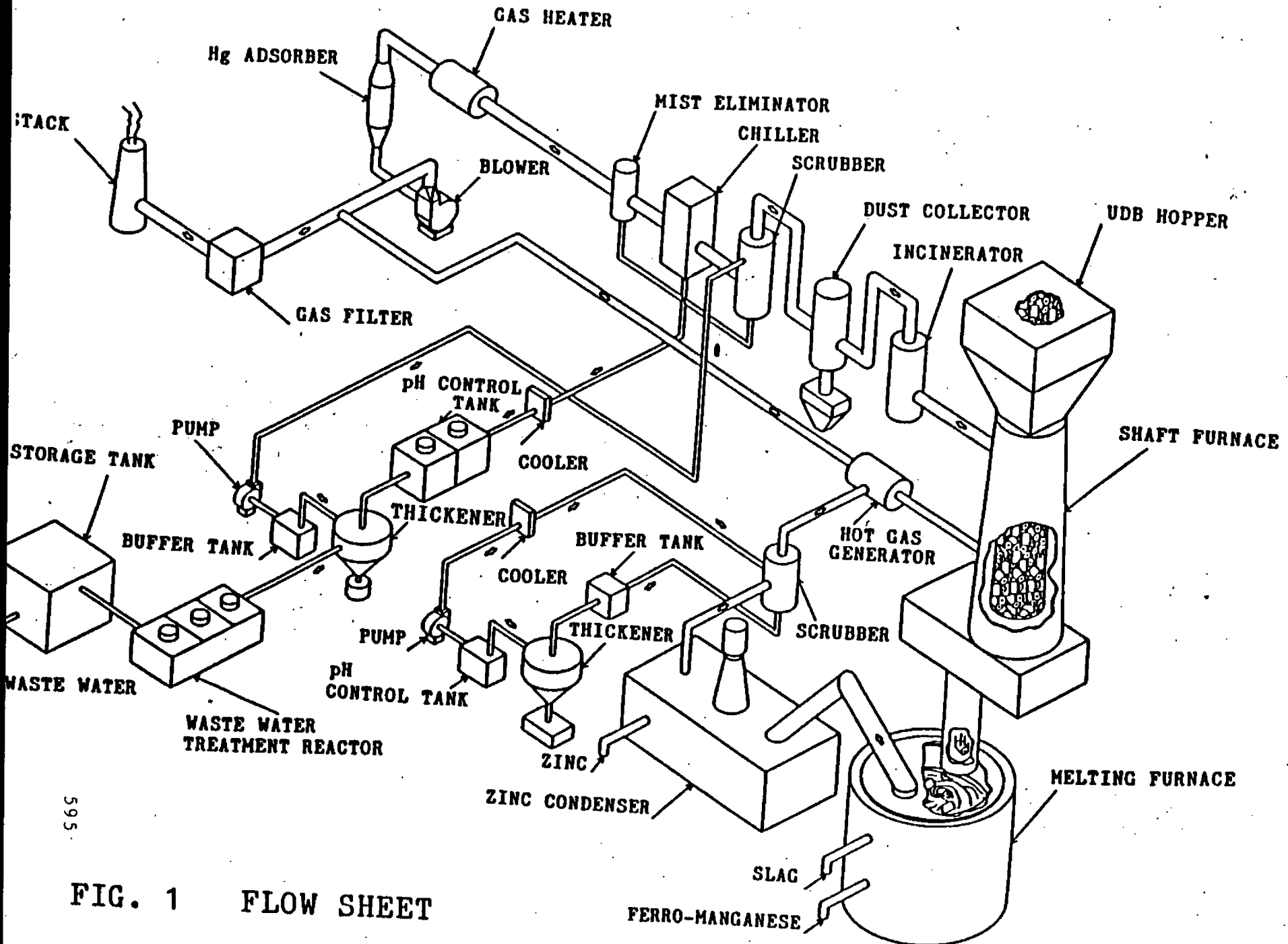


FIG. 1 FLOW SHEET

SUMITOMO HEAVY INDUSTRIES, LTD.

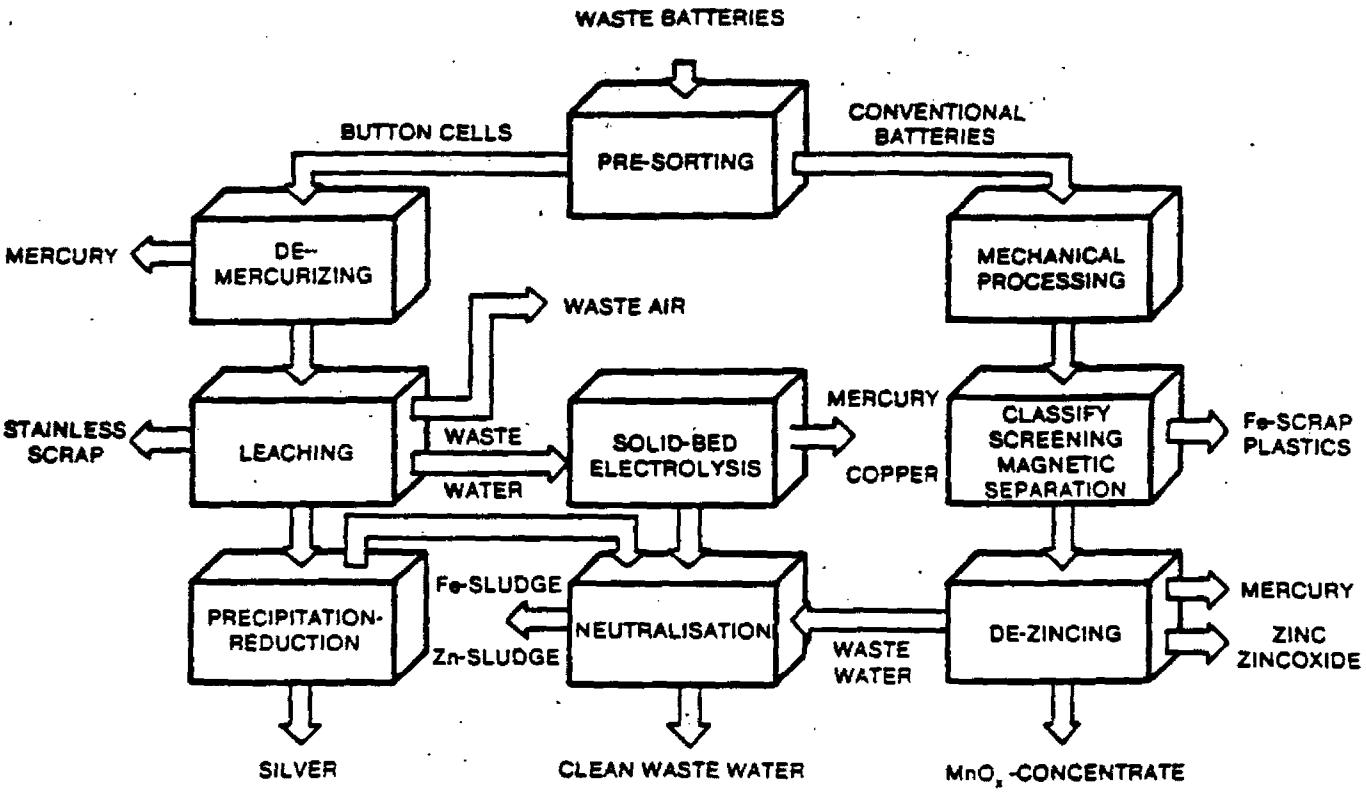


Fig. 11 Voest-Alpine Battery Recycling Flowsheet

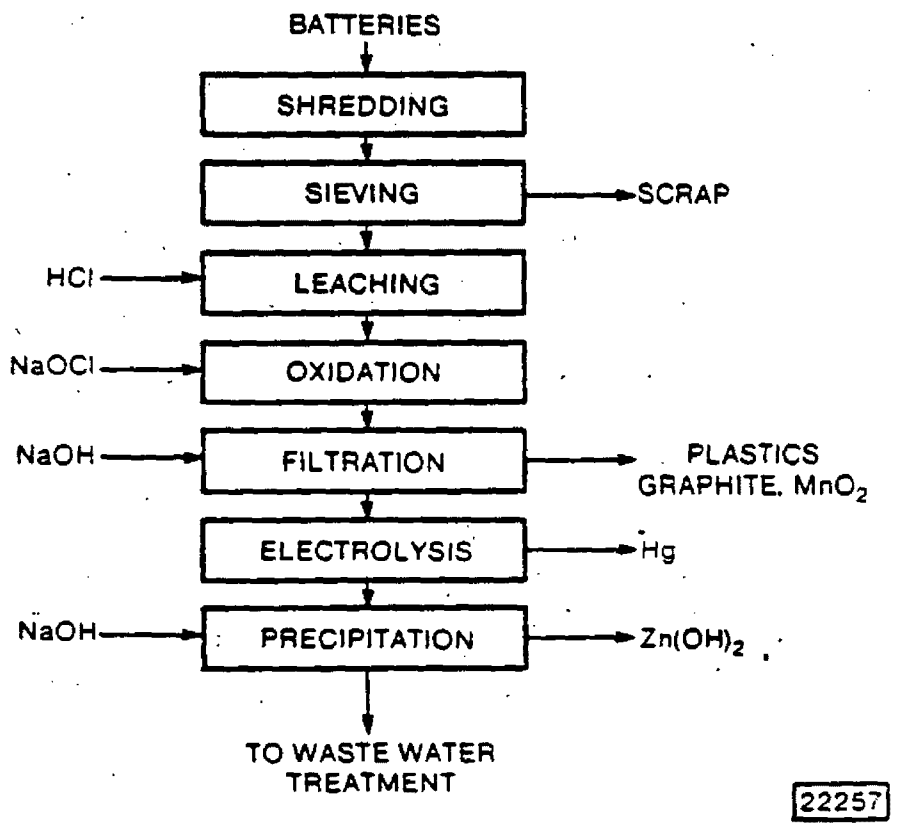


Fig. 12 TNO Battery Recycling Process. Alkaline-Manganese/Zinc-Carbon

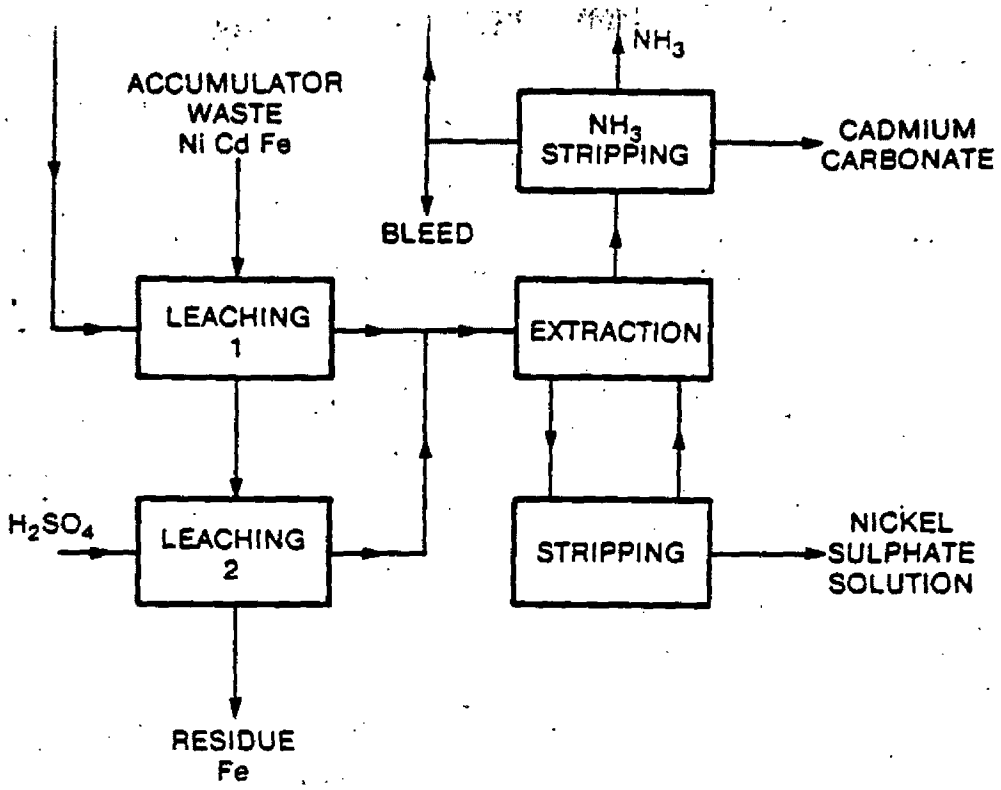


Fig. 16 The AmMAR Process

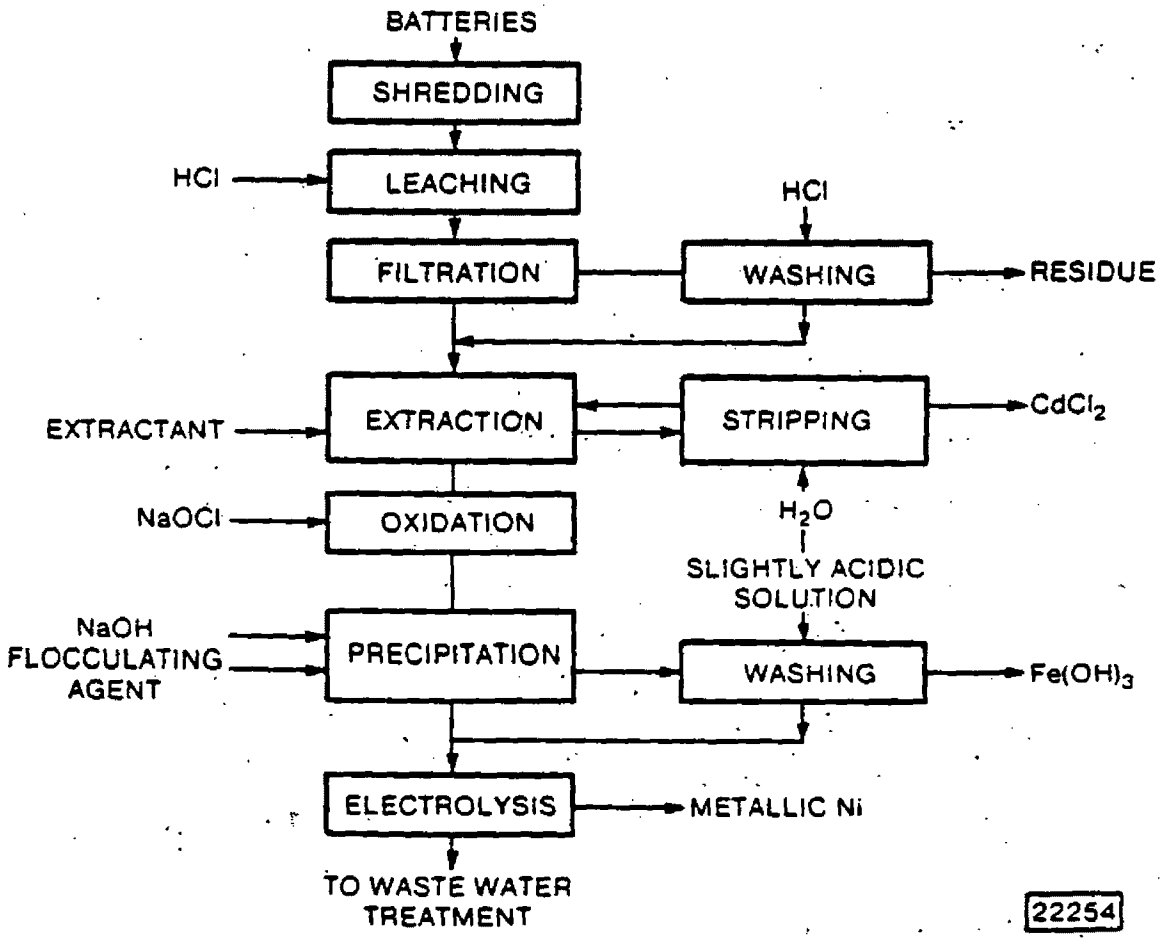


Fig. 17 The TNO Process

Removing Solvents from Latex Paint

David Maurer

Introducing . . . Glidden

SPRED® 2000

THE CLEAN AIR CHOICE™

Agenda

- Paint Industry Overview
- Paint & The Environment
- No VOC Innovation
- SPRED 2000 & LIFEMASTER 2000 Introduction

Summary

- SPRED 2000 is a Breakthrough in Environmental Technology:
  - SPRED 2000 eliminates petroleum solvents that emit harmful VOC vapors, which cause ozone/smog
  - SPRED 2000 delivers the same quality performance as all other Glidden SPRED Paints
- SPRED 2000 is a fundamental first step for how all latex paints will be formulated

Significant Progress Has Been Made In Decreasing The Impact Of Paints On The Environment:

- Elimination of lead, chromium and mercury from all consumer paints
- Introduction of latex paints, that have up to 90% less petroleum-based solvents than conventional oil-based paints
- Improved manufacturing processes to decrease air and waste pollution

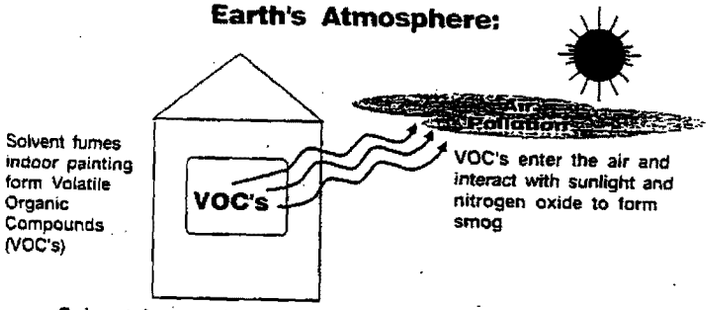
Glidden Has Been A Paint Industry Leader In Environmental Commitment And Innovation:

- Inventor of Latex Paint in 1948
- Leader in VOC-Free Powder Coatings
- Leader in Water-Borne Can Coating Technology
- Improved Manufacturing to Decrease Environmental Impact

Petroleum-Based Solvents And Volatile Organic Compounds (VOC's) Are A Key Environmental Issue:

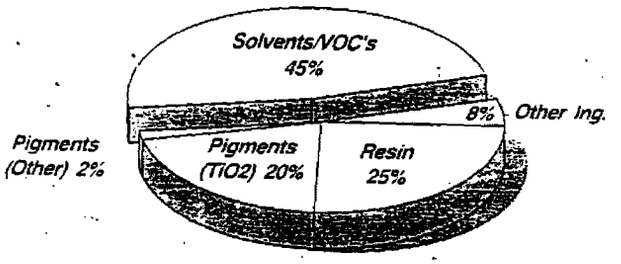
VOC's	According to the EPA - "Since 1970, reducing VOC emissions has been the backbone of our national ozone control strategy"
Paints	It is estimated that decorative, architectural and industrial coatings produce 9% of the VOC's emitted into the atmosphere by manmade sources
Ozone	Ground Level Ozone is produced when VOC's and Nitrogen Oxides react in the presence of sunlight
"Smog"	Ground Level Ozone is often a major component of "smog" and therefore VOC's can be a major contributor to Air Pollution

Solvents Are Especially Harmful To The Earth's Atmosphere:

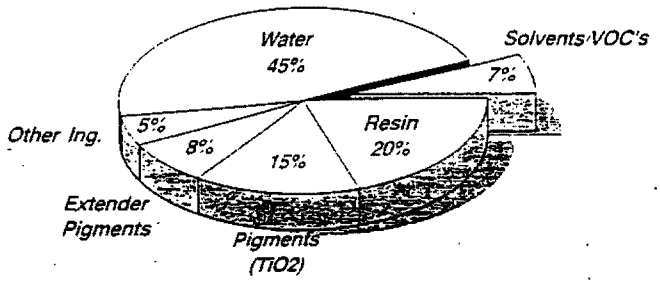


Solvent fumes also can contribute to indoor air pollution in the form of respiratory irritation during painting

Industrial Maintenance Coatings Contain The Largest Amount Of Solvents And VOC's



Latex Coatings Replace The Majority Of Solvents And VOC's With Water



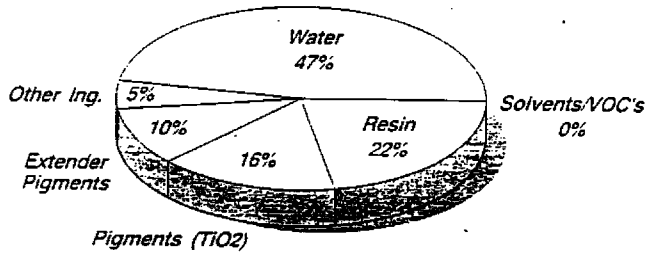
The Solvent And VOC Content Of Paints Have Been Steadily Dropping Over The Last Few Decades:

- Latex paints now account for 75% of all architectural coatings and 90% of flat sheen coatings
- New high tech raw materials and formulation techniques

In 1992, Glidden Has Developed The First Paint Formula That Completely Eliminates The Need For Petroleum-Based Solvents

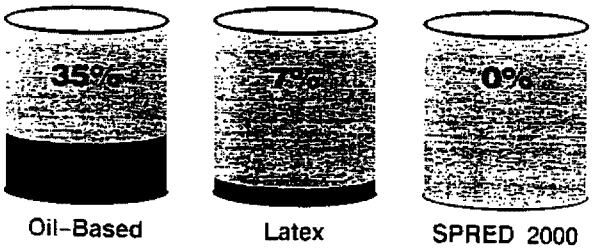
SPRED 2000

Glidden Has Developed A Revolutionary Latex Coating That, Through Special Resins, Eliminates The Need For Solvents And VOC's

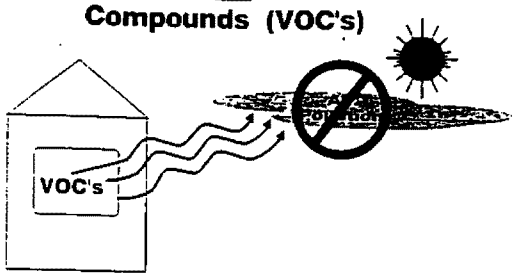


This New Formula Is The Basis For SPRED 2000 & LIFEMASTER 2000, Which Are The First Solvent-Free Interior Latex Paints In The U.S.:

% Solvents in Typical Paints



SPRED 2000 Has No Volatile Organic Compounds (VOC's)



SPRED 2000 Also Has Virtually No Odor And Fewer Offensive Fumes Than Regular Latex Paints

In Addition To Elimination Of Solvents And VOC's, SPRED 2000 Has Many Additional Benefits:

- Comparable performance and quality to Glidden SPRED paints
- Drys more quickly than regular latex paints, adding convenience to the painting process
- Potential for safer disposal without causing air or water pollution

SPRED 2000 Is Available In Only A Limited "Off-White" Color Range Because Tinting Would Add Solvents And VOC's Into The Paint

Summary

- Results to date have been encouraging:
  - Wide acceptance by the retail trade and business-to-business customers
- Glidden will continue to extend its leadership position in environmental innovation:
  - Support these innovative products
  - Develop VOC-free formulas for the rest of its product lines

Developing a Safer Paint Stripper

Nancy Walsh

Conference Presentation
Nancy E. Walsh
Do-It-Yourself Division
3M Company

"Developing a Safer Paint Stripper"

Safest Stripper™ Paint and Varnish Remover

How to develop a
successful,
safer,
environmentally better
paint remover

Product Responsibility at 3M

To address society's, our customers' and our own expectations for a healthy environment and for products that can be manufactured, distributed, used and disposed of safely

3M Do-It-Yourself Division

A market driven supplier of innovative products that will address consumer needs in repairing, maintaining, and enhancing of their household, automotive and personal possessions

Starting Point:

Consumer dissatisfaction with existing stripping methods

Existing Methods

- Chemical
  - Methylene chloride
  - Toluene
  - Methyl ethyl ketone
  - Caustics
- Mechanical
  - Abrasives
  - Sandblasting
  - Planing
- Heat
  - Hot air
  - Flame

The General Challenge:

How to develop a product
aggressive enough to remove coatings
but
safe enough for humans and the environment

Specific Development Challenges

The screening process-
Finding the
balance
between
performance
and
safety

- The use of water
  - Reducing solvent, increasing safety
  - Reducing cost
- The need for thickeners
  - For solvent emulsification
  - For vertical cling

The Art of Invention

Adding water **improved** performance

Result -

A safer stripping product...

THAT WORKED!!

Specific Marketing Challenges

How to communicate and educate about a revolutionary product:

- What the product **is**
- How the product **works**
- That the **balance** was achieved

What the product **is**

- Safer...
- Environmentally better...

How the product **works**

- Set time
- Tools

That the **balance** was achieved

- Safer, yet works
- Works, yet safer

Future Challenges/Opportunities

Safest Stripper™ Paint and Varnish Remover as a

TECHNOLOGY SPRINGBOARD

What other consumer needs can be addressed by emulsion technology?

Appendix I

Final Agenda

U.S. ENVIRONMENTAL PROTECTION AGENCY

HOUSEHOLD HAZARDOUS WASTE MANAGEMENT CONFERENCE

DECEMBER 8-12, 1992 MINNEAPOLIS, MINNESOTA

AGENDA

TUESDAY, DECEMBER 8, 1992

Minnesota HHW Issues Session

Excelsior Bay, 8th floor

10:00 am **General Session:** Challenges Facing HHW Managers
Problem Materials in Minnesota

10:30 am **Panel: HHW and problem materials at solid waste facilities**

11:30 am **Lunch (on your own)**

1:00 pm **Concurrent Sessions I**

- **Management of HHW and problem materials**

  HW regulations; managing VSQG waste; managing HHW; OWM grants

- **Reducing Problem Materials**

  Product exchange; marketing alternative products; home environmental audits

- **Facility Design**

  Building and fire codes

- **Problem Materials Management**

  Overview of battery programs; fluorescent lamps; mercury-containing wastes

2:30 pm **Break**

2:45 pm **Concurrent Sessions II**

- **HHW Education Programs**

  Longterm education; educating across county lines; working with schools

- **Minnesota HHW Programs**

  Extended collection days; permanent and temporary sites; regional mobile facilities

- **Problem Materials Management**

  Automotive wastes; paint and lead-abatement wastes; hazardous components of major appliances

4:15 pm **Close**

U.S. EPA Household Hazardous Waste Management Conference

5:30 - 7:30 pm **Registration** *Coatroom, 4th floor*

5:30 - 7:30 pm **Reception and Cash Bar** *Fifth Seasons I and II, 6th floor*

WEDNESDAY, DECEMBER 9, 1992

7:00 am - 5:00 pm **Registration** *Coatroom, 4th floor*

8:30 - 10:00 am **Opening Plenary Session** *Ballrooms III and IV, 4th floor*

Moderator: Dana Duxbury, The Waste Watch Center
Greetings from the State — Tim Scherkenbach, MPCA
Greetings from the County — John Derus, Chairman, Hennepin County Board of Commissioners, MN
Keynote: HHW and Municipal Solid Waste — Terry Grogan, U.S. EPA, DC
Design for the Environment — Walter Stahel, The Product Life Institute, Switzerland
Implications of Mercury in MSW Incinerator Emissions — Mike Winka, NJ DEP & Energy, NJ

10:00 - 10:30 am **Break**

10:30 - 12:00 noon **Opening Plenary Session *continued...***

New Initiatives in Science Education — Herbert Thier, CEPUP-University of California, CA
An Overview of CESQG Issues — David Galvin, Seattle Metro, WA
Source Reduction Priorities — Philip Dickey, Washington Toxics Coalition, WA

12:00 - 1:45 pm **Lunch** (By Prior Registration) *Ballrooms I and II, 4th floor*

Luncheon Speaker: Legislative Initiatives to Reduce the Toxicity of Municipal Solid Waste
— Representative Jean Wagenius, MN

CONCURRENT WORKSHOPS 1 A-D 2:00 - 3:30 pm

Workshop 1-A - How To's *Elk, 4th floor*

Moderator: Janelle Henderson
Why Establish an HHW Program — David Galvin, Seattle Metro, WA
Getting Organized — Suzanna Rumon, Laidlaw Environmental NE, MA
Collection & Program Options — Walter Haas, MPCA, MN
Home Storage Survey — Michael Bender, Central Vermont Regional Planning Commission, VT
EPA Indoor Air Program — Jim Darr, OPPT, U.S. EPA

Workshop 1-B - Paint I *Wayzata Bay Suite, 8th floor*

Moderator: Barbara Hotchkiss
Paint Re-use and Recycling Collection Options — Carolyn Dann, WWC, MA
Sorting & Testing — George Kinney, Dakota County, MN
Reprocessing Paint — A New Method — Scott Herbert, The Green Paint Company, MA

Workshop 1-C - Household Batteries I *Ballroom, 4th floor*

Moderator: Jan Kleman
NiCad Collection and Recycling — Norm England, Portable/Rechargeable Battery Association, GA
Primary Battery Reformulation, Collection and Recycling — Terry Telzrow, Eveready Battery Company, OH
A California Study — Fernando Berton, California Integrated Waste Management Board, CA
Hennepin County's Collection Program — Cheryl Lofrano-Zaske, Hennepin County, MN

Workshop 1-D - Other Problem Wastes *Lafayette Bay, 8th floor*

Moderator: Jennifer Holliday
Medical Wastes: San Francisco Safe Needle Disposal Program — Brad Drda, Sanitary Fill Co., CA
White Goods — Catherine Wilt, University of Tennessee, TN
Refrigerant Recovery — Paul Smith, Sanitary Fill Co., CA
Aerosol Contents Study — Greg Crawford, Steel Can Recycling Institute, PA

Display Room For HHW Materials *Pine/Cedar Lake, 4th floor*

3:30 - 4:00 pm **Break**

CONCURRENT WORKSHOPS 2 A-E 4:00 - 5:30 pm

Workshop 2-A - How To's *Elk, 4th floor*
Moderator: Shirli Axelrod
Liability — John Fogarty, U.S. EPA, DC
RCRA & HHW — Charlotte Mooney, OSW, U.S. EPA, DC
Roundtable Discussion

Workshop 2-B - Paint II Market Issues *Wayzata Bay Suite, 8th floor*
Moderator: Michael Frishman
Marketing Recycled Paint — Anne Thorson, Washington County Public Health, MN
A Paint Re-use and Recycling Consensus — Tracy Bone, OSW, U.S. EPA, WA
GSA's Procurement Process — Carolyn Dann, WWC, MA
Latex Paint Waste Treatment/Recycling by Pyrolysis — Phil Farina, Environmental Purification Industries, OH

Workshop 2-C - Household Batteries II: Recycling in the U.S. *Spring Park, 8th floor*
Moderator: Leslie Goldsmith
INMETCO's Nickel-Cadmium Recycling System — John Patterson, INMETCO, PA
Mercury Refining — Alan Wilds, Mercury Refining, NY
A New U.S. Battery Recycling Facility — Bill Meador, R&R Resource Recovery, TX

Workshop 2-D - Fluorescent Lamps *Lafayette Bay, 8th floor*
Moderator: Judy Orttung
Fluorescent Lamp Recycling in the U.S. — Dana Duxbury, WWC, MA
Lamp Maker Initiatives — Beverly Grimm, GE Lighting, OH
New Developments in Europe — Christer Sundberg, MRT System AB, Sweden

Workshop 2-E - Collection Case Studies I *Deer, 4th floor*
Moderator: Martha Beck
Programs in Florida — Jan Kleman, DER, FL
The EPA Region 8 Program — Brian Rimar, Region 8 U.S. EPA, CO
The Delaware Pilots — Julie Wilke, Delaware Solid Waste Authority, DE
Texas One-Days — Ingrid Dierlam, Texas Water Commission, TX

Display Room For HHW Materials *Pine\Cedar Lake, 4th floor*

5:30 - 7:00 pm **Reception and Cash Bar** *Foyer, 4th floor*

OPTIONAL Evening Activity: Minnesota's new Mall of America (express bus: $1.60 / 1.35-off peak, each way; bus schedule and maps available at registration desk).

THURSDAY, DECEMBER 10, 1992

8:00 am - 5:00 pm **Registration** *Coatroom, 4th floor*
7:15 pm - 8:15 am **Networking Breakfast: Minnesota Metropolitan Council Paint Grant Study**
— A light breakfast will be served. Register at Conference. *Spring Bay, 8th floor*

CONCURRENT WORKSHOPS 3 A-E 8:30 - 10:00 am

Workshop 3-A - How To's *Elk, 4th floor*
Moderator: Michael Bender
Developing an RFP — LeeAnn Merashoff, Laidlaw Environmental Services (NE), MA
Site Selection — A.J. Novak, Chemical Waste Management, IL
Permitting and Plan Approval — Sharon Rehder, NY DEC, NY
Negotiating a Contract — Liz McCormick, Laidlaw Environmental Services, SC

Workshop 3-B - Pesticide Use, Collection and Reduction *Deer, 4th floor*
Moderator: Marie Steinwachs
Overview of Farm Pesticide Collection Programs — Chuck Cubbage, Department of Agriculture, MI
National Home & Garden Pesticide Use Survey — Tracy Bone, U.S. EPA, DC
Minnesota's Farm Pesticide Program's — Larry Palmer, Department of Agriculture, MN

Workshop 3-C - Education I — Schools: Implementation and Evaluation *Ballroom, 4th floor*
Moderator: Michael Frishman
Environmental Education in the Schools: Minnesota's Experience — Shirley Dougherty, Department of Education, MN
Integrating HHW into an Environmental Curriculum — Sarah Dewey, HHWP, MO
Evaluating Effectiveness — Shirley Niemeyer, University of Nebraska-Lincoln, NB

Workshop 3-D - Used Oil & Filters *Lafayette Bay, 8th floor*
Moderator: Margit Hentschel-Duxbury
EPA's Management Standards — Charlotte Mooney, OSW, U.S. EPA, DC
Washington State's Program — Bill Green, Department of Ecology, WA
API's Program — Craig Campbell, API, DC

Workshop 3-E - Waste Management I: Waste Types and Management *Wayzata Bay Suite, 8th floor*
Moderator: Fernando Berton
Waste Types and Quantities — George Kinney, Dakota County, MN
Which HHW Is Reusable / Recyclable? — Brian Johnson, Santa Monica, CA
Identifying HHW — Deanna Seaman, Norcal, CA
Recycling Antifreeze — Rick Bowen, First Brands Corp., CT

Display Room For HHW Materials *Pine/Cedar Lake, 4th floor*
10:00 - 10:30 am Break

CONCURRENT WORKSHOPS 4 A-E 10:30 - 12:00 noon

Workshop 4-A - How To's *Elk, 4th floor*
Moderator: Bill Green
Load Checking — Kathy Kendall, Des Moines Metro Solid Waste, IA
Developing a Budget — Rachel Rosenzweig, Lancaster County, PA
Funding Via EPA's Enforcement Efforts — Brian Rimar, Region 8 U.S. EPA, CO
Creative Use of State Enforcement Efforts — Judi Frantz, California Department of Health Services, CA

Workshop 4-B - CESQG I *Wayzata Bay Suite, 8th floor*
Moderator: David Galvin
Overview — Ned Brooks, MPCA, MN
Federal Overview — Charlotte Mooney, OSW, U.S. EPA, DC
Overview of State Definitions, Laws, Regulations, etc. — Dana Duxbury, WWC, MA
Regulatory Information Discussion

Workshop 4-C - Education II — General Public *Spring Park, 8th floor*

Moderator: Sarah Dewey
Changing Attitudes, Knowledge and Behavior — Shirley Niemeyer, University of Nebraska - Lincoln, NB
Neighborhood Education — Lilias Jones, Eco Solutions, CO
Measuring the Effectiveness of an Education Program — Paula Kehoe, San Francisco, CA

Workshop 4-D - Source Reduction I: Labeling *Lafayette Bay, 8th floor*

Moderator: Joan Twiton
"Chronic Hazard Labeling Guidelines" — Chuck Jacobson, Consumer Product Safety Comm., DC
Scientific Certification Systems Product Evaluation — Kai Hagen, Scientific Certification Systems
Green Seal's Labeling Progress: Used Oil and Household Cleaners — Jim Dougherty, Green Seal, DC
Constituent Labeling — Philip Dickey, Washington Toxics Coalition, WA

Workshop 4-E - Waste Management II: Options *Deer, 4th floor*

Moderator: George Kinney
Incineration — Robert Coffey, Rollins, DE
Fuels Blending — Joe Foley, Chemical Waste Management, IL
Treatment — Earl Finder, U.S. Filter Recovery Systems, Inc., MN
Landfills — Loren Alexander, Chemical Waste Management, IL

Display Room For HHW Materials *Pine/Cedar Lake, 4th floor*

12:00 - 1:00 pm **Lunch** (By Prior Registration) *Ballrooms I and II, 4th floor*

Luncheon Speaker: A Common Vision for Our Environmental Future
— Hubert Humphrey III, Attorney General, State of Minnesota

1:00 - 1:45 pm - Educational Material Poster Session *Foyer and Ballrooms I and II, 4th floor*

CONCURRENT WORKSHOPS 5 A-D 2:00 - 3:30 pm

Workshop 5-A - How To's *Elk, 4th floor*

Moderator: Judi Frantz
Health & Safety Concerns — Judy Orttung, San Bernardino, CA
Managing Costs — Martha Beck, Ingham County Health Department, MI
Personnel & Training — Donna Portner, MPCA, MN
Managing and Integrating HHW into All the Media Offices — Leslie Goldsmith, MPCA, MN

Workshop 5-B - CESQG II — Collection Program Case Studies *Wayzata Bay Suite, 8th floor*

Moderator: Chuck Cubbage
Kitsap County — Annie Bringloe, Kitsap County, WA
Duluth's Pilot — Ned Brooks, MPCA, MN
Anchorage — Bill Kryger, Anchorage and Tom Poliquin, Northwest EnviroService, AK
Windham — Jan Ameen, Windham Solid Waste District, VT

Workshop 5-C - Collection Case Studies II *Ballroom, 4th floor*

Moderator: Michael Frishman
TVA's Program — Terry Kiraly, Tennessee Valley Authority, TN
Leeds, England — Elaine Kerrell, SWAP, England; Sonia Heaven, University of Southampton
Alachua County — Jill Parker, Alachua County, FL; Wilson Anthony, Quadrex Environmental, FL

Workshop 5-D - Source Reduction II: How to Measure Results *Lafayette Bay, 8th floor*

Moderator: Dana Duxbury
Surveys — Lois Kaufman, Environmental Resource Associates, NJ
Scanning for Consumer Behavior — Adam Portner, Information Resources, Inc., NJ
Four Season Sorting — John Ikeda and Susan Mitchell, MPCA, MN
Measuring Effectiveness of HHW Collection, Education and Source Reduction Programs — Isao Kobashi, Santa Clara Department of Planning and Development, CA

Display Room For HHW Materials *Pine/Cedar Lake, 4th floor*

3:30 - 4:00 pm **Break**

CONCURRENT WORKSHOPS 6 A-D 4:00 - 5:30 pm

Workshop 6-A - Rural Programs *Wayzata Bay Suite, 8th floor*

Moderator: Brian Rimar
Overview of Issues — Lola Schoenrich, Minnesota Project, MN
Eastern Washington State's Program — Bill Green, Department of Ecology, WA
Roundtable Discussion — Moderated by Lola Schoenrich

Workshop 6-B - CESQG III — Information *Ballroom, 4th floor*

Moderator: Ned Brooks
Target Criteria for Ranking Businesses — David Galvin, Seattle Metro, WA
Sources of Information — Anne Moser, Seattle Metro, WA
Great Lakes Technical Resource Library: A Source of Pollution Prevention Documentation — David Liebl, University of Wisconsin, WI

Workshop 6-C - Permanent Programs I *Elk, 4th floor*

Moderator: Jim Gruber
Training Requirements and Technical Assistance — Leslie Goldsmith, MPCA, MN
Types of Permanent Facilities — Carolyn Dann, WWC, MA
Mobile Permanent Programs — Jennifer Holliday, Chittenden Solid Waste District, VT
Regulatory Requirements — Judi Frantz, California Department of Health Services, CA

Workshop 6-D - Source Reduction III — Availability & Effectiveness of Alternatives *Lafayette Bay, 8th floor*

Moderator: Tracy Bone
Cleaning Products — Wanda Olson, Minnesota Extension, MN
Household Pesticide IPM — Subi Subramanyam, University of Minnesota, MN
Artist Materials — Angela Babin, Safety in the Arts, NY

Display Room For HHW Materials *Pine/Cedar Lake, 4th floor*

OPTIONAL Thursday Evening Special Program: 5:30 - 10:30 pm. Minnesota cuisine and activities at Aamodts apple orchard in rural Stillwater (30 minutes east of Minneapolis). Dinner of Minnesota specialties served in a restored 1880's barn followed by cross country skiing under a full moon on lighted trails around the orchard and clogging and Cajun dancing *or* relaxed fireside chatting. $30.00, ski rental extra, first 100 to register.

FRIDAY, DECEMBER 11, 1992

8:00 am - 5:00 pm **Registration** *Coatroom, 4th floor*

CONCURRENT WORKSHOPS 7 A-D 8:30 - 10:00 am

Workshop 7-A - Waste Management III: Controlling the Destiny of Your Waste *Elk, 4th floor*
Moderator: Judi Frantz
Writing an RFP and Contract
Program Manager's Perspective — Jim Gruber, Hartford, VT
Contractor's Perspective — Eric Laut, Chemical Waste Management, IL
Waste Tracking — George Kinney, Dakota County, MN

Workshop 7-B - CESQG IV — Technical Assistance *Wayzata Bay Suite, 8th floor*
Moderator: David Galvin
State Roundtable — Robert Style, WRITAR, MN
MnTAP — Donna Peterson, Minnesota Technical Assistance Program, MN
MA Program — Grace Caner, OTA, MA

Workshop 7-C - Permanent Programs II — Case Studies *Deer, 4th floor*
Moderator: Gail Arnold
Orange County, CA — Jaimy Jackson and Jim Pfaff, Orange County, CA
Portland, OR — Sam Chandler, Portland METRO, OR
Rochester, NY — Ed Harding, Monroe County Solid Waste, NY

Workshop 7-D - Source Reduction IV: Reformulation *Lafayette Bay, 8th floor*
Moderator: Dana Duxbury
Removing Mercury from Household Batteries — Terry Telzrow, Eveready, OH
Removing Solvents from Latex Paint — David Maurer, Glidden Paint Company, OH
Low Hazard Paint Strippers — Nancy Walsh and Carlos Lopez, 3M, MN

Display Room For HHW Materials *Pine/Cedar Lake, 4th floor*

10:00 - 10:30 am **Break**

10:30 - 12:00 noon **Plenary Session** *Ballrooms III and IV, 4th floor*
Moderator: Dana Duxbury
Questions from: Philip Dickey, David Galvin, Judy Orttung, George Kinney
Manufacturers Panel
— Jim McCabe, Chlorox, CA
— Terry Telzrow, Eveready, OH
— David Maurer, Glidden Paint Company, OH
— Darryl Brock, Monsanto, MO
— Bryan Thomlison, Church & Dwight, NJ
Contractors Panel
— Liz McCormick, Laidlaw Environmental Services, SC
— Eric Laut, Chemical Waste Management, IL
— Robert Coffey, Rollins, PA

11:45 - 12:00 noon **Closing Remarks** — Charlotte Mooney, OSW, US EPA, DC

12:00 - 1:30 pm **Lunch (By Prior Registration)** *Ballrooms I and II, 4th floor*

TOURS — 1:00 pm (See over)

1:30 - 2:00 pm Video Demonstration of Incompatibles — Larry Sweetzer, Sanitary Fill Co., CA
see Registration Desk for Location

2:00 - 3:30 pm Discussion Groups — Paint
Ballrooms III and IV, 4th floor

TOURS — 1:00 pm

Tour A: HHW Facilities North — 2 hours

HHW collection facilities on the northern end of the Twin Cities will include Dynex Industries in Ramsey County, Hennepin County's collection site and battery collection program; one of Minnesota's new mobile facilities will be on display at the Hennepin County transfer station.

Tour B: Problem Material Recyclers — 3 hours

Recyclights, a new fluorescent tube recycler in Minneapolis; JR's Appliance Disposal, freon recovery and recycler of major appliances in Eagan in Dakota County.

Tour C: HHW Facilities South — 4 hours

HHW collection facilities south of Minneapolis at Gopher Smelting, Aptus Environmental Services (where one of Minnesota's new mobile facilities will be available for viewing) and (weather permitting) Rice County's HHW collection site and product exchange in Dundas.

SATURDAY, DECEMBER 12, 1992

TOUR — 8:30 am - 12:30 pm

Tour C (Facilities South) with the addition of a stop at JR's Appliance Disposal. (4 hours)

TOURS — 9:00 am - 12:00 noon

Tour A (Facilities North) with the addition of a stop at Recyclights. (3 hours)

Tour B (Problem Material Recyclers). (3 hours)

Appendix II

Final List of Speakers

U.S. ENVIRONMENTAL PROTECTION AGENCY
HOUSEHOLD HAZARDOUS WASTE MANAGEMENT CONFERENCE
DECEMBER 8-12, 1992 MINNEAPOLIS, MINNESOTA

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Appendix III

Speakers' Biographical Sketches

U.S. EPA

HOUSEHOLD HAZARDOUS WASTE MANAGEMENT CONFERENCE

December 8-12, 1992 — Minneapolis, Minnesota

The Speakers: Brief Biographies

Loren Alexander, Marketing Manager Inorganics, Chemical Waste Management, major responsibility is to maximize CWM capability in landfill, aqueous treatment and deepwell technologies. He was previously with American Cyanimid amd Phillips Petroleum; has BS, Oklahoma City University.

Jan Ameen, Recycling Coordinator, Windham Solid Waste Management District, Brattleboro, VT, is responsible for the district: recycling, hazardous waste and composting programs; public education programs, and the all related printed material. She has a BS, Botany, University of Rhode Island; MS, Environmental Studies, Antioch New England Graduate School.

Wilson Anthony, Quadrex Environmental, Gainesville, FL.

Angela Babin, Director, Art Hazards Information Center, Center for Safety in the Arts, the only national clearinghouse for information and education on hazards and precautions in the arts. She writes, speaks, provides technical assistance, does research on health and safety in the visual and performing arts, manages the occupational safety and health bulletin board (OSHBBS), and is editor of *Art Hazards News*. She has a BA, Psychology/Biology, Barnard College; MS in Environmental Health and Occupational Safety, Hunter College.

Martha Beck, Program Specialist, Ingham (MI) County Health Department, has worked on the County HHW program since 1986 and is currently responsible for program management including publicity, education, grant compliance, collection day operations, etc. She has a BS, Limnology, University of Wisconsin.

Michael Bender, Solid Waste Planner, Central Vermont Regional Planning Commission, participated on Vermont's Task Force on Hazardous Waste and the Technical Advisory Committee on Solid Waste. He attends the planning meeting for this conference, reports for the HHWM News and writes a monthly column for Waste Dynamics of New England. He has a BA in Environmental Science, University of New York; an MA in Resource Management and Administration, Antioch New England Graduate School.

H. Fernando Berton, Senior Waste Management Specialist, Manager HHW Management Program, California Integrated Waste Management Board, administers HHW programs. He has a BA in Microbiology and Chemistry.

Tracy Bone, Environmental Scientist, U.S. EPA Office of Solid Waste, responsibilities include HHW, degradable plastics, landfill criteria and source reduction activities. She has an MS in Environmental Microbiology from Florida State University, has published articles dealing with groundwater microorganisms, has worked in public and private sectors in aquatic monitoring, sewage treatment, and potable water.

R.J. 'Rick' Bowen, President, Prestone Technology Systems, Inc., has 23 1/2 years experience with the Home and Automotive Products businesses of First Brands Corporation. He has BS, Business Administration, Arizona State University.

Annie Bringloe, Director, Solid Waste Division, Kitsap County (WA) Public Works, directs solid waste, recycling and moderate risk waste programs for a semi-rural county (pop. 200,000), previously was a nuclear waste lobbyist for Sierra Club. She has BS, Biology.

Ned Brooks, Hazardous Waste Specialist, Hazardous Waste Division, MPCA, MN.

Craig Campbell, Coordinator, Used Oil Program, American Petroleum Institute, responsible for the petroleum industry's nation-wide used oil collection and recycling program, is also a senior regulatory analyst for API in the areas of solid and hazardous waste regulation and legislation. He has BS, Chemical Engineering, and his MBA.

Grace Caner, HHW Program Coordinator, Massachusetts Office of Technical Assistance, is presently implementing and EPA grant supporting a drop-off program at a wastewater treatment plant. She has a BA, History, University of Wisconsin; is working towards an MA, Environmental Policy, Tufts University.

Sam Chandler, Solid Waste Operations Manager, Metro (Portland, OR) Service District, is responsible for two transfer stations; one active, one closed landfill; two HHW facilities, and numerous contracts. He previously was Director of General Services, Champaign, IL, and has BA, Grinnell College; MA, University of Iowa.

Robert Coffey, Manager, Consumer and Commercial Marketing, Rollins Environmental Services, Inc. (DE), is responsible for marketing direction for HHW, CESQG and pesticide collections, plus retail stewardship programs. He has 20 years experience in plastics and rubber marketing, over 11 in environmental fields with Rollins; BS, Chemical Engineering, Texas A&M.

Gregory Crawford, Vice President, Recycling Operations, Steel Can Recycling Institute, provides

technical assistance, and recycling expertise on all phases of steel can recycling for SCRI throughout the U.S. He went to SCRI from Reynolds Aluminum where he was regional manager for recycling operations. He has BS, Engineering, U.S. Military Academy; MBA, University of Utah.

Charles Cubbage, Agriculture Environmental Coordinator, Michigan Department of Agriculture, works with pesticide collection and container recycling programs, IPM, composting, worker protection and groundwater cleanup projects; he is Adjunct Professor at Eastern Michigan University and on the Michigan and national societies for risk assessment. He has a BA in Biology and PhD in Water Quality, both from University of Michigan.

Carolyn Dann, Associate, Dana Duxbury & Associates, assists in planning and permitting projects for permanent HHW facilities and provides technical assistance in other areas of HHW and hazardous waste management planning. She has 10 years experience in the environmental field, most recently six years as Recycling Projects Manager with Wheelabrator Environmental Systems. She has BA , Biology and Environmental Studies Williams College; MBA, Tuck School at Dartmouth College.

James Darr, Section Chief, Risk Analysis Branch, Office of Pollution Prevention and Toxics, U.S. EPA, manages review of chemical toxicity and exposure from a wide variety of sources with the goal of identifying chemicals that warrant more detailed assessment and regulation. He has been with EPA since 1976 and has BA, Chemistry, Western Maryland College, and has studied at MIT and through the EPA Institute.

John Derus, Chairman, Hennepin County (MN) Board of Commissioners.

Sarah Dewey, Program Development Specialist, Household Hazardous Waste Project (MO), is responsible for creation, development and presentation of HHW education and information programs. She has BA, Biology, Grinnell College; MS, Biology, University of Miami.

Philip Dickey, Director, Household Toxics Project, Washington Toxics Coalition, directs a public education program, produces educational materials, evaluates alternative products, participates in joint source reduction projects. He has PhD, Physics from University of Illinois.

Ingrid Dierlam, Program Specialist, Texas Water Commission - Community Support Program, administers state HHW and pesticide programs. She has BA, Geography, University of Texas.

Jim Dougherty, Vice President and General Counsel, Green Seal, directs the team that evaluates products for compliance with Green Seal's environmental standards. He has previously held senior management positions with the Environmental Law Center, Defenders of Wildlife, and the Superfund Enforcement Division of EPA; he has also served on the board of Sierra Club.

Shirley Dougherty, Office of Environmental Education, MN.

Brad Drda, Waste Acceptance Control Program Trainer, Sanitary Fill Company, designs, develops and presents hazardous materials training to 600 San Francisco garbage company employees. He previously taught English in Taipei; has BA Sociology/Anthropology, Carleton College and a Certificate of Hazardous Materials Management.

Dana Duxbury, founder of Dana Duxbury & Associates, is an environmental consultant. She specializes in providing policy and educational services in solid and HW management issues to government, industry, and public interest groups. As a Senior Environmental Research Analyst at the Center for Environmental Management, Tufts University, she was active in the area of waste reduction as well as HHW. She worked for 15 years as a volunteer with the Massachusetts and U.S. League of Women voters as a solid and HW specialist and has a BS in Biology, Cornell.

Norm England, Executive Director, Portable Rechargeable Battery Association (PRBA), has extensive experience in plastics recycling and this year joined the new organization, PRBA, formed to work actively to establish industry-wide programs that will promote the recycling of rechargeable batteries. He has a BS in Business Administration from University of Tennessee.

Phil Farina, Director, Marketing/Sales, Environmental Purification Industries, OH

Earl Finder, Sales and Marketing Manager, U.S. Filter Recovery Services; is involved in treatment and recovery of metals from inorganic wastes. He has BS, Chemistry and Geology, University of Wisconsin.

John Fogarty, Assistant enforcement Counsel for Superfund, Office of Enforcement, U.S. EPA, supervises EPA headquarters involvement in Superfund cases of national or precedental significance in three of the agency's ten regions; he also advises the office on municipal liability and HHW matters. He was formerly with the Environmental Law Institute. He earned his BA and George Washington University and his law degree at New England School of Law.

Joe Foley, Director Sales Support, Chemical Waste Management, is responsible for marketing management for all CWM hazardous waste services as well as the Waste Reduction Services consulting group, which assists customers in hazardous waste source reduction and recycling activities.He has BS, University of Illinois; MBA Northwestern University.

Judi Frantz, HHW Coordinator, California EPA, Department of Toxic Substances Control, is responsible for HHW programs statewide, initial development of HHW regulations, etc. She has worked on financial responsibility issues for the Department of

Health Services, has a BA, Business Administration, California State University, Sacramento.

David Galvin, Supervisor, Hazardous Waste Management, Seattle Metro, supervises Metro's hazardous waste management program, which is part of the Seattle-King County plan. He has a BA in Biology and Environmental Studies from Colby College, and spent a year working in Europe studying biological indicators of pollution.

Leslie Goldsmith, Supervisor, Special Wastes Unit, Hazardous Waste Division, Minnesota Pollution Control Agency.

William Green, Moderate Risk Waste Specialist, Washington State Dept. of Ecology, coordinates statewide activities and is responsible for development of moderate risk (HHW and SQG) programs, policy and guidance issues. He worked in the private sector as a chemist responsible for product development and regulatory affairs. He has MS, University of Washington, and BS, Brigham Young University, both Chemistry.

Beverly Grimm, Manager. Market Development, GE Lighting, is responsible for developing business strategies and plans; current emphasis includes GE efforts as an ally in EPA's "Green Lights" program and end-of-life disposal issues for GE lighting products. She has BA, University of West Florida and MA, University of Colorado, both Mathematics, and MBA, Case Western Reserve University.

Terry Grogan, Acting Chief, Waste Reduction and Management Branch, Office of Solid Waste, U.S. EPA, with EPA since 1977, is responsible for the national program to reduce volume and toxicity of MSW as well as the regulatory program for solid waste landfills; his assignments have included RCRA and recycling programs. He has a Masters in Public Policy from University of Texas LBJ School of Public Affairs.

James Gruber, Assistant Town Manager, Hartford, VT, executive director of the regional solid waste management district and project director for the town permanent HHW facility. He has a BS in Civil Engineering, MS in Engineering, and MPA.

Walter Haas, Hazardous Waste Division, MPCA, MN

Kai Hagan, Scientific Certification Systems, Inc.

Edward Harding, Assistant Engineer, Monroe County (NY) Division of Solid Waste, is involved in overseeing and supervision of contracts for the county solid waste operations including transfer stations, landfills, hazardous waste, HHW and recycling.He has BA, Environmental Design and Planning, University of Buffalo and AAS, Civil Technology in Environmental Control and Highways & Structures.

Sonia Heaven, Lecturer Environmental Engineering, Southampton University (Great Britain), does research and teaches on a range of waste-related environmental issues, was previously a civil engineer and Senior Operations Officer, North West Water Authority and Research Manager SWAP Recycling. She has BA, English, Cambridge University, BS, Civil Engineering, Leeds University.

M. Scott Herbert, President, H_2O Coatings, Inc./ The Green Paint Company, founded and manages the first paint recycling facility in the northeast, also manufactures waterborne line-marking paints. He has BS, Chemistry, Lowell Technological Institute, MBA, Boston University.

Jennifer Holliday, Hazardous Waste Coordinator, Chittenden (VT) Solid Waste District, responsible for planning and permitting, management and operation of the District fixed and mobile HHW facilities; also now working on a CESQG program. She has a BS in Environmental Science (minor Chemistry) from University of Massachusetts.

Hubert Humphrey III, Attorney General, State of Minnesota.

John Ikeda, Supervision, Rules and Assessment, Groundwater & Solid Waste Division, Minnesota Pollution Control Agency, manages activities related to financial and economic analysis of solid waste programs. He has BA, Macalester College, MBA St. Thomas University.

Jaimy Jackson, Staff Analyst, Orange County (CA) Integrated Waste Management Department, is public education coordinator for recycling, source reduction, HHW, composting, etc.; was until recently coordinator for the HHW program, beginning with planning and implementation. She has BA, Communications, California State University Fullerton.

Charles Jacobson, Compliance Officer, U.S. Consumer Product Safety Commission, is responsible for management of CPSC enforcement of federal hazardous material labeling requirements, has been with CPSC for nearly 20 years and previously was a food and drug inspector and compliance officer. He has BS, Agriculture/Chemistry, University of Wisconsin.

Brian Johnson, Environmental Programs Coordinator, Santa Monica (CA). He has BA and MA, Geography/Environmental Science, University of California Los Angeles.

Lilias Jones, Chair, Eco Solutions, Inc., does research and project development in source reduction; previously Clerk/Treasurer, Wolverton, MN, and involved at state level in solid waste, land use, energy, environment and transportation planning. She has BA, History, Lawrence University, MS, Public Administration, Moorhead State University, PhD candidate, Environmental Politics/Policy, Colorado State University.

Lois Kaufman, Vice President, Environmental Resource Associates, a division of American Opinion Research. ERA publishes *The Environmental Report*, the most widely quoted syndicated tracking study on Environmental issues. ERA also conducts custom research

of business and consumers. She has her PhD, New York University, and previously was a professor at NYU and Rutgers University.

Paula Kehoe, Environmental Program Coordinator, Department of Public Works, City and County of San Francisco, is responsible for public education outreach for the Water Pollution Prevention Program. She has worked in various other hazardous waste management and recycling positions. Sh has BA, Geography, University of Colorado; MS, Environmental Management, University of San Francisco.

Kathy Kendall, Waste Management Administrator, Des Moines (IA) Metropolitan Area Solid Waste Agency, plans and manages HHW programs, works on hazardous and special waste management and reduction programs. She has BS, Marketing and Environmental Planning, San Diego State University.

Elaine Kerrell, Special Collections Project Manager, SWAP Recycling (Leeds, Great Britain), manager of and now preparing report on six-month pilot HHW collection program in Leeds, also project officer for Institute of Environmental and Policy Analysis, Huddersfield University. She has BS, Human Ecology, Huddersfield University.

George Kinney, Supervisor of Hazardous Waste Management, Dakota County (MN), manages hazardous waste programs including licensing ans inspection of over 1,000 hazardous waste generators, six hazwaste facilities and two permanent HHW sites (average participation 500 vehicles per month).He previously worked as a chemist in industry and was a high school science teacher. He has BS, Biology and MS, Environmental Chemistry, University of Wisconsin.

Terrance Kiraly, Project Manager for Facilities Services Environmental & Operations Support, Tennessee Valley Authority, has held senior engineering positions with TVA. He has BS, Industrial Engineering and Operations Research, VPI; MS Managaement Science, University of Tennessee.

Jan Kleman, Environmental Specialist II, Florida Department of Environmental Regulation, is program administrator of Florida's Hazardous Waste Collection Center Grant Program. She also assists local governments in HHW program planning, operation, publicity, and development of ordinances to comply with state legislated mandates on hazardous waste management. She has a BS from Bowling Green University.

Isao Kobashi, Program Manager, HHW Program, Department of Planning and Development, Santa Clara County, is responsible for the development of countywide policies and programs to reduce hazardous waste generation and develop guidelines for the siting of hazardous waste management facilities. He has BA and MA, Economics, San Jose State University.

Wilford Kryger, Manager, Engineering & Planning, Anchorage (AK) Solid Waste Services, and was previously chief design engineer for the water and wastewater facility. He has BS, Forestry; State University of New York, BS, Civil Engineering, Syracuse University.

Eric Laut, Project Development Manager, Chemical Waste Management, Inc., Technical Services Division, Midwest Region, with CWM for over 11 years, is responsible for region-wide HHW, pesticide, and state contract development. He has BA, Political Science and Business from Elmhurst College.

David Liebl, Pollution Prevention Specialist, Solid & Hazardous Waste Education Center, University of Wisconsin, works with industry and government to provide educational programing, policy review and technical assistance for pollution prevention. He conducts seminars, workshops and teleconferences and does on site evaluations. He established the Great Lakes Technical Resource Library.

Cheryl Lofrano-Zaske, Planner, Hennepin County Department of Environmental Management, is the county planner for problem materials. She has previous experience as a solid and hazardous waste regulator, R&D chemist and quality assurance chemist; BS, Chemistry and her MBA.

Carlos Lopez, Lab Operations Manager, 3M, MN.

Sylvia Lowrance, Director, Office of Solid Waste, U.S. EPA, DC.

David Maurer, Manager, Product Planning, The Glidden Company (ICI Paints), has been with Glidden since 1976. He has BA, John Carroll University, MBA, State University of New York.

Jim McCabe, The Clorox Company, CA.

Elizabeth McCormick, Manager, HHW, Laidlaw Environmental Services, Inc., since 1988, is responsible for coordinating the company's HHW activities in the U.S. She began work in hazardous waste management in 1979 with predecessors to Laidlaw. She has a BS in Distributive Science from American University, in 1987-88 she chaired the Chemical Waste Transportation Council and was a member of the National Solid Waste Management Association Board of Directors. She has been a speaker at the six previous HHWM conferences and is on the board of advisors for *HHWM News*.

William Meador, President, Recovery & Reclamation, Inc., a battery recycling company. He has BS degrees in Education, Mining and Material Processing and Passive Solar and Synthetic Fuels; MS degrees in History and Education.

LeeAnn Merashoff, Field Service Manager, Laidlaw Environmental Services, North East, Inc., is in charge of the company's industrial hazardous waste site cleanups and HHW programs. Her group operates five permanent HHW facilities and has managed hundreds of HHW collection. She has a BS in Life Sciences, and has done graduate work in Environmental Education.

Susan Mitchell, Pollution Control Specialist, Minnesota Pollution Control Agency, conducts, organizes and analyzes waste composition studies including HHW collections. She has BS, Biology, University of Minnesota.

Charlotte Mooney, Environmental Protection Specialist, Office of Solid Waste Characterization and Assessment Division, U.S. EPA, provides staff support for the development of regulation and policy in the areas of hazardous waste recycling, responsible for Conditionally Exempt Small Quantity Generator Waste regulation. She has, BA, Geology, University of Pennsylvania.

Anne Moser, Librarian, Seattle Metro Hazardous Waste Management Program, has BA, Spanish/Art History, Colby College, MA, Library and Information Studies, University of Wisconsin.

Shirley Niemeyer, Extension Specialist, Cooperative Extension, Institute of Agriculture and Natural Resources, University of Nebraska, has done extensive research and published widely on household management and waste management subjects. She has BS, University of Nebraska, MS, Family Environment, Iowa State University, PhD, Community and Human Resources.

A.J. Novak, Project Development Manager, Chemical Waste Management, is responsible for sales and marketing of HHW programs for a five-state mid-west region. He has BS Chemistry and MBA, both Loyola University.

Wanda Olson, Housing Technology Specialist, Minnesota Extension Service, is also Associate Professor, Department of Design, Housing and Apparel. She develops educational materials and conducts applied research relating to the environment, ventilation, water quality and most recently cleaning products. She has BS, Home Economics Education, Augsburg College; MS, Home Economics/Household Equipment, University of Minnesota.

Judy Orttung, Supervising Environmental Health Specialist, San Bernardino (CA) Department of Environmental Health Services, is responsible for implementation of county hazardous waste minimization and management programs. She has published HHWM materials, has BS, University of Michigan and MS, Stanford University; Chemistry, MPH, Loma Linda University.

Larry Palmer, Unit Supervisor, Minnesota Department of Agriculture, is supervisor for waste pesticide collection and pesticide container disposal programs. He has BA, Organizational Management.

Jill Parker, Senior Environmental Specialist, Alachua County (FL) Office of Environmental Protection, is responsible for small quantity generator, HHW and hazardous waste awareness programs. She was previously a Senior Environmental Engineer with General Dynamics and has a BS, Chemistry, Texas Christian University, has done work towards a MS, Environmental Science.

John Patterson, Marketing and Sales Representative, INMETCO, works with manufacturing wastes, shipping and environmental audits. he has BS, Chemistry/Physics, University of Pittsburgh.

Donna Peterson, Senior Scientist, Minnesota Technical Assistance Program (MnTAP), provides technical assistance for CESQGs, printers and educational institutions. She has BS, Chemistry, Wheaton College (IL); MS Biochemistry, Minnesota State University.

Jim Pfaff, Staff Analyst, Orange County (CA) Integrated Waste Management Department, recently appointed coordinator of the HHW program, wrote the recycling plan for the unincorporated areas of the county. He has BA, Political Science/Public Administration, California State University at Fullerton.

Thomas Poliquin, General Manager, Alaska Division, Northwest Enviroservice, Inc., responsible for all the company operations in Alaska, was previously manager of the permanent HHW facility in Anchorage. He has also been a railroad inspector and Manager of Environmental and Safety Engineering in industry.

Donna Portner, Senior Pollution Control Specialist, Minnesota Pollution Control Agency, works with the HHW program. She has BS degrees in Biology and Environmental Studies, Mankota State University.

Sharon Rehder, Environmental Engineer, New York State Department of Environmental Conservation, is responsible for the state-wide HHW program; worked on the battery task force. She has BS, Chemical Engineering, Rensselaer Polytechnic Institute; licensed Professional Engineer, Chemical Engineering.

Brian Rimar, Environmental Protection Specialist & HHW Contact, MSW Program, Region 8, U.S. EPA, previously worked with the International City Management Association, was a Peace Corps Volunteer (wildlife management) in Guatemala, and a Spanish teacher. He has a BS in Urban and Regional Planning and Geology, SUNY College at Buffalo; an MA in Physical Geography, University of Maryland.

Rachel Rosenzweig, HHW Manager, Lancaster County Solid Waste Management Authority, was responsible for development and implementation of Pennsylvania's first permanent HHW facility which she now manages; she is also infectious waste program manager. She has previously worked as a planner for solid and hazardous waste and recycling programs. She has a BS in International Environmental Studies from Cook College, Rutgers University.

Suzanna Rumon, Center Coordinator, HazWaste Central (CT), has been project coordinator for Connecticut's only permanent HHW collection facility since its inception and has previous experience in several recycling programs. She has a BS in Political Sci-

ence from Skidmore College.

Lola Schoenrich, Community Development/Solid Waste Specialist, The Minnesota Project, provides technical assistance and training to rural Minnesota areas in planning and implementing "alternative" solid waste management systems. She has BA, Hampshire College.

Deanna Seaman, Environmental Compliance Specialist, Norcal Waste Systems, Inc., is responsible for development and implementation of load-checking programs; has also designed and implemented other waste analysis and assessment programs. She has BS, Chemistry, San Francisco State University.

Paul Smith, Technical Writer, Sanitary Fill Company (San Francisco, CA), produces the written materials on company hazardous waste programs; previously prepared environmental compliance documents for Pacific Gas & Electric. He has BA, Communications, California State University at Fullerton.

Walter Stahel, Consultant, mainly in the fields of: re-use, repair, reconditioning and technological upgrading of components, goods and systems; risk management and insurance, and regional economic development. He is one of the directors of the Product Life Institute in Geneva, holds a degree from the Swiss Federal Institute of Technology (Architecture and Town Planning) and has published widely on the economics of durability, the environment and human and material resources.

Bob Style, WRITAR, MN,

Subi Subrramanyam, Assistant Extension Entomologist, University of Minnesota, is involved with stored-product pest management, pesticide impact assessment programs, pesticide use surveys, pesticide benefits and safety, toxicology of pesticides, IPM. He has MS and PhD, Entomology, University of Minnesota.

Christer Sundberg, Marketing Manager, MRT System AB, Karlskrona, Sweden, is in charge of worldwide marketing and sales of MRT's equipment — for mercury recovery.

Larry Sweetser, Norcal Solid Waste Systems Environmental Compliance Program Manager, develops programs to divert hazardous waste from landfills, including the dedicated, full time staffed HHW collection facility for the City and County of San Francisco. He has an MA in Environmental Management from University of San Francisco.

Terry Telzrow, Manager, Standards, Product Safety (and Government Affairs), Eveready Battery Company, has worked for Eveready since 1962 in various areas of quality control, production, and engineering. He has a BS in Chemical Engineering from Cleveland State (Fenn College) University; NT, Clogging, Mountain State Hall.

Herbert Thier, Associate Director, CEPUP (Chemical Education Program for Public Understanding), University of California, Berkeley. He directed the Science Curriculum Improvement Study (SCIS) and several similar projects. He has BA, Science and Mathematics, MS and EdD, New York University.

Anne Thorson, Environmental Health Specialist, Washington County (MN) Health Department, manages and directs the operation of the county HHW and problem material program and was also involved in development of the program including a mobile HHW collection facility. She has a BS, Community Health. Education.

Jean Wagenius, State Representative, Minnesota House of Representatives, is co-chair of the Legislative Commission on Waste Management. she has BA, George Washington University; graduate studies, Economics and social work; JD, William Mitchell College of Law.

Nancy Walsh, Senior Product Responsibility Chemist, 3M - Do-It-Yourself Division, is responsible for ensuring compliance of products with governmental regulations, especially regarding health, safety and the environment. She has BA, Chemistry; graduate work in Philosophy with emphasis in ethics.

Alan Wildes, Vice President, Marketing and Sales, MERECO, NY.

Julie Wilke, Delaware Solid Waste Authority, DE.

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Speakers and Workshops

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Wilson Anthony	5-C
Angela Babin	6-D
Martha Beck	5-A
Michael Bender	1-A
Fernando Berton	1-C
Tracy Bone	1-B, 3-B
Rick Bowen	3-E
Annie Bringloe	5-B
Darryl Brock	PLEN-FRI
Ned Brooks	4-B, 5-B
Craig Campbell	3-D
Grace Caner	7-B
Sam Chandler	7-C
Robert Coffey	4-E
Gregory Crawford	1-D
Charles Cubbage	3-B
Carolyn Dann	1-B, 2-B, 6-C
Jim Darr	1-A
John Derus	PLEN-WED
Sarah Dewey	3-C
Philip Dickey	PLEN-WED, 4-D
Ingrid Dierlam	2-E
Jim Dougherty	4-D
Shirley Dougherty	3-C
Brad Drda	1-D
Dana Duxbury	2-D, 4-B
Norm England	1-C
Phil Farina	2-B
Earl Finder	4-E
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Joe Foley	4-E
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Terry Grogan	PLEN-WED
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Walter Haas	1-A
Kai Hagen	4-D
Ed Harding	7-C
Sonia Heaven	5-C
Scott Herbert	1-B
Jennifer Holliday	6-C
Hubert Humphrey III	LUNCH-THUR
John Ikeda	5-D
Jaimy Jackson	7-C
Chuck Jacobson	4-D
Brian Johnson	3-E
Lilias Jones	4-C
Lois Kaufman	5-D

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Jan Kleman	2-E
Isao Kobashi	5-D
Bill Kryger	5-B
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1/21/93

Appendix VI

National Listing of Household Hazardous Waste Collection Programs: 1992

THE NATIONAL LISTING OF HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAMS* 1992

The data in this listing of household hazardous waste (HHW) collection programs has been collected and assembled by The Waste Watch Center (WWC) to provide basic information on HHW collection programs nationwide (including farm and conditionally exempt generator waste), and to serve as a resource for identifying program contacts. This listing includes all 1992 programs identified by WWC. Collection program data from 1980-1987, 1988-1990 and 1991 can be ordered from WWC.

Programs are listed by state in chronological order. Specialty programs are identified with a particular symbol (see key below). They include "paint only," "farm pesticides only," "dry cell batteries only," or used oil collected at the curbside. We also specified whether a program was a permanent program. A permanent program is defined by WWC as a program with at least monthly collections held at a fixed site or at a dedicated mobile facility. Permanent programs appear in the data base only once in each year of operation. Programs with a common sponsor and in the same community or local area are listed as a single event, even if held at multiple sites or on two or more consecutive days.

Information on costs, amount of waste collected, and number of participants is presented in the units provided by our sources. Although a single program sponsor is listed for each program, some programs have multiple sponsors. WWC recommends contacting the sponsor for more comprehensive information about individual programs.

As no central directory or national reporting requirement exists, WWC used various project sponsor materials, state and municipal information, personal contacts, reporting forms, and other information sources to obtain as complete and accurate data as possible. We would appreciate your assistance in keeping the listings current as well as in correcting any inaccuracies. Please supply us with any additions or corrections by filling out the accompanying survey on the following page. Send it to The Waste Watch Center, 16 Haverhill Street, Andover, MA 01810. (508) 470-3044. Please use this form to send us all future program information as well.

Specialty Program Key		
^ = paint only	^D = paint drop & swap	~ = latex only
@C = curbside used oil	@ = used oil collection only	+ = antifreeze only
E = Education only	CB = Curbside car batteries	$/ = CESQG only
< = oil-based only	^C = paint curbside	> = tailgate mobile
-- = Institutionalized	# = farm pesticide only	S = school lab clean up
BR = retail drop-off household battery only		BC = Household battery curbside collection
R! = HHW recyclables only		
* = permanent programs (fixed site with collections at least once per month)		
*> = permanent mobile programs (dedicated facility with collections at least once per month)		
$ = also accepts Conditionally Exempt Small Quantity Commercial Generator waste		
O = a number after the location, indicates number of sites participating in one collection		
(Xdy)/(dys) = X number of days in given time period for multi-day collection		

* The data includes collection programs for HHW; farm and conditionally exempt small quantity generator waste, and specialized programs such as: paint only, farm pesticide only, dry cell battery only, curbside or special used oil collection programs, etc.

NATIONAL HOUSEHOLD HAZARDOUS WASTE (*HHW*) COLLECTION PROGRAM SURVEY

Please complete yearly ***either*** **one** survey for **each** single/multiple day HHW or Specialty Collection Program, or give us a **12 month summary** of your Permanent Program, ongoing Specialized Program (i.e. Curbside Collection) or multiple one-day events data. For **planned** programs please fill in questions 1-4 and 8,9. Please provide separate data on household hazardous waste and conditionally exempt small quantity generator of {CESQG - i.e; very small businesses (0-100 Kil/month)} hazardous waste, if possible.

1. Sponsor _____

   Address _____

   City _____ State _____ Zip _____

   Contact Person _____ Phone _____

   Title _____ Affiliation _____

2. Type of program: (please check all that apply)

ALL HHW:*	**SPECIALTY COLLECTIONS:**
One/ Multiple Day❶ __ Number of Days __ Number of Sites __ Institutionalized (in Budget) __ Tailgate Mobile __ Including CESQG Permanent Program✡ __ Permanent fixed facility __ Permanent mobile facility __ Toxic Taxi (door to door) __ with CESQG at permanent facility ❶ No dedicated facility ✡ A permanent program is defined as a fixed/mobile dedicated facility with frequent, regular collection times (at least 1/month).	__ Only CESQG __ Curbside Used Oil __ Farm Pesticides __ Curbside Car Batteries __ Household batteries __ curbside __ retail drop off __ Other _____ __ All Paint **ONLY** __ latex **ONLY** __ oil based **ONLY** __ Drop & Swap __ Curbside __ HHW Recyclables **ONLY** __ latex paint __ car battery __ antifreeze __ used oil __ oil filters __ other __ Education **ONLY** __ Antifreeze **ONLY** __ School Lab **ONLY**
Other (please specify)_____	

* Does your program collect ___ Oil Filters, ___ Fluorescent Lights, ___ Medical Waste, ___ Freon from old Refrigerators,

___ Latex Paint, or ___ Gas Cylinders?

3. General information concerning the collection program and where it will be/ or was held:
   Date(s) _____ Hours _____
   Type of site(s) (i.e. landfill, etc.) _____
   Location(s) (community) _____
   A. Size of Area Served _____
   B. Population of Program's Community _____
   C. Number of Households _____
   D. Number of Participants Served _____
   E. Households or Participants _____ / Population _____
      = The % of Households (Participants) that the program Serves(ed) _____
   F. % of first time participants____% of repeat participants____
      % of HHW participants _____% of CESQG participants_____
   When first opened? (for permanent program) _____

4. Hazardous Waste Contractor _____

   Address _____

   City _____ State _____ Zip _____

   Contact Person _____ Phone _____

FOR PERMANENT PROGRAMS PLEASE USE YEAR TOTALS OR SPECIFY TIME FRAME

5. **Capital & Operating Costs:** Please indicate all funding information; briefly describe items in spaces below.

ITEM	DESCRIPTION	COST
<u>Fixed/Capital Costs</u>:		
Site		
Equipment		
Training		
Other		
<u>Operational Costs</u>:		
Waste Management		
Disposal Cost		
Recycling Cost		
Reuse Cost		
Testing		

Transportation _____ _____

Labor
- Administrative _____ _____
- Technical _____ _____
- Volunteers _____ _____
- Contractor _____ _____

Insurance _____ _____

Publicity _____ _____

Education _____ _____

Other
- Supplies _____ _____
- Maintenance _____ _____
- Utilities _____ _____
- Permits & Fees _____ _____
- Miscellaneous _____ _____

6. **Waste Management** Methods and Quantities- Indicate waste management method(s) and quantities under the appropriate heading (Either reuse, recycled, and treated or landfilled. Wastes reused or recycled are listed by product type, those that are treated or landfill can be entered **either** by hazard class or by product type). Different types of wastes managed in different ways can be entered under each appropriate category.

Not Accepted-**NA**, Other (specify)-**O**:

	AMOUNT COLLECTED	RAW/ PACKAGED
REUSED WASTE TABLE - (note if they are consolidated before reuse-C/R)		
Automotive Products		
Antifreeze		
Brake Fluids		
Car Batteries		
Oil		
Oil Filters		
Transmission fluids		
Other		
Paints and Home Repair Products		
Home Repair		
Acids		
Adhesives		
Sealers		
Solvents		
Other		
Paints and Coatings		
Latex Paint		
Oil Based Paint		
Other		
Pesticides and Fertilizers		
Pesticides		
Fertilizers		
Other		
Household Cleaners		
Miscellaneous		

Aerosols _____ _____
Fluorescent Lights _____ _____
Fuels _____ _____
Household Batteries _____ _____
Other _____ _____

RECYCLED WASTE TABLE - (Note if they are consolidated for fuel-C/F)

Automotive Products
- Antifreeze _____ _____
- Car Batteries _____ _____
- Oil Filters _____ _____
- Used Motor Oil _____ _____
- Other _____ _____

Paints and Related Materials
- Latex Paint _____ _____
- Oil Based Paint _____ _____
- Other _____ _____

Miscellaneous
- Household Batteries _____ _____
- Solvents _____ _____
- Other _____ _____

TREATED AND LANDFILLED HAZARDOUS WASTE - (BY HAZARD CLASS)

INDICATE WHETHER THE WASTES ARE TREATED OR LANDFILLED AND THE TREATMENT METHOD: Treatment (Incineration-**I**,Neutralize-**N**,Waste Water Treatment-**W**), Hazardous Waste Landfill-**HL**,

Flammables
- Solids _____ _____
- Liquids _____ _____
- Combustible Liquids _____ _____
- Other _____ _____

Oxidizers
- Acids _____ _____
- Bases _____ _____
- Neutrals _____ _____
- Organic Peroxides _____ _____
- Other _____ _____

Reactive and Explosive
- Water Reactive Solid _____ _____
- Explosive _____ _____
- Other _____ _____

Corrosive
- Acid Liquids _____ _____
- Alkaline Liquids _____ _____
- Other _____ _____

Poisons
- Poisonous Liquids _____ _____
- Poisonous Solids _____ _____
- Other _____ _____

Hazardous Substance Solid
- Asbestos _____ _____
- P.C.B. Regulators _____ _____
- Other _____ _____

Physical _____ _____

Chemical
Neutralization _____ _____
Thermal
Incineration _____ _____
Biological
Waste Water _____ _____

Miscellaneous
Fluorescent Lights _____ _____
Household Batteries _____ _____
Medical Waste _____ _____
Other _____ _____

TREATED AND LANDFILLED HAZARDOUS WASTE TABLE - (BY PRODUCT CATEGORY)

Treatment (Incineration-**I**,Neutralize-**N**,Waste Water Treatment-**W**)
Hazardous Waste Landfill-**HL**,

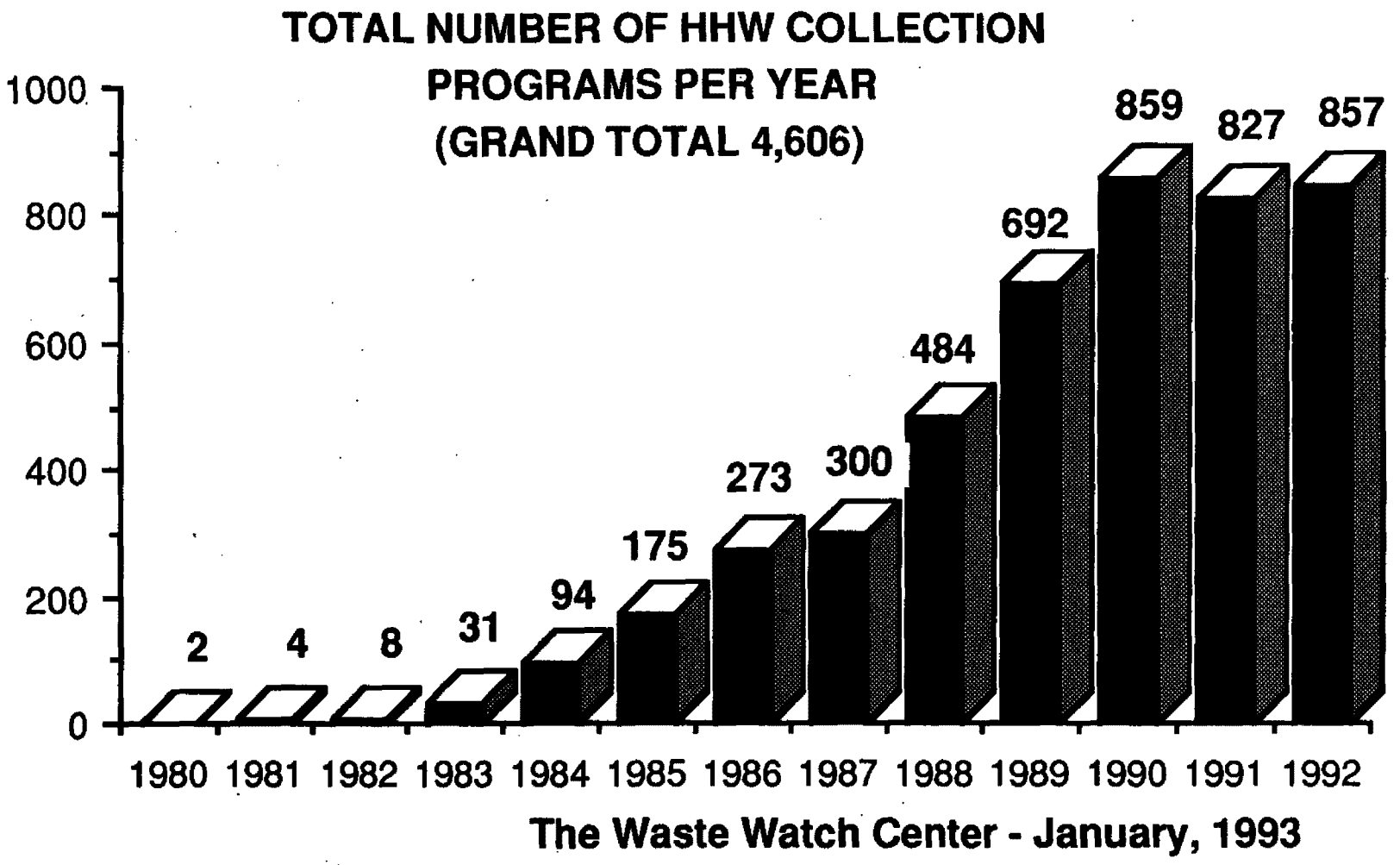
Automotive Products
Antifreeze _____ _____
Brake Fluids _____ _____
Car Batteries _____ _____
Oil _____ _____
Oil Filters _____ _____
Transmission fluids _____ _____
Other _____ _____
Paints and Home Repair Products
Home Repair
Acids _____ _____
Adhesives _____ _____
Sealers _____ _____
Solvents _____ _____
Other _____ _____
Paints and Coatings
Latex Paint _____ _____
Oil Based Paint _____ _____
Other _____ _____
Pesticides and Fertilizers
Pesticides _____ _____
Fertilizers _____ _____
Other _____ _____
Household Cleaners _____ _____
Miscellaneous
Aerosols _____ _____
Fluorescent Lights _____ _____
Fuels _____ _____
Household Batteries _____ _____
Other _____ _____

7. Were previous programs held? _____ if yes,when? _____

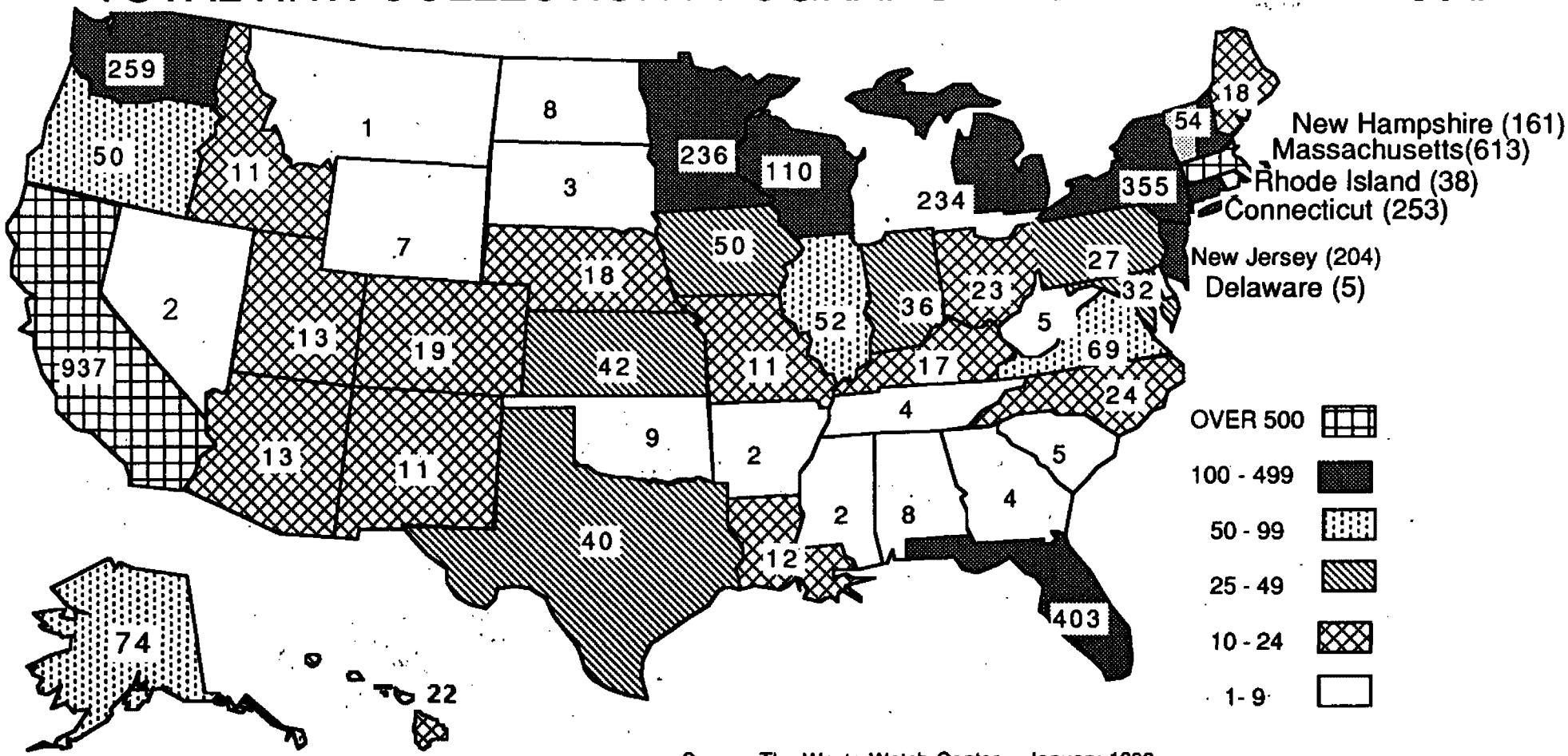
8. Please include an ANNUAL REPORT (based on the **Program's Fiscal Year**) and any other published information.

9. Please attach or write in any known program information other than your own. _____

F:\WP51\DOCS\WWC\ADMIN\SUR92

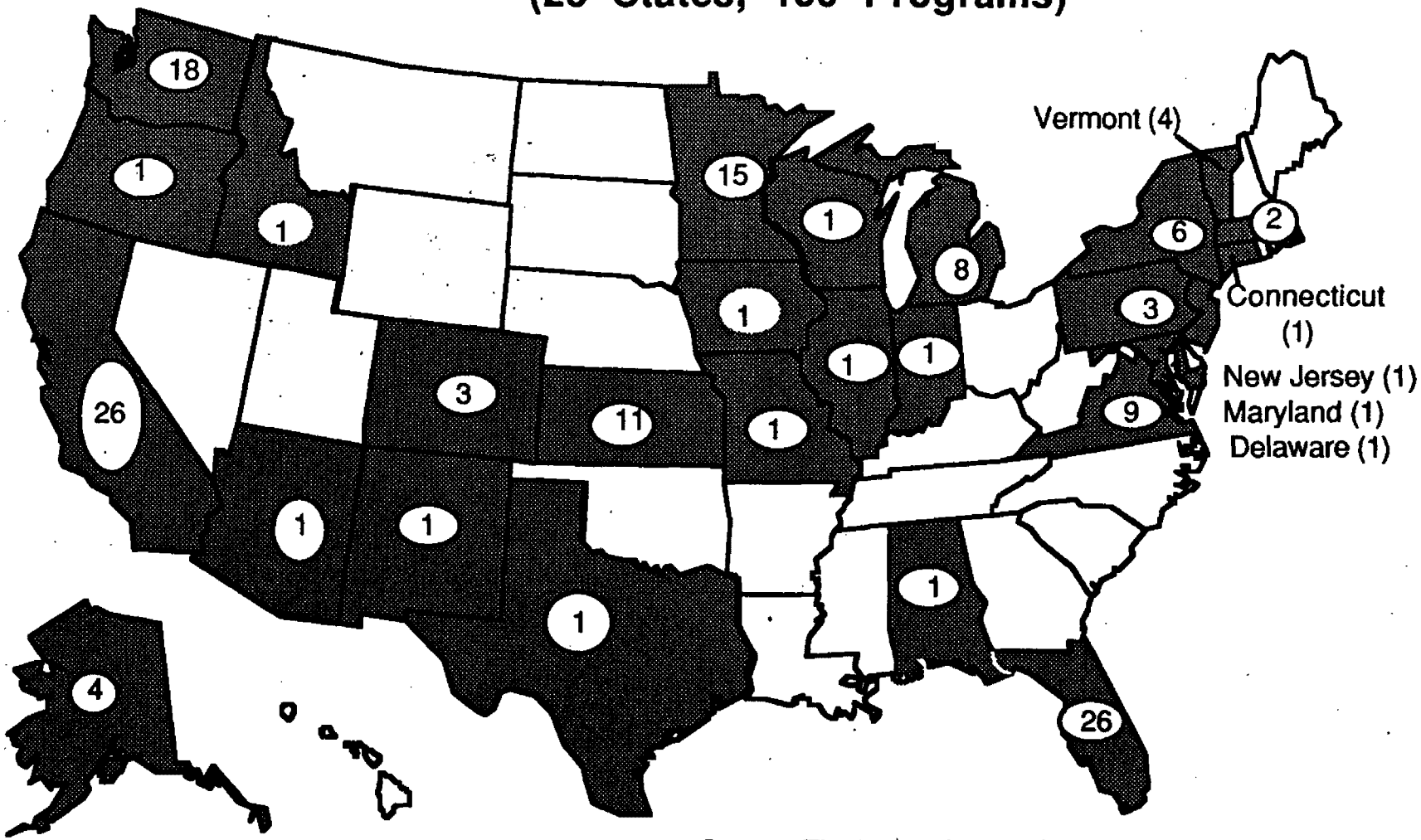

TOTAL NUMBER OF HHW COLLECTION PROGRAMS PER YEAR
(GRAND TOTAL 4,606)
1000
800
600
400
200
0
2
4
8
31
94
175
273
300
484
692
859
827
857
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992
The Waste Watch Center - January, 1993

TOTAL HHW COLLECTION PROGRAMS BY STATE 1980 — 1992

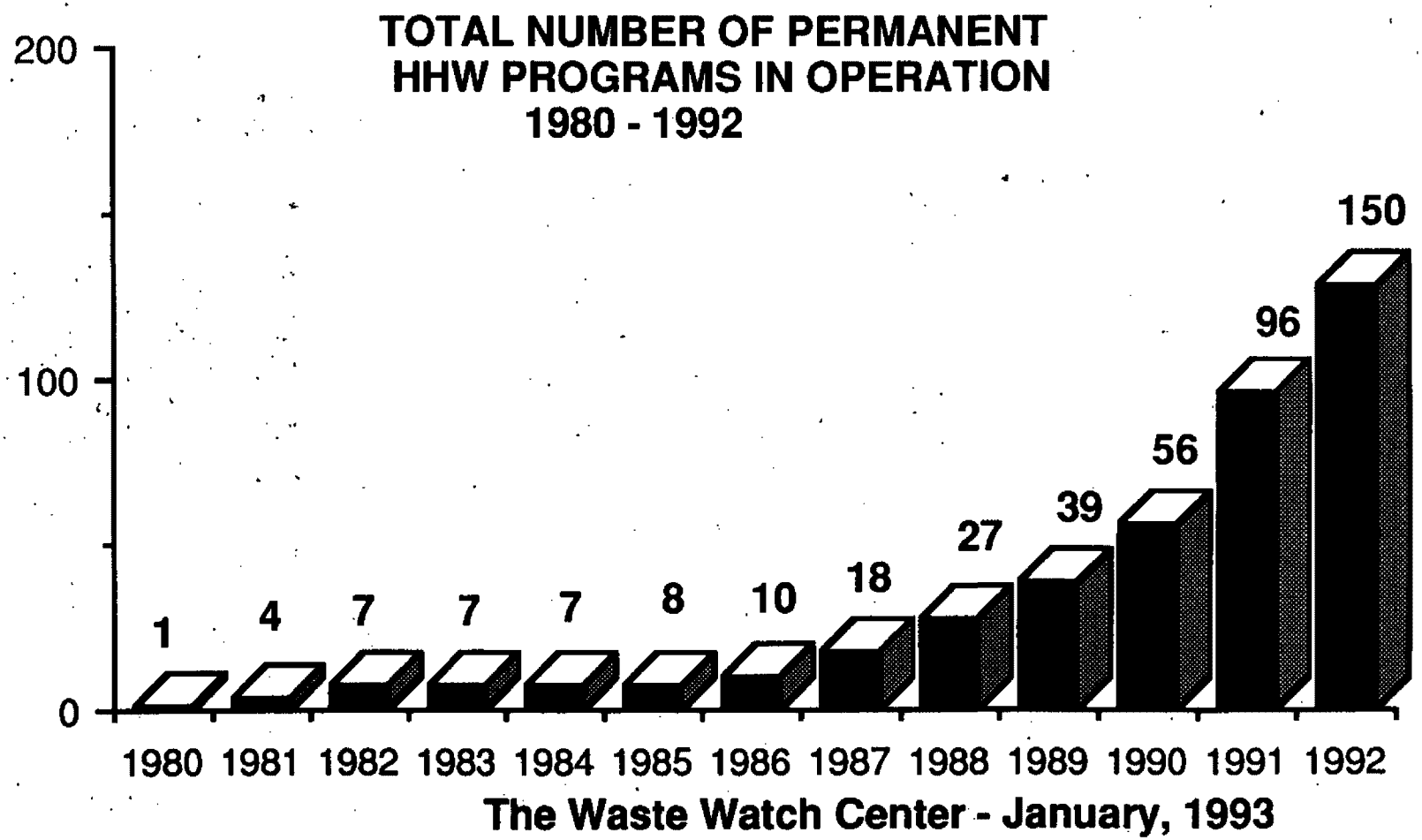


Source: The Waste Watch Center —January 1993

1992
STATES WITH PERMANENT HHW PROGRAMS
(28 States, 150 Programs)



Source: The Waste Watch Center
January 1993


TOTAL NUMBER OF PERMANENT
HHW PROGRAMS IN OPERATION
1980 - 1992
200
100
0
1
4
7
7
7
8
10
18
27
39
56
96
150
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992
The Waste Watch Center - January, 1993

HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAMS TOTALED BY YEAR

State	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1990	Total
Alabama						1				1	2	2	2	8
Alaska				2	3	4	7	2	6	10	9	15	16	74
Arizona								1	1	2	2	4	3	13
Arkansas								1				1		2
California			1	5	12	37	28	81	99	113	181	149	231	937
Colorado					4	1				3	3	3	5	19
Connecticut					1	9	25	24	38	37	49	42	28	253
Delaware								1			1	2	1	5
Florida					21	22	16	13	18	72	85	95	61	403
Georgia												2	2	4
Hawaii							1	1	2	9		9	8	30
Idaho										2	3	2	4	11
Illinois								1	6	1	10	19	15	52
Indiana						2	1	2	5	4	10	3	9	36
Iowa							2		3	12	6	9	18	50
Kansas							3				16	12	11	42
Kentucky		2		1							4	4	6	17
Louisiana						1	1	1	2	2	2	2	1	12
Maine			1		2		1		1	3	6	2	2	18
Maryland						1		2	3	5	10	5	6	32
Massachusetts			1	14	30	33	78	51	101	102	78	63	62	613
Michigan					2	8	14	11	23	30	51	60	35	234
Minnesota						7	10	9	33	56	31	41	49	236
Mississippi												2		2
Missouri									2	1	5		3	11
Montana					1									1
Nebraska						3		1	3	3	6	1	1	18
Nevada												2		2
New Hampshire					1	4	11	22	19	27	23	19	35	161
New Jersey						8	7	3	13	33	39	47	54	204
New Mexico						1				3	2	3	2	11
New York			1	4	2	8	21	28	44	62	73	57	55	355
North Carolina						2				5	6	6	5	24
North Dakota	1				1				1	1	1		3	8
Ohio					2		1		1	2	4	7	6	23
Oklahoma										1	1	7		9
Oregon			1	1	1		2	2	3	3	6	16	15	50
Pennsylvania						1	1	2	5	6	3	4	5	27
Rhode Island					5	4	4	7	5	5	5	2	1	38
South Carolina									1		3	1		5
South Dakota							1					2		3
Tennessee							1				1		2	4
Texas							6	2	5	3	12	5	7	40
Utah							2			1	2	6	2	13
Vermont					1	2	5	3	2	6	14	7	14	54
Virginia						1	3	7	15	10	13	11	9	69
Washington	1	2	3	4	3	8	12	12	17	37	63	55	42	259
West Virginia						1		1			1	1	1	5
Wisconson					2	6	9	9	7	18	16	16	27	110
Wyoming										1	1	2	3	7
Total/Year	2	4	8	31	94	175	273	300	484	692	859	827	857	4606
Total States	2	2	6	7	18	25	28	28	31	38	43	46	43	50

The Waste Watch Center - January, 1993

HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAMS BY STATE 1988-1992

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
Alabama	*	Huntsville		/92	SW Disposal Authorit	Dixie Bray	205-880-6054	Laidlaw ENvironmenta		0.00		0
Alabama		Muscle Shoals	04/25	/92	TVA	Terry Kiraly	615-632-2537			0.00		0
Alaska	*	Anchorage		/92	City of Anchorage	Bill kryger	907-561-1906	NW Enviroservice	907-272-9007	0.00		0
Alaska	*	Soldotna		/92	City of Soldotna	Steve Willingham	907-465-5158	NW Enviroservice	907-272-9007	48251.00	107 drums	0
Alaska	*	Seward		/92	City of Seward	Steve Willingham	907-465-5158	NW Enviroservice	907-272-9007	0.00	23 drums	0
Alaska	*	Homer		/92	City of Homer	Steve Willingham	907-465-5158	NW Enviroservice	907-272-9007	70000.00	35 drums	0
Alaska		Juneau(3 days)	01/12	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	0.00		0
Alaska	>	Kenai Peninsula(2 dy	05/01	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	0.00	47040 lbs	21
Alaska	>	Valdez	05/22	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	21614.00	11695 lbs	15
Alaska		City of Glennallen	05/25	/92	AK Dept Enviro Conse	rteve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	0.00	600 lbs	3
Alaska	>	Kodiaic (2 dys)	05/29	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	10076.00	9470 lbs	100
Alaska	>	McGrath City Shors(2	05/29	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	11061.00	13 drums	4
Alaska	>	City of Haines(2 dys	06/05	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5153	Northwest Enviroserv	907-272-9007	16003.00	45135 lbs	40
Alaska	>	Fairbanks NS Borough	06/05	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	0.00	24305 lbs	40
Alaska	>	Sitka PW(2 dys)	06/12	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	0.00	6482 lbs	0
Alaska	>	Petersburg(2 dys)	06/19	/92	AK Dept of Envir Con	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	10344.00	13186 lbs	90
Alaska		Ketchikan PW(2 dys)	06/26	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	0.00	16667 lbs	100
Alaska	>	City of Unalaska(2 d	09/05	/92	AK Dept Enviro Conse	Steve Willingham	907-465-5158	Northwest Enviroserv	907-272-9007	0.00	5400 lbs	30
Arizona	*BR	Tuscon		/92	City of Tuscon/Pima	Anna Spitz	602-888-6947	Rinchem Co	602-722-2330	380500.00	242718 lbs	541
Arizona		Glendale/Peoria/Scot	10/00	/92	Glendale/Peoria/Scot	Wanda Wildman	602-256-3310			0.00		0
Arizona		Phoenix	11/	/92	Phoenix Public Works	Wanda Wildman	602-256-3310			147157.00		313
California	*	Marina		/92	Monterey Regional WM	Neil Jones	408-384-5313	Solvent Services,Inc	408-251-7554	88700.00	3357 Gallons,40 lbs	200
California	@C	San Rafael		/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00	1122 gallons	39
California	@B*	Novato		/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California	*	Orville		/92	Oroville	Dean Hill	916-538-2400	Rollins Environmenta	510-226-1600	98866.00		2700
California	>	San Andreas		/92	Calaveras County	James Hemminger	209-754-6403			72850.00		0
California	E	Martinez		/92	Contra Costa	Bart Carr	510-372-3531			10038.00		0
California	@*	Santa Clarita		/92	Los Angeles	Pandee Leachman	805-294-2500			59994.00		0
California	*@@	Bridgeport		/92	Mono County	Bill Mayer	619-932-5228			89569.00		0
California	*	Rialto		/92	San Bernardino	Jamie Evans	714-820-2623			529368.00		2
California	E	Chula Vista		/92	San Diego	Athena Lee Bradley				33383.00		0
California		Sonora		/92	Tuolumne County	Mark Rappaport	209-533-5601			205403.00		2
California	>	Simi Valley		/92	Ventura County	John Cole	805-533-6761			479400.00		0
California	E	Woodland		/92	Yolo County	Gerald Kindsfather	916-661-5969			31659.00		0
California	*R!	Yuba City		/92	Bi-County Intrgrated	Keith Martin	916-671-4327	Yuba Sutter Disposal	916-743-6933	521667.00	11646 lbs	2000
California	*	San Fransisco		/92	City & Cnty of San F	Cedar Kehoe	415-468-2442	Crosby & Overton	510-633-0336	589000.00	67342 gal,110 lbs	0
California		Barstow		/92	City of Barstow	Dale Milligan	619-256-2254			4459.00		0
California		Beverly Hills		/92	City of Beverly Hill	Aline Purcell	213-285-2501			36555.77		0
California		Burbank		/92	City of Burbank	Stan Nelson	818-953-8771			196667.75		0
California		Davis		/92	City of Davis	Robert Weir	916-767-5686			69670.38		0
California		El Segundo		/92	City of El Segundo	John Hilton	213-322-3769			29589.00		0
California		Fairfield		/92	City of Fairfield	Jay Trottier	707-428-7492			65389.00		0
California		Freemont(2 days)		/92	City of Freemont	Kara Dinhoffer	510-745-2762			440934.66		0
California		Glendale		/92	City of Glendale	Vasken Demirjan	818-548-2085			653362.81		0
California		Hayward		/92	City of Hayward	Steve Raetz	415-293-6695			79818.56		0
California		Hesperia		/92	City of Hesperia	Richard Lupton	619-947-1603			7842.43		0
California		Inglewood		/92	City of Inglewood	Karen Gill	310-412-5510			75076.00		0
California		Irvine		/92	City of Irvine	Cindy Asher	714-724-7664			486489.23		0
California		Lancaster		/92	City of Lancaster	Harold Madison	805-723-6169			1443.03		0
California		Lompoo		/92	City of Lompoo	John Welbourn	805-736-1261			74636.26		0
California		Los Altos		/92	City of Los Altos	Daphne Siegert	415-948-1491			59937.00		0
California		Los Angeles		/92	City of Los Angeles	Carl Hasse	213-893-8542			993718.00		0
California		Milpitas		/92	City of Milpitas	Robert Webster	408-942-2363			66000.00		0
California		Morgan Hill		/92	City of Morgan Hill	Sharon Kohlmaralehne	406-776-7351			23091.00		0
California		Mountain View		/92	City of Mountain Vie	Dan Armenta	415-903-6227			59389.00		0
California	@C	Palo Alto		/92	City of Palo Alto, P	Robert Le	415-496-6913			345673.83		0
California	*	Redlands		/92	City of Redlands	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	35597.80	12575 gal,238 batt	2395
California		Redondo Beach		/92	City of Redondo Beac	Joel Coster	213-318-0653			75695.00		0

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
California	@C	Roseville		/92	City of Roseville	Terry Boslk	916-449-5283			7763.86		0
California	@C	Sacramento		/92	City of Sacramento	Reginald Young	916-449-5283			196563.49		0
California	@C	San Jose		/92	City of San Jose	Rita Norton	408-277-5533			65883.71		0
California	@C	Santa Clara		/92	City of Santa Clara	Richard Kauck	408-984-3151			120888.92		0
California	*E	Santa Cruz		/92	County of Santa Cruz	Patrick Mathews	408-425-2481			96896.36		0
California	*@C	Santa Monica		/92	City of Santa Monica	Brian Johnson	213-458-8227			273615.00		0
California	@C	Saratoga		/92	City of Saratoga	Isabel Gleoge	408-867-3438			176310.00		0
California	@C	Sunnyvale		/92	City of Sunnyvale	Mark Bowers	408-730-7421			160278.73		0
California	@	Thousand Oaks		/92	City of Thousand Oak	Don Kubesh	805-497-8611			11607.38		0
California		Terrance		/92	City of Terrance					4989.00		0
California		Vallejo		/92	City of Vallejo,Dept	Peter Friesen	707-552-3118			84261.43		0
California	C@@	Walnut Creek		/92	City of Walnut Creek	Janet Schneider	510-258-3503			26378.00		0
California	*	Jackson		/92	County of Amador	Margaret Blood	209-223-6439			6955.00		0
California		Bakersfield		/92	County of Kern	Lynette Beurmann	805-861-2481			305900.34		0
California		Whittier		/92	County of Los Angele	Joseph Reiley				709954.00		0
California		Nevada City		/92	County of Nevada	Bret Nerlund	916-265-1353			71010.00		0
California	*>	Riverside		/92	Cnty of Riverside	Michael Shelter	714-358-5055			450000.00		0
California		Sacramento		/92	County of Sacramento	Robert Knight	916-386-6169			301584.96		0
California	*E	San Bernardino		/92	Cnty of San Bernardi	Judy Orttung	714-387-4629			624510.47	117581 gal	18655
California		San Deigo		/92	County of San Deigo	Pam Jackson	619-338-2175			0.00		0
California		Redwood City		/92	County of San Mateo	Rick Miller	415-363-4356			272558.00		0
California	E	Santa Barbara		/92	Cnty of Santa Barbar	Karen Feeny	805-963-0583			366967.68		0
California	@	Yreka		/92	County of Siskiyou	Roger Cummins	916-842-8250			1166.00		0
California		Santa Rosa		/92	Cnty of Sonoma,DPW	Jim Simpson	209-733-6441			27520.30		0
California	@C	Modesto		/92	Cnty of Stanislaus	Jim Simpson	209-525-4150			27520.30		0
California		Visalia		/92	Cnty of Tulare	Larry Dvoskin	209-733-6441			0.00		0
California		Woodland		/92	Cnty of Yolo	Eric Miller	916-666-8775			111963.00		0
California		Ventura		/92	Ventura Reg. Sanitat	Kelly White	805-658-4600			108346.00		0
California	@*B	Richmond		/92	West Cnty Agency	F. Mark Braly	916-758-1463			22666.00		0
California	@C	Marin County		/92	Marin County	Gina Purin	415-499-6647	Evergreen Enviro.Ser		0.00		0
California	*	Orange County		/92	Integrated Waste Mgt	Jim Pfaff	714-560-4891	Greenfield Environme	619-431-3957	2097152.00	160000 gal	1820
California	@C	Santa Cruz		/92	County of Santa Cruz	Jeffery Smedberg	408-454-2373	Evergreen Environmen	800-972-5284	9200.00	500 gal per month	0
California	@C	Foster City		/92	City of Foster	Michele Daves	408-349-1200	Evergreen Oil	415-359-0469	0.00	1,500 gallons	6291
California	@C	Newman		/92	City of Newman	Ernie Garza	209-862-3725	Bertollotti Disposal	209-537-6911	0.00		0
California	~	Castro Valley		/92	City of Castro Valle			Pleasant Hill Baysho	510-685-4716	0.00	1473 cans	0
California	BOP	Pacheco		/92	City of Pacheco			Pleasant Hill Baysho	510-685-4716	0.00	9535.5 gal,350 batt,	2320
California	BOP	Antioch		/92	City of Antioch			Pleasant Hill Baysho	510-685-4716	0.00	4212.05 gal,219 bat,	1064
California	BOP	Benicia		/92	City of Benicia			Pleasant Hill Baysho	510-685-4716	0.00	2462 gal,115 bat,133	656
California	BOP	Rodeo		/92	City of Rodeo			Pleasant Hill Baysho	510-685-4716	0.00	743 gal,35 batt,29 c	165
California	@C	Los Gatos		/92	Town of Los Gatos	Vera Dahle-Lacaze	408-867-3438	Evergreen Environmen	510-795-4410	9240.00	6000 gal	11300
California	@C	Campbell		/92	City of Campbell	Vera Dahle-Lacaze	408-867-3438	Evergreen Environmen	510-795-4410	9240.00	6000 gal	11330
California	@C	Monte Sereno		/92	City of Monte Sereno	Vera Dahle-Lacaze	408-867-3438	Evergreen Environmen	510-795-4410	443.00	540 gal	1163
California	@C	Ceres		/92	City of Ceres	Kay Dunkel	209-538-5789	Evergrenn Environmen	800-972-5284	0.00	7754 gal	6944
California	*	Barstow		/92	San Bernadino Cnty	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	0.00	4575 gal,68 batt,66	955
California	*@C	Chino		/92	San Bernadino Cnty	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	0.00	11348 gal,184 batt	1223
California	*	Fontana		/92	San Bernadino Cnty	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	0.00	6489 gal,78 batt,112	855
California	*	Hesperia		/92	San Bernadino Cnty	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	0.00	13753 gal,14 batt	2050
California	*	Rancho Cucamonga		/92	San Bernadino Cnty	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	0.00	18354 gal,138 batt	2115
California	*	Upland		/92	San Bernadino Cnty	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	0.00	4085 gal,56 batt,77	663
California	*	Victorville		/92	San Bernadino Cnty	Judy Orttung	714-387-4629	Containerized Chem	714-626-6645	0.00	12399 gal,62 batt	2289
California	@C	Gilroy		/92	City of Gilroy	Lisa Meracho	408-848-0245	Evergreen Environmen	800-972-5284	0.00	4690 gal	0
California	@C	San Mateo		/92	Browing-Ferris Ind.	Debi Sargent	415-637-1411	All Petroleum Recove	415-359-0469	0.00	6055 gall	1265
California	@C	Hillsborough		/92	Browing-Ferris Ind.	Debi Sargent	415-637-1411	All Petroleum Recove	415-359-0469	0.00	1016 gall	216
California	@C	San Francisco		/92	South San Francisco	Stephanie Uccelli	415-589-4020	Evergreen Environmen		0.00	14000 gal	19000
California	*	Chula Vista		/92	County of San Diego	Melissa Colburne	619-421-1175	Appropriate Tech	619-421-1175	0.00		0
California	*	Richmond		/92	Contra Costa Cnty	Thomas Oakley	415-233-8001	AETC		0.00		0
California	*	Coronado		/92	San Diego County	Pam Jackson	619-338-2175	Appropriate Tech	619-421-1175	0.00		0
California	*	Visalia		/92	Tulare County	Lawrence Dvoskin	209-733-6441	Chem Waste Mgt	800-222-2964	0.00		0
California	@C	Milpitas		/92	City of Milpitas	Cindy Rosson	408-942-2302	Evergreen Environmen	510-795-4410	0.00	1304 gallons	0

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
California	@C	Cupertino		/92	City of Cupertino	Steve Sano	252-4505	Evergreen Environmen	510-795-4400	0.00	14355 gallons	0
California	*	Gridley		/92	Yuba/Sutter Disposal	Evelyne Paine		RES	510-226-1680	31000.00		0
California	^C	Marin County		/92	Marin County	Gina Purin	415-499-6647	Evergreen Environ.	510-795-4410	0.00	330 gallons	330
California	CP	Castro Valley		/92	Pleasent Hill Baysho	Patty Mehaouchi	510-685-4716	Pleasant Hill Disp.		0.00	4293 cans	3750
California		Palo Alto	01/04	/92	Santa Clara Cnty	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Escondido	01/04	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	28614 lbs	337
California		San Marcos	01/11	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	10269 lbs	156
California		Reseda	01/11	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	313044 lbs	2650
California		Oceanside	01/12	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	7405 lbs	160
California		Encinitas	01/18	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	27790 lbs	445
California		Santee	01/19	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	30754 lbs	531
California		El Cajon	01/25	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	40067 lbs	494
California		Palo Alto	02/01	/92	Santa Clara Cnty	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Balbloa Park	02/01	/92	San Diego City	Donna Skinner	619-492-5006	Greenfield Environme	619-431-5500	0.00	21216 lbs	312
California		Alhambra	02/01	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	234885 lbs	2672
California	@^B	Escondido	02/01	/92	City of Escondido	Teri Edelbrock	619-741-4610	Greenfield Environme	619-431-5500	0.00	18106 lbs	255
California		Davis	02/08	/92	Yolo County	Eric Miller	916-666-8775	Green Alternatives	800-345-3363	0.00		0
California		Imperial Beach	02/08	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	17225 lbs	224
California		Descanso	02/08	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	10223 lbs	75
California		Sylmar	02/08	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	216,031 lbs	1665
California		La Mesa	02/15	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	28354 lbs	284
California		Rosecrans	02/22	/92	San Diego City	Donna Skinner	619-492-5006	Greenfield Environem	619-431-5500	0.00	22331 lbs	268
California		Vista	02/29	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	16749 lbs	201
California		Palo Alto	03/07	/92	Santa Clara	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Borrego	03/07	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	4905 lbs	61
California	B@^	Escondido	03/07	/92	City of Escondido	Teri Edelbrock	619-741-4610	Greenfield Environme	619-431-5500	0.00	11565 lbs	194
California		Sonoma	03/14	/92	Sonoma County			Green Alternatives	800-345-3363	0.00		0
California		Apple Valley	03/14	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	1586.5 gal,21 batt	366
California		29 Palms	03/14	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	179 gal,10 batt	84
California		Yucca Valley	03/14	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	423 gal,9 batt	150
California		Westwood	03/15	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	212,683 lbs	1600
California		Romona	03/21	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	15969 lbs	137
California		Northrop	03/21	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	137212 lbs	1535
California		Needles	03/25	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	50.5 gal,1 batt	11
California		USCD	03/28	/92	San Diego City	Donna Skinner	619-492-5006	Greenfield Environme	619-431-5500	0.00	30619 lbs	360
California		Carlsbad	03/28	/92	San Diego County	Pam JAckson	619-338-2175	Greenfield Environme	619-431-5500	0.00	17366 lbs	264
California		Palo Alto	04/04	/92	Santa Clara County	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Escondido	04/04	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	24879 lbs	359
California		Santa Barbara	04/04	/92	Santa Barbara Cnty D	Karen Feeney	805-963-0583	MSE, Environmental	805-987-0217	61206.18	795 gl. 53 bat. 96 d	475
California		Oceanside	04/05	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	15723 lbs	305
California		Calabasas	04/05	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	97629 lbs	1093
California		Patrick Henry	04/11	/92	San Diego City	Donna Skinner	619-492-5006	Greenfield Environme	619-431-5500	0.00	22149 lbs	333
California		San Marcos	04/11	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	28378 lbs	383
California		Dominguez Hills	04/11	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	112921 lbs	904
California	BOP	Rancho Cucamonga	04/11	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	2099.5 gal,220 batt	667
California		Yucalpa	04/11	/92	San Bernadino	Judy Orttung	714-387-4629			0.00	1864 gal,160 batt	439
California		El Cajon	04/25	/92	San Diego County	Pam Jackson	618-338-2175	Greenfield Environme	619-431-5500	0.00	52589 lbs	496
California		Encinitas	04/25	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	28746 lbs	454
California		Claremont	04/25	/92	City of Claremont			Greenfield Environme	619-431-5500	0.00	52845 lbs	805
California		Fallbrook	04/26	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	48598 lbs	506
California		Phelan Wrightwood	04/29	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	453 gal,1 batt	66
California		Palo Alto	05/02	/92	Santa Clara County	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Imperial Beach	05/02	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	19193 lbs	259
California	B@^	Escondido	05/02	/92	City of Escondido	Teri Edelbrock	619-741-4610	Greenfield Environme	619-431-5500	0.00	33066 lbs	380
California		Montclair	05/02	/92	San Bernadino	Judy Orttung	714-387-4629			0.00	680.1 gal,27 batt	209
California		Julian	05/09	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	9237 lbs	66
California		Granada Hills	05/09	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	231,672 lbs	2192
California	$	Placerville	05/09	/92	County of El Dorado	Rebecca Post	916-621-5300	Greenfield Environme	619-431-5500	0.00	33000 lbs	260
California		Santee	05/10	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	2413 lbs	501

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STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
California	$	South Lake Tahoe	05/10	/92	County of El Dorado	Rebecca Post	916-621-5300	Greenfield Environme	619-431-5500	0.00	10000 lbs	220
California		Sunnyvale	05/16	/92	Santa Clara County	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		La Mesa	05/16	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-461-5500	0.00	56216 lbs	654
California		Cotton	05/16	/92	San Bernadino	Judy Orttung	714-387-4629			0.00	615 gal,28 batt	160
California		Highland	05/16	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	732 gal,51 batt	207
California		Santa Cruz	05/23	/92	Santa Cruz County	Jeanne Boudreau	408-761-4150	Green Alternatives	800-345-3363	0.00		0
California		Spring Valley	05/23	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield environme	619-431-5500	0.00	40134 lbs	460
California		Oakdale	05/23	/92	County of Stanislaus	Mr. Richards	209-525-4150	Greenfield Environme	619-431-5500	0.00	25046 lbs	155
California		Edwards Air Force Ba	05/30	/92	Kern County	Lynn Berman	805-861-2159	Green Alternatives	800-345-3363	0.00		0
California		Vista	05/30	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	26986 lbs	280
California		West Covina	05/30	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	175203 lbs	2166
California		Toulumne Cnty	06/00	/92	Toulouume Cnty	Mark Rappaport	209-533-5500			44151.00	440 gal	446
California		Palo Alto	06/06	/92	Santa Clara County	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		South East S.D.	06/06	/92	San Diego City	Donna Skinner	619-492-5006	Greenfield Environme	619-431-5500	0.00	20323 lbs	260
California	B@*	Escondido	06/06	/92	City of Escondido	Teri Elderbrock	619-741-4610	Greenfield Environme	619-431-5500	0.00	11433 lbs	230
California		Loma Linda	06/10	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	263 gal,52 batt	107
California		Carlsbad	06/13	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	33770 lbs	571
California		Humbolt(2 days)	06/20	/92	Humbolt County			Green Alternatives	800-345-3363	0.00		0
California		L.A. Downtown	06/20	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	76000 lbs	625
California		Torrance	06/27	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	145515 lbs	2304
California		Grand Terrace	06/27	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	160 gal,21 batt	66
California		Lake Arrowhead	06/27	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	1301 gal,81 batt	352
California	BOP	Big Bear	06/27	/92	San Bernadino Cnty	Judy Orttung	714-387-4629			0.00	2624 gal,105 batt	475
California		Palo Alto	07/11	/92	Santa Clara County	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Glendora	07/11	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	100885 lbs	1650
California		Van Nuys	07/18	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	197,673 lbs	2180
California		Westchester	07/18	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	122,155 lbs	1680
California		Mendicino County	07/25	/92	Medicino County	Roger Foot	707-463-4666			0.00		340
California	$/	San Rafael	08/01	/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Palo Alto	08/01	/92	Santa Clara County	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Pittsburg	08/02	/92	County of Contra Cos			Greenfield Environme	619-431-5500	0.00	4424 lbs	23
California		Poway	08/08	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	29598 lbs	436
California		Oceanside	08/08	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	52520 lbs	616
California		Santa Anita	08/08	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	219857 lbs	2954
California	$/	Mill Valley	08/15	/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Humbolt	08/15	/92	Humbolt County			Green Alternatives	800-345-3363	0.00		0
California		Northrop	08/15	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	84507 lbs	1211
California		Tomales	08/22	/92	Marin County	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Point Reyes	08/23	/92	Marin County	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Bolinas	08/23	/92	Marin County	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Nicasio	08/24	/92	Marin County	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Mill Valley	08/25	/92	Marin County	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Santee	08/29	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	91555 lbs	789
California		Palo Alto	09/05	/92	Santa Clara County	Isao Kobashi	408-441-1195	Green Alternatives	800-345-3363	0.00		0
California		Novato	09/07	/92	Marin County	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Somona	09/12	/92	Somona County			Green Alternatives	800-345-3363	0.00		0
California		Carlsbad	09/12	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	34586 lbs	465
California		Downey	09/12	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	115903 lbs	1760
California	B@*	Escondido	09/12	/92	City of Escondido	Teri Elderbrock	619-741-4610	Greenfield Environme	619-431-5500	0.00	22803 lbs	302
California		Placerville	09/12	/92	County of El Dorado	Rebecca Post	916-621-5300	Greenfield Environme	619-431-5500	0.00	34551 lbs	392
California		Mission Bay	09/19	/92	San Diego City	Donna Skinner	619-492-5006	Greenfield Environme	619-431-5500	0.00	71690 lbs	800
California		Canoga Park	09/19	/92	Los Angeles City	John Moore	213-893-8536	Greenfield Environme	619-431-5500	0.00	323,500 lbs	2852
California		San Rafael	09/21	/92	Marin County	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California	$/	Novato	09/26	/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00	5727.25 lbs	461
California		Fallbrook	09/26	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	34848 lbs	400
California		La Mesa	09/26	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	33754 lbs	493
California	B@*	Oakland	10/03	/92	Placer County	Henry Renteria	510-238-3938	Green Alternatives	800-345-3363	0.00		2530
California		Campo	10/03	/92	San Diego County	Pam Jackson	619-338-2175	Greenfield Environme	619-431-5500	0.00	10933 lbs	71
California		Santa Fe Springs	10/03	/92	Los Angeles County	Joe Reilly	213-699-7411	Greenfield Environme	619-431-5500	0.00	33732 lbs	583

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STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
California		Vacaville	10/17	/92	Vacaville Sanitary	Archie Humphries	707-446-2945	RES	510-226-1600	0.00		1800
California	$/	Tomales	10/31	/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California	$/	Pt. Reyes	11/01	/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
California		Camarillo	11/14	/92	Ventura Reg Sanit Di	Norma Camacho	805-654-2809	NORCAL	415-330-1109	0.00		1543
California	BR	Marin County	12/	/92	Marin Recycling Cent	Barbara Thunen	415-499-6647	MERECO	518-785-1703	0.00	6446 batteries	191
California	$/	San Rafael	12/05	/92	Marin Cnty Office	Gina Purin	415-499-6647	Greenfield Environme	619-431-5500	0.00		0
Colorado	*	Estes Park		/92	Larimer Cnty Dept Na	Janelle Henderson	303-498-5771	Laidlaw Environmenta	800-251-1227	10100.00	4350 gal,13075 lbs	150
Colorado	*	Ft. Collins		/92	Larimer Cnty Dept Na	Janelle Henderson	303-498-5771	Laidlaw Environmenta	800-251-1227	197500.00	422555 lbs	2032
Colorado	*	Boulder		/92		Hilary Collins	303-441-3900			0.00	2480 gal,12000 lbs	629
Colorado		Golden	05/15	/92	Jefferson County	Mark Loye	303-271-5806			131715.43	56295 lbs	2161
Colorado		Commerce City	09/19	/92	Adams County	Cynthia Bosco	303-287-5249	Heritage Environment	800-998-1390	0.00		0
Connecticut	*	New Haven		/92	Haz Waste Central	Suzanna Rumon	203-624-6671	Laidlaw	508-683-1002	0.00		9857
Connecticut		Andover	04/25	/92	Town of Andover	Adel Urban	203-228-0100	Laidlaw Environmenta	508-683-1002	0.00	44 drums	0
Connecticut		Manchester	04/25	/92		Louise Guarnaccia	203-647-3248	Laidlaw Environmenta	508-683-1002	0.00		0
Connecticut		New Britian	05/02	/92	Town of New Britian	Joseph Carilli	203-826-3391	Laidlaw Environmenta	508-683-1002	0.00	97 drums	0
Connecticut		Farmington	05/02	/92	Town of Farmington	Planning Dept	203-673-8200	Triumvirate Enviro	617-269-9000	0.00		0
Connecticut		Farmington	05/09	/92		Elizabeth Dolphin	203-647-3248	Laidlaw Environmenta	508-683-1002	0.00		0
Connecticut		Newington	05/16	/92	NDC Hazwaste	Suzanna Rumon	203-278-7853	TEI	617-269-9000	39782.00	104 Drums	446
Connecticut		Norwell	05/16	/92	Town of Norwell	Diane Beltz	203-854-7750	Laidlaw Environmenta	508-683-1002	0.00	97 drums	0
Connecticut		Westport	05/16	/92	Town of Westport	Denis McCarthy	203-227-1511	Laidlaw Environmenta	508-683-1002	0.00	77 drums	0
Connecticut		Groton	05/16	/92	Town of Groton	Diane Small	203-441-6720	Laidlaw Environmenta	508-683-1002	0.00	68 drums	0
Connecticut		Wethersfield	05/30	/92	NDC Hazwaste	Suzanna Rumon	203-278-7853	TEI	617-269-9000	26962.00	79 Drums	437
Connecticut		Plainville	05/30	/92		Robert Finn	203-228-9406	Laidlaw Environmenta	508-683-1002	0.00		0
Connecticut		Plainville	05/30	/92	Town of Plainville	Health Dept	203-793-0221	Triumvirate Enviro	617-269-9000	0.00		0
Connecticut		Waterford	06/06	/92	Town of Waterford	George Calkins	203-777-0001	Laidlaw Environmenta	508-683-1002	0.00	100 drums	0
Connecticut		East Windsor	06/06	/92	Town of East Windsor	Recycling Dept	203-623-8121	Triumvirate Enviro	617-269-9000	0.00		0
Connecticut		Windsor	06/13	/92	NDC Hazwaste	Suzanna Rumon	203-624-6671	TEI	617-269-9000	27642.00	78 Drums	354
Connecticut		Windsor	06/13	/92	NDC	Suzanna Rumon	203-624-6671	TEI	617-269-9000	27642.00	78 55-gal drums	354
Connecticut		Hartford	06/27	/92	NDC	Suzanna Rumon	203-624-6671	TEI	617-269-9000	9922.50	28 55-gal drums	101
Connecticut		Woodbridge	07/10	/92	Town of Woodbridge	Suzanna Rumon	203-624-6671	Laidlaw Environmenta	508-683-1002	0.00	20 drums	0
Connecticut		Fairfield	07/25	/92	S. Ct Reg Water Auth	Suzanna Rumon	203-624-6671	Laidlaw Environmenta	508-683-1002	0.00	97 drums	0
Connecticut		New Milford	09/12	/92	New Milford	Suzanne Emick	203-355-6035	Laidlaw Environmenta	508-683-1002	0.00	76 drums	0
Connecticut		Cheshire	09/19	/92	S. CT Reg Water Auth	Suzanna Rumon	203-624-6671			0.00		0
Connecticut		Darien	10/03	/92	Town of Darien	DPW		Triumvirate Enviro	617-269-9000	0.00		0
Connecticut		Enfield	10/10	/92	Town of Enfield	Walter Markett	203-749-2379	Laidlaw Environmenta	508-683-1002	0.00	125 drums	0
Connecticut		Windsor Locks	10/17	/92	Windsor Locks	Joel Levin	203-627-1444	Laidlaw Environmetna	508-683-1002	0.00	47 drums	0
Connecticut		Goshen	10/24	/92	Torrington	Lithchfield Hills		Triumvirate Enviro	617-269-9000	0.00		0
Connecticut		Trumbull	10/24	/92	Town of Trumbull	DPW	203-452-5045	Triumvirate Enviro	617-269-9000	0.00		0
Connecticut		Bethel	11/07	/92	Housatonic Valley Co	Housatonic Valley		Triumvirate Enviro	617-269-9000	0.00		0
Delaware	*	Sussex County		/92						0.00		0
Florida	*	Daytona Beach		/92	Volusia Cnty SW Dept	Susan Gaze	904-239-7766	Volusia SW Dept	904-239-7766	0.00		0
Florida	*	Sarasota 1		/92	Sarasota Cnty SWD	Dennis Laabs	813-364-4488	Laidlaw Environmental	813-573-1405	0.00	495 Barrels	0
Florida	*	Vero Beach		/92	Indian River Cnty SW	Stacy Strickland	407-569-0050	Laidlaw Environmental	800-421-0553	118421.00	62460 Lbs	2666
Florida	*$	Palm Beach		/92	SWA of Palm Beach Cn	David Gregory	407-687-1100	Laidlaw Environmental	800-421-0553	374660.00	454 drums	3421
Florida	*$	Fort Pierce		/92	St. Lucie Cnty SWD	Wilfredo Cordero	407-468-1768	Laidlaw Environmenta	800-421-0553	92059.00	24703 gal,24865 lbs	708
Florida	*	Brevard County		/92	Brevard Cnty Board	Beborah Lugar	407-633-2043	Laidlaw Environmenta	800-421-0553	387705.00		467
Florida	*	Collier County		/92	Collier County	Keith Kipps	813-774-8258			0.00		984
Florida	*	Pinellas County		/92	Pinellas County	Martha Gray	813-892-7720			0.00		0
Florida	*	Duval County		/92	Duval County	Steve Waterman	904-630-0973			0.00		0
Florida	*	Jensen Beach		/92	Martin County	Dana Hansen	407-286-5700			0.00	39636 lbs	682
Florida	*	Monroe County		/92	Monroe County	Ron Stack	305-292-4432			0.00	62000 lbs	1802
Florida	*	Orange County		/92	Orange County	Judy Swartwood	407-273-3730			0.00	480000 lbs	1752
Florida	*	Osceola County		/92	Osceola County	Chris Pappas	407-847-4481			0.00	48396 lbs	5724
Florida	*	New Port Richey		/92	Pasco Cnty Dept SW	Farouk El-Shamy	813-847-8041	Quadrex Environmenta	904-373-6066	0.00		0
Florida	$	Madison		/92	Madison Cnty	Jerome Thompson	904-973-3700	Quadrex Environmenta	904-373-6066	0.00		0
Florida	$	Jasper		/92	Hamilton Cnty	Jim Smith	904-792-1020	Quadrex Environmenta	904-373-6066	0.00		0
Florida		Green Cove Springs		/92	Clay Cnty	Gregory Pitts	904-269-6374	Quadrex Environmenta	904-373-6066	0.00		0
Florida	*	Sarasota 2		/92	Jackson Rd. Transfer	Dennis Laabs	813-364-4488	Laidlaw Environmenta	813-573-1405	15211.75	6277 lbs	0
Florida	*	Alachua Cnty #1		/92	Alachua Cnty	Chris Bird	904-336-2442			0.00		0

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STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
Florida	*	Alachua Cnty #2		/92	Alachua Cnty	Chris Bird	904-336-2442			0.00		0
Florida	*	Alachua Cnty #3		/92	Alachua Cnty	Chris Bird	904-336-2442			0.00		0
Florida	*	Alachua Cnty #4		/92	Alachua Cnty	Chris Bird	904-336-2442			0.00		0
Florida	*	Alachua Cnty #5		/92	Alachua Cnty	Chris Bird	904-336-2442			0.00		0
Florida	*	Alachua Cnty #6		/92	Alachua Cnty	Chris Bird	904-336-2442			0.00		0
Florida	*	Lake County		/92	Lake Cnty Board of C	Jennifer Hobbs	904-343-9619			0.00		0
Florida	*	Seminole County		/92	Seminole County	John Hauserman	407-323-9615			0.00		0
Florida		Punta Gorda	01/25	/92	Charlotte County	Barbara Kula	813-639-1349			0.00		0
Florida		Punta Gorda	02/08	/92	Charlotte County	Barbara Kula	813-639-1349			0.00		0
Florida	$>	Sarasota County	02/15	/92	Amnesty Day	Daeenis Laabs	813-364-4488	Laidlaw Environmenta	813-573-1405	27350.05	19748 lbs	285
Florida	$	Pasco County	02/29	/92	Pasco County	Farouk El-Shamy	813-847-8041	Quadrex Environmenta	904-373-6066	35914.50	25760 lbs	250
Florida		Highlands County	02/29	/92	Highlands County	Christy Reed	813-655-4288			26589.00	16860 lbs	178
Florida	$>	Sarasota County	02/29	/92	Amnesty Day	Dennis Laabs	813-364-4488	Laidlaw Environmenta	813-573-1405	16225.07	7034 lbs	113
Florida		Punta Kula	03/21	/92	Charlotte County	Barnara Kula	813-639-1349			0.00		0
Florida	$	Sarasota County(2 dy	03/21	/92	Amnesty Day	Dennis Laabs	813-364-4488	Laidlaw Environmenta	813-573-1405	128468.51	91021 lbs	1099
Florida	$	Sarasota County(2 dy	03/28	/92	Amnesty Day	Dennis Laabs	813-364-4488	Laidlaw Environmenta	813-573-1405	93048.77	70297 lbs	1138
Florida	^	Melbourne(3 days)	04/	/92	Brevard Cnty SW Mgt	Deborah Lugar	407-633-2043	Laidlaw	800-421-0553	0.00		1461
Florida		Desoto County	04/04	/92	Desoto County	Anne Alley	813-993-4826			7327.50	1750 lbs	36
Florida	$	Hamilton County	04/04	/92	Hamilton County	Jim Smith	904-792-1020	Quadrex Environmenta	904-373-6066	14526.75	12826 lbs	22
Florida		Punta Gorda	04/11	/92	Charlotte County	Barbara Kula	813-639-1349			0.00		0
Florida	$	Dade County(2 days)	04/11	/92	Dade Cnty DSW Mgt	Cindy Dwyer	305-594-1585	Quadrex Environmenta	904-373-6066	89355.00	103156 lbs	1269
Florida		Seminole County	04/11	/92	Seminole County	John Hauserann	407-322-7605			30737.00	28073 lbs	490
Florida	$>	Sarasota County	04/11	/92	Amnesty Day	Dennis Laabs	813-364-4488	Laidlaw Environmenta	813-573-1405	25965.94	16141 lbs	454
Florida		Gainesville(3 days)	04/23	/92	Alachua County	Chris Bird	904-336-2442	Quadrey Environmenta	904-373-6066	79014.00	139101 lbs	2292
Florida		Orange County(2 days	04/25	/92	Orange County	Dan Carrington	407-836-7400			146274.00	193323 lbs	1218
Florida	$	Clay County(2 days)	04/25	/92	Clay County	Pitts	904-284-6394	Quadrex Environmenta	904-373-6066	19262.50	30962 lbs	248
Florida		Pompano Beach	05/01	/92	Broward County	Al Gomez	305-970-1154			143358.24	86,821 lbs	682
Florida	$	Leon County(2 days)	05/01	/92	Leon County	Rosemary Bottcher	904-922-0400	Quadrex Environmenta	904-373-6066	39111.75	61472 lbs	600
Florida	$	Putnam(2 days)	05/15	/92	Putnam County	Joe Battillo	904-329-0396	Quadrex Environmenta	904-373-6066	16611.75	17495 lbs	141
Florida		Lee County(2 days)	06/05	/92	Lee County	Rick Clontz	813-335-2432			112527.27	110473 lbs	1760
Florida		Citrus County	06/06	/92		Cathy Winters	904-746-5000			20171.95	17486 lbs	460
Florida		Jensen Beach	06/23	/92	Martin Cnty DSW	Dana Hansen	407-288-5700	Quadrex Environmenta	904-373-6066	10200.00	12130 lbs	0
Florida	$	Jensen Beach(2 days)	07/10	/92	Martin Cnty DSW	Dana Hansen	407-288-5700	Quadrex Environmenta	904-373-6066	12453.25	6654 lbs	1:
Florida		Lee County(2 days)	09/19	/92	Lee County	Rick Clontz	813-335-2432			0.00		0
Florida	$	Gainesville(3 days)	09/24	/92	Alachua County	Chris Bird	904-336-2442	Quadren Environmenta	904-373-6066	0.00		2521
Florida	^	Melbourne(3 days)	10/	/92	Brevard Cnty SW Mgt	Deborah Lugar	407-633-2043	Laidlaw Environmenta	800-421-0553	0.00		0
Florida	$	Miami(2 days)	10/17	/92	Dade County Dept SW	Cindy Dwyer	305-594-1585	Quadrex Environmenta	904-373-6066	0.00		0
Florida	$	Tallahassee	10/24	/92	Leon Cnty Div SW & R	Rosemary Bottcher	904-922-0400	Quadrex Environmenta	904-373-6066	0.00		0
Florida	$	St. Augustine(2 days	11/06	/92	St.Johns Cnty SW Dep	Michael Breit	904-823-9027	Quadrex Environmenta	904-373-6066	0.00		0
Florida		Palatka(2 days)	11/13	/92	Putnam County	Joseph Battillo	904-329-0395	Quadrex Environmenta	904-373-6066	0.00		0
Florida		Highlands County	11/14	/92	Highlands County	Christy Reed	813-655-4288			0.00		0
Florida		Lee County(2 days)	12/05	/92	Lee County	Rick Clontz	813-335-2432			0.00		0
Georgia	R!	Atlanta	05/02	/92	GA Dept of Natural R	Pamela Thomas	404-362-2537			0.00	1500 gal., 700 tires	0
Georgia		Atlanta	11/07	/92	GA Dept of Natural R	Pam Thomas	404-362-2692			0.00		0
Hawaii	$	Kauai(2 dys)	10/03	/92	Fereral Emergency Mg	Jane Dewell	808-586-4373			0.00		0
Hawaii		Oahu(2 days)	10/24	/92	Dept of Health,SW,&H	Jane Dewell	808-586-4373			0.00		0
Hawaii		Honolulu(2 days)	10/31	/92	Dept of Health, SW &	Jane Dewell	808-586-4373			0.00		0
Hawaii		Maui(2 days)	11/07	/92	Dept of Health, SW &	Jane Dewell	808-586-4373			0.00		0
Hawaii		Molokai	11/14	/92	Dept of Health,SW &	Jane Dewell	808-586-4373			0.00		0
Hawaii		Lanai	11/15	/92	Dept of Health, SW &	Jane Dewell	808-856-4373			0.00		0
Hawaii		Oahu(2 days)	11/21	/92	Dept of Health,SW &	Jane Dewell	808-586-4373			0.00		0
Hawaii		Kauai	11/28	/92	Dept Of Health, SW &	Jane Dewell	808-856-4373			0.00		0
Idaho	*	Kootenai County		/92	Kootenai County	Janie Fuhrman	208-344-5879			0.00		0
Idaho	$	Moscow	04/25	/92	City of Moscow	Bill Smith	208-882-5553	Chem-Safe Services	509-968-3973	7590.00	1170 Gallons	450
Idaho		Boise	05/30	/92	City of Boise	Dave Neal	208-853-1296	Chem-Safe Services	509-968-3973	60950.00		1202
Idaho		Pocatello	06/13	/92	City of Pocatello	Ron Timpson	208-234-6163	Chem-Safe Services	509-968-3973	36300.00	1455 Lbs	0
Illinois	*	Naperville		/92	Naperville	Kris Karr	708-420-6088			0.00		0
Illinois		Centralia	03/28	/92	Centralia Clean & Gr	Connie Parker	618-533-7610	Clean Harbors	312-646-6202	0.00		232
Illinois		Peoria	04/04	/92	Peoria County Hlth D	Sam Churchill	309-685-6101	Cln Hrbrs/Hrtg Rmdtn	312-646-6202	0.00		2156

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STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
Illinois		Barrington	04/11	/92	Barn of Barrington	John Hines	708-381-7903	Heritage Remediation	708-378-1600	0.00		79[illegible]
Illinois		Ottawa	04/25	/92	LaSalle County Hlth	Greg Chance	815-433-3366	Clean Harbors	312-646-6202	0.00		5[illegible]4
Illinois		Elhurst	05/02	/92	City of Elmhurst	Dave Stauffer	708-530-3018	Clean Harbors	312-646-6202	0.00		100[illegible]
Illinois		Oak Park	05/02	/92	Village of Oak Park	Lilly Bradford	708-383-0090	Heritage Remediation	708-378-1600	0.00		[illegible]
Illinois		St. Charles	05/09	/92	City of St. Charles	Cliff White	708-377-4489	Heritage Remediation	708-378-1600	0.00		73[illegible]
Illinois		Mt. Prospect	09/12	/92		Mike Chandler	217-785-8604	Heritage	317-243-7475	0.00		1182
Illinois		Arura	09/19	/92		Mike Chandler	217-785-8604	Clean Harbors		0.00		1302
Illinois		Kankakee/Swansea	10/03	/92		Mike Chandler	217-785-8604	Clean Harbors/Herita		0.00		[illegible]
Illinois		Shelbyville	10/10	/92		Mike Chandler	217-785-8604	Heritage	317-243-7475	0.00		[illegible]
Illinois		Bloomington	10/17	/92		Mike Chandler	217-785-8604	Clean Harbors		0.00		[illegible]
Illinois		McLean County	10/17	/92	McLean County	Don Meyer		Clean Harbors		0.00	373.4 55-gallon drum	[illegible]
Illinois		Carry/Woodstock	10/24	/92		Mike Chandler	217-785-8604	Clean HArbor/Heritag		0.00		[illegible]
Indiana	@	Indianapolis(31 Site		/92	DPW / SWD	Jeff Miller	317-327-3332	Heritagr Remediation	317-243-0811	0.00	14605 gall	[illegible]
Indiana	*BR	Bloomington		/92	Monroe County SWMD	Jane St. John	812-333-3866	Heritage Environment		34264.00		41[illegible]
Indiana		Allan County		/92	Allen County	Tony Burrus	219-428-7265			40000.00	14000 lbs	[illegible]
Indiana	^D	Indianapolis	04/25	/92	DPW/ SWD	Jeff Miller	317-327-3332	Heritage Environment	800-998-1398	107167.00	15420 gal	160[illegible]
Indiana			07/25	/92		Jeff Miller	317-327-4589	Heritage Remediation	317-243-7475	0.00		800
Indiana		Indianapolis	07/25	/92	DPW/ SWD	Kathy Fisher	317-327-4889	Heritage Environment	800-998-1398	87096.00	11435 gal	800
Indiana		West Lafayette(2 dys	08/13	/92	Purdue University	David Scott	317-494-1587	Heritage Environment	800-998-1398	0.00		[illegible]
Indiana	^D	Indianapolis	09/12	/92	DPW / SWD	Kathryn Fisher	317-327-4889	Heritage Remediation	317-243-7475	95605.00	12715 gall	120[illegible]
Indiana		Fort Wayne	10/10	/92	Allen County	Anthony Burrus	219-428-7265	Chem Waste Mgt	708-513-4500	40000.00	14000 lbs	[illegible]
Iowa	*	Desmoines		/92	Demoines Metro Agenc	Kathy Kendall	515-244-0021	Chem Waste Mgt	708-369-9543	13000.00	140471 lbs	671[illegible]
Iowa		Calhoun County	05/16	/92	Calhoun County	Marlyin Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Colombus Junction	05/30	/92	Louisa County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		114
Iowa		Lee County	05/30	/92	Lee County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Lee County	06/06	/92	Lee County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Mt. Pleasant	06/06	/92	Henry County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Clinton County	06/06	/92	Clinton County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Mason City	09/12	/92	Saratoga County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Turin	09/12	/92	Mona County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Turin	09/12	/92	Plymouth County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Palo Alto	09/19	/92	Palo Alto	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Waukon	09/19	/92	Alamaka County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Forest City	09/19	/92	Winebego County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Harlen	09/26	/92	Shelby County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Cass County	09/26	/92	Cass County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Sax City	09/26	/92	Sax County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Jones County	10/03	/92	Jones County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Iowa		Howard County	10/03	/92	Howard County	Marilyn Krogulski	515-281-8308	Laidlaw Environmenta	800-845-1019	0.00		[illegible]
Kansas	*	Witchita		/92	City of Wichita	Alan Gremmel	316-268-8351	USPCI	316-268-9498	25666.00		16022
Kansas	*	Hutchinson		/92	Riley County			Laidlaw	615-643-0972	16700.00	110 gal	[illegible]
Kansas	*	Leavenworth		/92	Leavenworth Cnty Boa	Joe Daniels	913-684-0730	Chemical Waste Mgt	708-513-4500	36500.00		17002
Kansas	*	Ottawa		/92	Franklin County	Ray DeJulio	913-242-1176	Laidlaw Environmenta	800-251-1227	25085.00	5975.65 lbs	280
Kansas	*@C	Olathe		/92	City of Olathe	Diane Utz	913-764-6477	Laidlaw Environmenta	800-251-1227	45955.00	2461 gal,35 lbs,400	1960
Kansas	*	Great Bend		/92	Barton County	Austin Boyd	316-793-1894			0.00		[illegible]
Kansas	*	Hays		/92	Ellis Cnty	Gene Wellbrook	913-625-4458			0.00		[illegible]
Kansas	*	Paola		/92	Miami County	Chuck Hadsall	913-294-5859			0.00		[illegible]
Kansas	*	Riley County		/92	Riley County	Dennis Peterson	913-539-3202	Chem Waste Mgt	708-513-4500	0.00		[illegible]
Kansas	*	Harvey County		/92	Harvey County	Roy Patton	316-283-1890			0.00		[illegible]
Kansas	*	Reno County		/92	Reno County	Cindy Kidd	316-694-2565	Laidlaw	615-643-0972	33365.00	1325 gal,4054 lbs	[illegible]
Kentucky	@	Frankfort	04/16	/92	Walmart/NAPA/Valvoli	Steve Baigandi	502-564-6716			0.00	Recycled oil only	[illegible]
Kentucky		Georgetown	04/25	/92	Toyota	Kim McCann	606-258-3784	Chem Waste Mgt	708-305-0877	0.00		[illegible]
Kentucky	^D	Lexington	07/11	/92	Lexington Division E	Kim Dozier	606-258-3784			0.00		500
Kentucky		Louisville	08/08	/92	Metro Sewer District	Cass Harris	502-625-6510	Chem Waste Mgt	708-305-0877	0.00	34000 lbs	302
Kentucky		Louisville	09/12	/92	Metro Sewer District	Cass Harris	502-625-6510	Chem Waste Mgt	708-305-0877	0.00	34000 lbs	1030
Kentucky		Louisville	10/10	/92	Jefferson County	Cass Harris	502-625-6510	Chem Waste Mgt	708-305-0877	0.00		[illegible]
Louisiana	^D	Baton Rouge	05/02	/92	Dow,USA	Lynne Hanrahan	504-389-6089	Dow Chemical		0.00	72,000 lbs	500
Maine	^	Kittery		/92	Town of Kittery	Richard Rossiter	207-439-0333	Toyal Waste Mgt	603-431-2420	0.00	4-55 gal drums	[illegible]
Maine	BR	Rockport		/92	Rockport	Christine Barstow	207-236-4708	HERECO		0.00		[illegible]

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
Maryland	*	Montgomery County		/92	Dept of EP	Arom Trombka	301-217-2380			0.00		0
Maryland		Purtlesville	03/28	/92		Karen Napolitano	301-925-5872	Laidlaw Environmenta		0.00		0
Maryland		Anne Arundel Conuty	06/06	/92	Anne Arundel County	Susan Combs	301-222-6103	Laidlaw		0.00		871
Maryland		Largo	06/28	/92		Karen Napolitano	301-925-5872	Laidlaw Environmenta		0.00		0
Maryland		Anne Arundel Cnty	10/03	/92	Anne Arundel County	Susan Combs	301-222-6103	Laidlaw		0.00		0
Maryland		Buyo	10/18	/92		Karen Napolitano	301-925-5872			0.00		0
Massachusetts	*	Sturbridge		/92	Sturbridge Brd of Hl	George Berry	508-342-2504	Laidlaw	508-683-1002	0.00		1600
Massachusetts	*	Martha's Vineyard		/92	Martha's Vineyard Re	Russell Smith	508-698-3479	Laidlaw Northeast	508-683-1002	0.00		0
Massachusetts		Stoughton		/92	Town of Yarmouth	Health Dept	617-341-1300	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Maynard		/92	Town of Maynard	Health Dept	508-897-1002	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Nantucket	03/28	/92	Town of Natucket	Paula Pequignot	508-228-7244	Clean Harbors,Natick	508-655-8863	19500.00	2265 gal drums	0
Massachusetts		Belchertown	04/11	/92	Town of Belchertown	Richard Cook, Sr	413-323-0403	Clean Harbor,Natick	508-655-8863	11000.00	3300 gallons	0
Massachusetts		Foxboro	04/11	/92	Foxboro Health Dept		508-543-1207	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Mansfield	04/18	/92	Town of Mansfield	Health Dpet	508-261-7366	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts	\	Pittsfield	04/25	/92	General Electric			Clean Harbors,Natick	508-655-8863	40000.00	3985 gal. drums,50 l	400
Massachusetts		Weymouth	04/25	/92				Laidlaw Environmenta	508-683-1002	0.00		0
Massachusetts		West Springfield	04/25	/92	Town of West Springf	Albert Laborati	413-781-7550	Laidlaw Environmenta	508-683-1002	0.00	44 drums	0
Massachusetts		Provincetown	04/25	/92	Town of Provincetown	Health Dept	508-487-2663	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Truro	04/25	/92	Town of Truro	Health Dept	508-349-3635	Triumvirate Enviro	619-269-9080	0.00		0
Massachusetts		Acton	05/02	/92	Town of Acton	Health Dpet	508-264-9634	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Danvers	05/09	/92	Town of Danvers	Jack Kozuchowski	203-797-4625	Laidlaw Environmenta	508-683-1002	0.00	41 drums	0
Massachusetts		Chelmsford	05/09	/92	Town of Chelmsford	Richie Day	508-250-5241	Laidlaw Environmenta	508-683-1002	0.00	18 drums	0
Massachusetts		Pepperell	05/09	/92	Town of Pepperell	Cheryl Campbell	508-433-0328	Laidlaw Environmenta	508-683-1002	0.00	35 drums	0
Massachusetts		Wrentham	05/09	/92	Wrentham	Maureen O'Sulnick	617-565-1500	Laidlaw Environmenta	508-683-1002	0.00	33 drums	0
Massachusetts		East Bridgewater	05/16	/92	Browing Ferris Ind.	Richard Martini	508-588-2260	Clean Harbors,Natick	508-655-8863	21500.00	1210 gallons,4 lbs	0
Massachusetts		Brookline Village	05/16	/92	Town of Brookline	Francis Marnell	617-730-2195	Clean Harbors,Natick	508-655-8863	19000.00	1895 gallons, 4 lbs	0
Massachusetts		Marion	05/16	/92	Carver,Marion,Wareha	Edmund Florindo,Jr	508-748-3550	Clean Harbors,Natick	508-655-8863	19200.00	1715 gallon drums	0
Massachusetts		Marthas Vineyard	05/16	/92		Russell Smith	508-698-3479	Laidlaw Environmenta	508-683-1002	0.00		0
Massachusetts		Burlington	05/16	/92	Town of Burlington	Health Dept	617-270-1600	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Westwood	05/19	/92	Westwood	Cass Goldwater	617-461-8249	Laidlaw Environmenta	508-683-1002	0.00	51 drums	0
Massachusetts		Weymouth	05/25	/92	City of Weymouth	Joe Mazzotta	617-337-5100	Laidlaw Environmenta	508-683-1002	0.00	50 drums	0
Massachusetts		Carlisle	05/30	/92	Town of Carlisle	Teri West	508-369-5924	Clean Harbors,Natick	508-655-8863	16000.00	1170 gallons,50 lbs	0
Massachusetts		Athol	05/30	/92	Town of Athol	DPW	508-249-4542	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Arherst	06/06	/92	Town of Arherst	Barry DelCastilho	413-256-4077	Clean Harbor,Natick	508-655-8863	16425.00	1755 Drums	150
Massachusetts		Medfield	06/06	/92	Medfield,Dover,Sherb	Erin Pastuszenski	508-359-8505	Clean Harbors,Natick	508-655-8863	8000.00	200 gallon drums	0
Massachusetts		Fall River	06/06	/92	Browing Ferris Ind.,			Clean Harbors,Natick	508-655-8863	10500.00	937 Gal. drums,4 lbs	0
Massachusetts		Framinghan	06/06	/92	Town of Framinghan	Edward Skinner	508-626-4862	Laidlaw Environmenta	508-683-1002	0.00	70 drums	0
Massachusetts		Nantucket	06/13	/92	Town of Natucket	Paula Pequignot	508-228-7244	Clean Harbors,Natick	508-655-8863	19500.00	2265 gal drums	0
Massachusetts		Boston	06/13	/92	City of Boston	Environment Dept	617-725-4416	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Wilbrahar	06/13	/92	Town of Wilbrahar	Recycling Dept	413-596-8111	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Peabody	06/27	/92	City of Peabody	Health Dept	508-532-3000	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		South Yarmouth	06/27	/92	Town of Yarmouth	Health Dept	508-398-2231	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Westport	08/08	/92	Town of Westport	Selectmen's Office	508-636-1003	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Falmouth	08/22	/92	Town of Falmouth	Health Dept	508-548-7611	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Sandwich	08/22	/92	Town of Sandwich	Highway Dept	508-833-8002	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Chathan	08/29	/92	Town of Chathan	Health Dept	508-945-2793	Triumvirate Enviro	617-269-9060	0.00		0
Massachusetts		Cohasset	09/12	/92	Town of Cohasset	Richard Henders	617-383-9000	Laidlaw Environmenta	508-683-1002	0.00	26 drums	0
Massachusetts		Westford	09/19	/92	City of Westford	Elizabeth Michaud	509-692-8681	Laidlaw Environmenta	508-683-1002	0.00	28 drums	0
Massachusetts		Sharon	09/23	/92	Town of Sharon	DPW	617-784-1525	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Dennis	09/26	/92	Town of Dennis	Health Dept	508-394-1313	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Gloucester	09/26	/92	Town of Gloucester	Erin Battistelli	508-281-9850	Laidlaw Environmenta	508-683-1002	0.00	34 drums	0
Massachusetts		Westford	09/26	/92	Westford	Elizabeth Michaud	508-692-8683	Laidlaw Environmenta	508-683-1002	0.00	34 drums	0
Massachusetts		Sudbury	10/03	/92	Town of Sudbury	Robert Leupold	508-443-6891	Laidlaw Environmenta	508-683-1002	0.00	33 drums	0
Massachusetts		Weston	10/17	/92	Town of Weston	Town Administrator	617-893-7320	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Harwich	10/17	/92	Town of Harwich	Paula Champagne	508-430-7509	Laidlaw Environmenta	508-683-1002	0.00	26 drums	0
Massachusetts		Wayland	10/17	/92	Wayland	Debbie Halco	508-358-7728	Laidlaw Environmenta	508-683-1002	0.00	26 drums	0
Massachusetts		Franklin County	10/24	/92	Franklin County	Lynn Rubenstein	617-772-1536	Laidlaw Environmenta	508-683-1002	0.00	106 drums	0
Massachusetts		Norwell	10/24	/92	City of Norwell	George Cavanaugh	617-659-8158	Laidlaw Environmenta	508-683-1002	0.00	22 drums	0
Massachusetts		Dedhan	10/25	/92	Town of Dedhan	Health Dept	617-326-0540	Triumvirate Enviro	617-269-9080	0.00		0

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
Massachusetts		Wellfleet	10/31	/92	Town of Wellfleet	Health Dept	508-349-0308	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Lowell	10/31	/92	City of Lowell	DPW-Health Dept	508-970-3306	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Southwick	10/34	/92	Town of Southwick	Health Dept	413-569-1212	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Littleton	11/07	/92	Town of Littleton	Highway Dept		Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Belmont	11/07	/92	Town of Belmont	Donna Moultrop	617-489-8249	Laidlaw Environmenta	508-683-1002	0.00	54 drums	0
Massachusetts		Franklin	11/07	/92	City of Franklin	Richard Slein	508-540-4949	Laidlaw Environmenta	508-683-1002	0.00	27 drums	0
Massachusetts		Middleton	11/07	/92	City of Middleton	Louise Kres		Laidlaw Environmenta	508-683-1002	0.00	33 drums	0
Massachusetts		Cambridge	11/14	/92	City of Cambridge	Health Dept	617-498-1468	Triumvirate Enviro	617-269-9080	0.00		0
Massachusetts		Dartmouth	11/21	/92	Town of Dartmouth	Conservation Commiss	508-998-0722	Triumvirate Enviro	617-269-9080	0.00		0
Michigan	*	Macomb County		/92	Macomb County Hlth D	Bob MacDonald	313-469-5236	Drug and Lab	616-685-9824	19150.00		275
Michigan	#*	Hart		/92	District Health Dept	Mark Hill	616-873-2193	Drug & Laboratory	616-685-9824	0.00		0
Michigan	*	Detroit		/92	City of Detroit	Carl Marshall	313-923-2240	City Environmental	313-923-0080	0.00	663.5 drums,1980 gal	0
Michigan	*	Three Rivers		/92	St. Joseph County	Ton Wilson	616-279-5444	Chem Waste Mgt	708-305-0877	0.00		0
Michigan	BR	Detroit		/92	Battery Solutions, I	Chris Sova	313-467-9110			0.00	3156 lbs	0
Michigan	*	Kent County		/92	Kent County DPW	Donna Engstrom	616-774-6892	Dow Chemical USA	517-636-6766	0.00		0
Michigan	*	Ingham County		/92	Ingham Cnty Health D	Bob Ceru	517-887-4312	Dow Chemical USA	517-636-6766	0.00		0
Michigan	*	Kalamazoo		/92	Kalamazoo Cnty Hum S	Tom Devhirst	616-384-8084	Dow Chemical	517-363-6766	0.00		0
Michigan	*	Iron Mountain		/92	Dicinson Cnty	Judy Schafer	906-524-7503			0.00		0
Michigan	*	Berrien County		/92	SE Berrien Cnty Land	Debra Davino	515-683-4700			0.00		0
Michigan		Allaegan	02/10	/92	Allaegan Cnty Health	Bill Hinz	616-673-5415	Drug & Laboratory	616-685-9824	0.00		0
Michigan		Marquette	02/21	/92	Marquette County	Steve Kotamieni	906-249-4125	Drug & Laboratory	616-685-9824	0.00		0
Michigan		Holland	03/28	/92	City of Holland	Roger Stroh	616-394-1365	Drug & Laboratory	616-685-9824	0.00		0
Michigan		Ann Arbor	04/03	/92	Washtenaw Cnty Health	Doug Spencer	313-994-2542	Drug & Laboratory	616-685-9824	0.00		0
Michigan		Wixom	04/25	/92	City of Wixom	A.J. Novak	708-305-0877	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		Grand Haven	04/28	/92	Ottawa County	Brenda Kling	616-846-8295	Drug & Laboratory	616-685-9824	0.00		0
Michigan	(2)	Smith Creek	04/29	/92	St. Clair Cnty	Robin Krenke	313-367-3061	Drug & Laboratory	616-685-9824	0.00		0
Michigan	"CB	Battle Creek	04/30	/92	Calhoun Cnty Health	Ted Havens	616-781-0771	Drug & Laboratory	616-685-9824	99121.00		500
Michigan		Farmington Hills	05/02	/92	City of Farmington	A.J. Novak	708-305-0877	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		Southfield	05/09	/92	City of Southfield	A.J. Novak	708-305-0877	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		Muskegon	05/16	/92	Muskegon County	Robert Ribbens	616-724-6411	Drug & Laboratory	616-685-9824	0.00		0
Michigan		Livonia	05/16	/92	City of Livonia	A.J. Novak	708-305-0877	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		Muskegon	06/04	/92	Muskegon County DPW	Robert Ribbons	616-724-6411	Chemical Waste Mgt	708-305-0877	0.00		56
Michigan		St. John	06/13	/92	Clinton Cnty Courtho	Ann Mason	517-224-5186	Drug & Laboratory	616-685-9824	0.00		0
Michigan	#	Benton Harbor	07/31	/92	Berrien County	Don Oderkirk	616-926-7121	Chem Waste Mgt	708-305-0877	0.00		0
Michigan	#	Hillsdale	08/11	/92	Hillsdale County	David Pratt	517-439-9301	Drug & Laboratory	616-685-9824	0.00		0
Michigan		Petoskey	08/18	/92	Emmet Cnty	Elisa Sletzer	616-348-0640	Drug & Laboratory	616-685-9824	0.00		0
Michigan	#	Benton Harbor	08/27	/92	Berrien Cnty	Donald Oderkirk	616-926-7121	Drug & Laboratory	616-685-9824	0.00		0
Michigan	#	L'Anse	09/15	/92	Delta-Menominee Cnty	Laurie Mosher	906-786-4111	Drug & Laboratory	616-685-9824	0.00		0
Michigan		Muskegon	09/16	/92	Muskegon County DPW	Robert Ribbens	616-724-6411	Chemical Waste Mgt	708-305-0877	0.00		45
Michigan		Livonia	09/19	/92	City of Livonia	A.J. Novak	708-305-0877	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		Muskegon	09/26	/92	Muskegon County	Rob Ribbens	616-724-6411	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		Southfield	10/03	/92	City of Southfield	A.J. Novak	708-305-0877	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		Farmington Hills	10/10	/92	City of Farmington	A.J. Novak	708-305-0877	Chem Waste Mgt	708-305-0877	0.00		0
Michigan		St. Johns	11/21	/92	Clinton Cnyt Dept Ma	Ann Mason	517-224-5186	Drug & Lab Disposal	616-685-9824	0.00		200
Minnesota	*	Detroit Lakes		/92	Becker County/MDCA	Susie Thomas	218-846-7310	Aptus	612-469-3475	43600.00		0
Minnesota		Anoka		/92		Carolyn Smith	612-421-4760			0.00		0
Minnesota	*	Chasha		/92	Carver Cnty	Leslie Loeffler	612-448-1217	APTUS	612-469-8356	53201.00	200 gal	0
Minnesota	*	Dakota		/92	Dakota County	George Kinney	612-891-7541			0.00		0
Minnesota	*	Hennepin		/92	Hennepin County	Mike Brandt	612-348-2311	Chem Waste Mgt	612-936-9510	1237048.00	510038 gall	3062
Minnesota	*	Ramsey		/92	Ramsey Cnty Dept PW	Joe Wozniak	612-292-7825	DYNEX Industries	612-784-4040	875883.00	26200 gal,39630 lbs	4635
Minnesota		Scott		/92		Pete Schimdt	612-496-8177			0.00		0
Minnesota	*	Carlton County		/92	Carlton County	Heidi Ringhofer	218-384-4281			0.00		0
Minnesota	*	Waseca County		/92	Waseca County	Lee Williams	507-835-0660			0.00		0
Minnesota	*	Steele County		/92	Steele County	Mary Overlee Olson	507-451-4842			0.00		0
Minnesota	*	Duluth		/92	Western Lake Superio	Mike Guite	218-722-3338			0.00		0
Minnesota	*	Kandiyohi County		/92	MPCA	Mary Catherwood	612-235-3678			0.00		0
Mianescta	*	Lyon County		/92	MPCA	Leslie Goldsmith	612-297-8366			0.00		0
Minnesota	*	St. Cloud		/92	Tri- County	Kent Danquist	612-255-6148			0.00		0
Minnesota	*	Rice County		/92	Rice County Waste Mg	Roger Wilkowske	507-332-6032	APTUS	612-469-3475	29000.00		600

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STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
Minnesota		Worthington	06/06	/92	Nobles	Tracey Roache	507-537-6733	APTUS	612-469-3475	0.00		0
Minnesota		Two Harbors	06/06	/92	Lake	Julie O'Leary	218-722-3336	APTUS	612-469-5140	0.00		0
Minnesota		Virginia	06/13	/92	St. Louis	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Hudson/Aurora	06/17	/92	St. Louis	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Grand Rapids	06/27	/92	Itasca	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Grand Marais	07/15	/92	Cook	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Anoka	07/25	/92		Carolyn Smith	421-4760	APTUS	612-469-3475	0.00		0
Minnesota		Cook	08/01	/92	St. Louis	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Waseca	08/05	/92	Waseca	Roger Wilkowske	507-332-6833	APTUS	612-469-3475	0.00		0
Minnesota		Brookston	08/08	/92	St. Louis	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		International Falls	08/12	/92	Koochiching	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Ely	08/19	/92	St. Louis	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Cottage Grove	03/20	/92	Washington Cnty PHD	Anne Thorston	612-430-6683	APTUS	612-469-3475	55691.00	1650 gals, 7878 lbs	456
Minnesota		Windom	08/22	/92	Cottonwood	Tracey Roache	507-537-6733	APTUS	612-469-3475	0.00		0
Minnesota		Grand Rapids	08/22	/92	Itasca	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Oakdale	08/27	/92		Anne Thorson	430-6683	APTUS	612-469-3475	0.00		0
Minnesota		Oakdale	08/27	/92	Washington Cnty PHD	Anne Thorson	612-430-6683	APTUS	612-469-8356	39907.00	1210 gal, 4567 lbs	389
Minnesota		Silver Bay	08/29	/92	Lake	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Luverne	08/29	/92	Rock	Tracey Roache	507-537-6733	APTUS	612-469-3475	0.00		0
Minnesota		Minneapolis(2 dys)	09/06	/92	Hennepin Cnty	Michael Brandt	612-348-2311	Chem Waste Mgt	612-936-9510	449530.00	1775 batt,	741
Minnesota		Litchfield	09/12	/92	Meeker	Carol Schmiesing	612-231-3587	APTUS	612-469-3475	0.00		0
Minnesota		Hibbing	09/12	/92	St. Louis	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Minneapolis(2 dys)	09/13	/92	Hennepin Cnty	Michael Brandt	612-348-2311	Chem Waste Mgt	612-936-9510	0.00		0
Minnesota		Owatonna	09/16	/92	Steele	Roger Wilkowske	507-332-6833	APTUS	612-469-3475	0.00		0
Minnesota		Lake Elmo	09/17	/92		Anne Thorson	430-6683	APTUS	612-469-3475	0.00		0
Minnesota		Stillwater(3 dys)	09/17	/92	Washington Cnty PHD	Anne Thorson	612-430-6683	APTUS	612-469-8356	64923.00	1595 gal, 11,144 lbs	384
Minnesota		Loretto	09/25	/92	Hennepin			APTUS	612-469-3475	0.00		0
Minnesota		Long Lake	09/25	/92	Hennepin			APTUS	612-469-3475	0.00		0
Minnesota		Grand Marais	09/26	/92	Cook	Julie O'Leary	218-722-3336	APTUS	612-469-3475	0.00		0
Minnesota		Park Rapids	09/26	/92	Hubbard	Susie Thomas	218-846-7310	APTUS	612-469-3475	0.00		0
Minnesota		Fridley	10/03	/92		Carolyn Smith	421-4760	APTUS	612-469-3475	0.00		0
Minnesota		Morris	10/07	/92	Stevens	Carol Schmiesing	507-457-6462	APTUS	612-469-3475	0.00		0
Minnesota		Forest Lake	10/08	/92	Washington Cnty PHD	Anne Thorson	612-430-6683	APTUS	612-469-3475	35762.00	825 gal, 5394 lbs	173
Minnesota		Stillwater(3 dys)	10/08	/92	Washington Cnty PHD	Anne Thorson	612-430-6683	APTUS	612-469-8356	0.00		0
Missouri	*	Columbia		/92	City of Columbia	Richard Wiemar	314-874-7280	Chem Waste Mgt	708-305-0077	0.00		0
Missouri	BP	Platte City		/92	Platte Environmental	Sharen Hunt	816-431-2165	MERECO		0.00		0
Missouri		Springfield	07/25	/92	City of Springfield	Steve Bordic	417-864-1904	Chemical Waste Mgt	708-513-4560	101500.00	100000 lbs	1000
Nebraska	*D	Omaha(7 Sites)	09/19	/92	Various	Bruce Ehrich	402-444-6866	Sophir Company		0.00	8000 gallons	800
New Hampshire		Portsmouth	04/04	/92	City of Portsmouth	Tom Richter	603-427-1530	Laidlaw Environmenta	508-683-1002	12350.00	1340 gallons	109
New Hampshire		Hampton	04/25	/92	SE Regional Refuse D	Carol Seta	603-964-7116	Laidlaw Environmenta	508-683-1002	31266.00	19 drums	543
New Hampshire		Sandown	04/25	/92	SE Regional Refuse D	Carol Seta	603-964-7116	Laidlaw Environmenta	508-683-1002	0.00		0
New Hampshire		Sandown & Hampton	04/25	/92	SE Regional Refuse D	Carol Seta	603-964-7116	Laidlaw Environmenta	508-683-1002	0.00	89 drurs	0
New Hampshire		West Lebanon	05/02	/92	Upper Valley HHW Com	Natalie Starr	802-694-2200	Laidlaw Environmenta	508-683-1002	27010.00	69 drums	401
New Hampshire		Jaffrey	05/02	/92	Town of Jaffrey	Floyd Roberts	603-532-6251	Laidlaw Environmenta	508-683-1002	12528.00	31 drums	182
New Hampshire		Derry	05/16	/92	Town of Derry	David Kelly	603-432-1120	Laidlaw Environmenta	508-683-1002	15834.24	29\55 gal drm 6\30 g	266
New Hampshire		Londonderry	05/16	/92	Town of Londonderry	Dave Kelly	603-434-6248	Laidlaw Environmenta	508-683-1002	0.00	45 drums	0
New Hampshire		Weare	06/06	/92	Town of Weare	Joseph Kelley	603-529-7525	Laidlaw Environmenta	508-683-1002	7895.00		73
New Hampshire		Goffstown	06/06	/92	Town of Goffstown	Michael Millhouse	603-622-2040	Laidlaw Environmenta	508-683-1002	936.00	15\55 drm, 5\30 gal	113
New Hampshire		New Boston	06/06	/92	Town of New Boston	Michael Richard	603-487-2158	Liadlaw Environmenta	508-683-1002	8331.00	525\9.5 gal. drums	102
New Hampshire		Lincoln	06/06	/92	Town of Lincoln	Marc Resnick	603-745-2757	Laidlaw Environmenta	508-683-1002	6393.15	5\55 gal 6\30 gal 3\	32
New Hampshire		New Boston	06/06	/92	Town of New Boston	Mike Richards	603-487-5571	Laidlaw Environmenta	508-683-1002	0.00	20 drums	0
New Hampshire		Weare	06/06	/92	Town of Weare	Transfer Station	603-529-1630	Triumvirate Enviro	617-269-9080	0.00		0
New Hampshire		Goffstown	06/06	/92	Town of Goffstown	Recycling/Landfill	603-622-2040	Triumvirate Enviro	617-269-9080	0.00		0
New Hampshire		Lincoln	06/06	/92	Towns of Linclon/Woo	Town Planner	603-745-8527	Triumvirate Enviro	617-269-9080	0.00		0
New Hampshire		Nashua	06/13	/92	Nasshua Region SW Mg	Lisa Mauself	603-883-0366	Laidlaw Environmenta	508-683-1002	13865.56	23\55 gallon drums	336
New Hampshire		Berlin	06/13	/92	North Country Counci	Adam West	603-444-6303	Laidlaw Environmenta	508-683-1002	0.00		0
New Hampshire		Kingston	06/20	/92	Town of Kingston	Valerie Gilbert	603-642-3717	Laidlaw Environmenta	508-683-1002	11374.88	2040 gallons	245
New Hampshire		Berlin	06/22	/92	Androscoggin Regiona	Androscoggin Regiona	603-752-3342	Triumvirate Environ	617-269-9080	12667.56	20\55 gal 8\30 gal 3	59
New Hampshire		Manchester	06/27	/92	City of Manchester	Bruce George	603-624-6444	Laidlaw Environmenta	508-683-1002	19650.19	6570 lbs 550 gal	400

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New Hampshire		Littleton	06/27	/92	North Country Counci	Adam West	603-444-6303	Laidlaw Environmenta	508-683-1002	12475.40	2920 lbs	135
New Hampshire		Manchester	06/27	/92	Manchester	Bruce George		Laidlaw Environmenta	508-683-1002	0.00	55 drums	0
New Hampshire		Lakes Region	07/25	/92	Lakes Region	Kim Koule	603-279-8171	Laidlaw Environmenta	508-683-1002	5704.95	27575 lbs 900 gallon	1125
New Hampshire		Conway	09/19	/92	Town of Conway	Stephen Burns	603-447-3855	Laidlaw Environmenta	508-683-1002	17995.29	12615 lbs	280
New Hampshire		Keene	09/19	/92	City of Keene & ARVD	Duncan Watson	603-352-5739	Pollution Solutions	802-860-1200	18610.30		250
New Hampshire		Pembroke/Warner	10/03	/92	Central NH Regional	Amy Parker	603-796-2129	Laidlaw Environmenta	508-683-1002	18984.50	2575 gallons	300
New Hampshire		Rochester	10/03	/92	Strafford Reg. Plann	Paul Smith	603-742-2523	Laidlaw Environmenta	508-683-1002	9770.00	850 gallons	140
New Hampshire		Portsmouth	10/03	/92	City of Portsmouth	Tom Richter	603-427-1530	Triumvirate Enviro	617-269-9000	14552.00	1601 gallons	197
New Hampshire		Plymouth	10/17	/92	Pemi-Baker SWD	Adam West	603-444-6303	Laidlaw Environmenta	508-683-1002	11771.60	1100 gallons	135
New Hampshire		Milton	10/17	/92	Town of Milton	Carl Wetherbee	603-654-6158	Laidlaw Environmenta	508-683-1002	11886.24	5725 lbs	152
New Hampshire		Hudson/Merrimack/Nas	10/24	/92	Nashua Region SW Mgt	Lisa Nausolf	603-883-0366	Laidlaw Envir.	508-683-1002	42524.03	18,265 lbs, 150 gall	778
New Hampshire		Exeter	10/24	/92	Town of Exeter	George Olson	603-778-0591	Laidlaw Environmenta	508-683-1002	12594.40	1445 gallons	261
New Hampshire		Dover	10/24	/92	City of Dover	Jeff Pratt	603-743-6073	Triumvirate Enviro	617-269-9000	35507.34	57\55 gal, 31\30 gal	495
New Hampshire		Durham	10/31	/92	Town of Durham	Gail Jablonski	603-868-5578	Triumvirate Enviro	617-269-9000	10710.00	1260 gallons	113
New Jersey	*	Burlington County		/92	Burlington County	Ann Williams	609-499-1001			0.00		0
New Jersey	BCB	Warren County		/92	Pollution Control Fi	Mary Briggs	908-453-2174	MERECO & RADIAC	518-785-1703	10000.00		35000
New Jersey	BRC	Freehold		/92	Monmouth County	Chet Burtt	908-922-4815	Republic Environment		44000.00		1375
New Jersey		Flemington	03/28	/92	County of Hunterdon	Terri Martin	908-788-1110	Clean Harbors,Natick	508-655-8863	4000.00	3250 gal. drums,24 l	0
New Jersey		Raritan Township	04/00	/92	Hunterdon County	Terry Martin	908-788-1110			0.00		0
New Jersey		Tinton Falls	04/04	/92	Monmouth County	Larry Zaayenga	908-431-7460			0.00		0
New Jersey		Hillsborough/Bridgew	04/04	/92	Somerset	Mike Elko	908-231-7031			0.00		0
New Jersey		Clayton	04/11	/92	Gloucester	Janet Miller	609-863-6661	Radiac	718-963-2233	0.00		752
New Jersey		Bridgeton	04/18	/92	Cumberland	Dennis DeMatte	609-825-3700			0.00		0
New Jersey		Little Ferry	04/25	/92	Bergen Cnty Utilitie	Al Potosnak	201-807-5824	Radiac	718-963-2233	137566.00	577 55-gal drums	711
New Jersey		Egg Harbor	04/25	/92	Atlantic County	Monica Dubler	609-646-5500			0.00		0
New Jersey		Westhampton	05/00	/92	Burlington County	Ann Williams	609-499-1001			0.00		0
New Jersey		Lakewood/Stafford(2	05/00	/92	Ocean County	John Haas	908-244-2121			0.00		0
New Jersey		Oxford	05/02	/92	Pollution Control	Mary Briggs	908-453-2174	Radiac Research	718-963-2233	112000.00	660 drums,1300 gal	900
New Jersey		Lawrence	05/02	/92	Mercer County	Pat Koening	609-695-1200			0.00		0
New Jersey		Hazlef	05/02	/92	Monmouth County	Larry Zaayenga	908-431-7460			0.00		0
New Jersey		Hammonton	05/09	/92	Atlantic County	Monica Dubler	609-646-5500			0.00		0
New Jersey		Lindenwald	05/09	/92	Camden County	Jack Sworaski	609-541-1171			0.00		0
New Jersey		Middle Township	05/09	/92	Cape May	Tony Moncman	609-465-8388			0.00		0
New Jersey		New Brunswick	05/30	/92	Middlesex Cnty	Fred Stanger	908-745-4170	Radiac	718-963-2233	746.00	14355 55-gal drums	716
New Jersey	>BR	Lafayette	06/	/92	Sussex Cnty Municipa	John Cannuta	201-579-6998	RADIAC	176-963-2233	0.00	274 55-gal drums	302
New Jersey		Raritan Township	06/00	/92	Hunterdon County	Terry Martin	908-788-1110			0.00		0
New Jersey	BC^	Alloway	06/06	/92	Salem Cnty Utilities	Joy Berger		ENPAC, Inc		3542.00	13524 lbs	145
New Jersey		Wall Township	06/06	/92	Monmouth County	Larry Zaayenga	908-431-7460			0.00		0
New Jersey		Hillsborough/Bridgew	06/06	/92	Somerset County	Mike Elko	908-231-7031			0.00		0
New Jersey		Woodstown	06/13	/92	Salem Cnty Utilities		201-935-1310			0.00		0
New Jersey		Hanover Township	06/13	/92	Morris County	Larry Gindoff	201-285-8388			0.00		0
New Jersey		Flemington	06/20	/92	County of Hunterdon	Terri Martins	908-788-1110	Clean Harbors,Natick	508-655-8863	4000.30	3250 gal. drums,24 l	0
New Jersey		Hillsborough/Bridgew	08/16	/92	Somerset County	Mike Elko	908-231-7031			0.00		0
New Jersey		Raritan Township	09/00	/92	Hunterdon County	Terry Martin	908-788-1110			0.00		0
New Jersey		Lakewood/Stafford(2	09/00	/92	Ocean County	John Haas	908-244-2121			0.00		0
New Jersey		Ciba-Geigy,Summit	09/00	/92	Union County	Joann Gemenden	908-527-4215			0.00		0
New Jersey		Tinton Falls	09/12	/92	Monmouth County	Larry Zaayenga	908-431-7460			0.00		0
New Jersey		Little Ferry	09/13	/92	Bergen Cnty Utilitie	Alexander Potosnak	201-807-5824	Radiac	718-963-2233	186000.00		2275
New Jersey		Flemington	09/19	/92	County of Hunterdon	Terri Martins	908-788-1110	Clean Harbors,Natick	508-655-8863	4000.30	3250 gal. drums, 24	0
New Jersey		Woodhole	09/19	/92	Cape May	Tony Moncman	609-465-8388			0.00		0
New Jersey		Egg Harbor	10/00	/92	Atlantic County	Monica Dubler	609-464-5500			0.00		0
New Jersey		Hammonton	10/00	/92	Atlantic County	Monica Dubler	609-646-5500			0.00		0
New Jersey		Freehold	10/03	/92	Monmouth County	Larry Zaayenga	908-431-7460			0.00		0
New Jersey		Hanover Township	10/10	/92	Morris County	Larry Gindoff	201-285-8388			0.00		0
New Jersey		Clayton	10/17	/92	Gloucester	Janet Miller	609-863-6661			0.00		0
New Jersey		Hillsborough/Bridgew	10/17	/92	Somerset County	Mike Elko	908-231-7031			0.00		0
New Jersey		Jersey City	10/17	/92	Hudson County Imprv	Mary Gilpin	201-795-4555	Care Environmental C	201-515-8192	650464.00	2423 55-gal drums,	1855
New Jersey		Oxford	10/24	/92	Pollution Conrol	Mary Briggs	908-453-2174	Radiac Research	718-963-2233	112000.00	1300 gal.,660 drums	900
New Jersey		Upper Freehold	10/24	/92	Monmouth County	Larry Zaayenga	908-431-7460			0.00		0

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New Jersey		Kearny	12/24	/92	Hudson Cnty Improv A	Mary Gilpin	201-795-4555	Care Environmental	201-515-8190	650464.00		1855
New Jersey		New Brunswick	10/29	/92	Middlesex Cnty Dept	Fred Stanger	908-745-4178			0.00		0
New Jersey		Lawrence	10/31	/92	Mercer County	Pat Koenig	609-695-1200			0.00		0
New Jersey		Secaucus(2 sites)	10/31	/92	Hudson Cnty Improve	Mary Gilpin	201-795-4555	Care Environmental	201-515-8190	0.00		1855
New Jersey		Raritan Township	11/00	/92	Hunterdon County	Terry Martin	908-788-1110			0.00		0
New Jersey		Flemington	11/07	/92	County of Hunterdon	Terri Martins	908-788-1110	Clean Harbors,Natick	508-655-8863	4000.00	3250 gal. drums,24 l	0
New Jersey		New Brunswick	11/21	/92	Middlesex Cnty Dept	Fred Stanger	908-745-4178			0.00		0
New Jersey		Clayton	11/21	/92	Gloucester Cnty Plan	Janet Miller	201-863-6661	Radiac	718-963-2233	0.00		750
New Jersey		Wayne	Sprin	/92	Passaic County	Al Marchitto	201-881-4491			0.00		2
New Mexico	*	Albuquerque		/92	City of Albuquerque	Milo Myers	505-768-2617	Rinchem Co, Inc	505-345-3655	360000.00		18000
New Mexico		Las Cruces	05/02	/92	City of Las Cruces	Miguel Welch	505-527-7845	Rinchem	505-824-0164	47472.00	1400 lbs.,20 gal lab	130
New York	*	Westbury		/92	Nassau County DPW	Dena Miller	516-997-8282	Chemical Mgt Inc	516-454-6766	208735.00	737 55 Gallon Drums	3826
New York	*	Rochester		/92	Monroe Cnty SWD	Ed Harding	716-254-4000	Laidlaw Environmenta	508-683-1022	613650.00	10170 gal	1122
New York	*	Riverhead		/92	Town of Riverhead	John Reeve	516-727-8194	Chemical Pollution	516-586-0333	0.00		2
New York	*	Southold		/92	Town of Southold	Jim Bunchuck	516-734-7685	Chemical Pollution	516-586-0333	0.00		0
New York	BR	Pleasantville		/92		Charles Cock	914-769-1900	MERECO	518-785-1703	250.00		2500
New York	BR	East Greenbush		/92	Town of East Greenbu	Elaine Hoogkamp	517-477-9430	MERECO	518-785-1703	700.00		0
New York	BR	Westchester Cnty		/92	Village of Bronxvill	Peter Woodcock	914-337-6500	MERECO	518-785-1703	0.00		1502
New York	BR	Schenectady		/92	Town of Niskayuna	Clarence Fredrick,Jr	518-377-1400	MERECO	518-785-1703	400.00		7250
New York	BR	Albany Cnty		/92	Town of Bethlehem	Sharon Fisher	518-767-9618	MERECO	518-785-1703	0.00		6000
New York	BR	Little Valley		/92	Cattaraugus Cnty	Richard Preston	716-938-9121	MERECO	518-785-1703	900.00		35000
New York	BR	Millbrook		/92	Millbrook Meadows Re	Mary Kates	914-677-8254	MERECO		43.82	30 lbs	30
New York	BR	Queensbury		/92	Warren Cnty Recyclin	Bob Link	518-798-0847	MERECO		5000.00	2234 lbs	60002
New York	BR	Ithaca		/92	Tompkins Solid Waste	Barbara Hotchkiss	607-273-6632	GSX Services of SC		86000.00	65 gal	805
New York	BR	Briarcliff		/92	Town of Ossining	Russell Curtain	914-941-2241	MERECO	518-785-1703	0.00		5000
New York	BCR	Woodstock		/92	Town of Woodstock Re	Bill Reich	914-679-6578	MERECO	518-785-1703	1523.00	2700 batt	3400
New York	*	Southampton		/92	Town of Southampton	Brian Gilbride	516-283-5210			0.00		0
New York	BR	Binghamton		/92	Broome County	Alan Rudolph	607-778-2392	MERECO	518-785-1703	0.00	2 55-gallon drums	92000
New York	*	Oneida/Herkimer Coun		/92	Oneida/Herkimer Coun	Kevin Manion		Laidlaw Environmenta	508-683-1002	0.00		0
New York	BR	ERCSWNA	01/	/92	ERCSWNA	Margretta E Morris	518-733-6224	MERECO		0.00		0
New York		Syosset	03/14	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York		Goshen(2 days)	04/11	/92	County of Orange					0.00		0
New York		Massapequa	04/11	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York		Cheektowaga	05/09	/92	County of Erie					0.00		0
New York		Easthampton	05/09	/92	Town of Easthampton					0.00		0
New York		Babylon	05/09	/92	Village of Babylon	Ralph Scordino	516-669-1212			0.00		0
New York		Niagara Falls	05/16	/92	City of Niagara Fall					0.00		0
New York		Montauk	05/16	/92	Town of Easthampton					0.00		0
New York		Syosset	05/16	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York		Binghamton	05/30	/92	County of Broome	Claudia Stallman				0.00		0
New York		Plattsburg	05/30	/92	Plattsburg Air Force					0.00		0
New York		Albany	06/06	/92	City of Albany	Kevin Byng	518-432-1144			0.00		0
New York		Jamesville	06/06	/92	County of Onondaga					0.00		0
New York		North Syracuse	06/06	/92	County of Onondaga					0.00		0
New York		Sand Lake	06/06	/92	Town of Sand Lake					0.00		0
New York		Onondaga Cnty	06/06	/92	Onondaga County	Suzanne LaLonde	315-453-2866	Laidlaw Environmenta	508-683-1002	0.00	235 drums	0
New York		Massapequa	06/13	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York		Sea Cliff	07/11	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York		County of Westcheste	07/18	/92	County of Westcheste	Carlos Torres	914-593-5038	RADIAC	718-963-2233	157735.00	137195 lbs	927
New York		Old Bethpage	08/15	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York		Oswego	08/22	/92	Oswego County	Oswego Cnty DPW	315-349-8329	Triumvirate Enviro	617-269-9080	0.00		2
New York		Oyster Bay	09/19	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York		Babylon	09/19	/92	Town of Babylon	Anne Webster	516-422-7540	Chem Pollution Contr	516-486-0333	32500.00	2707 gal,2515 lbs	365
New York		Oswego	09/26	/92	Oswego County	Oswego Cnty DPW	315-349-8329	Triumvirate Enviro	617-269-9080	0.00		2
New York		Onondaga County	09/26	/92	Onondaga County	Suzanne LaLonde	315-453-2866	Laidlaw Environmenta	508-683-1002	67500.00	30600 lbs	450
New York		Oswego	10/03	/92	Oswego County	Oswego Cnty DPW	315-349-8329	Triumvirate Enviro	617-269-9080	0.00		0
New York	$	Albany	10/03	/92	City of Albany					0.00		2
New York	$	Chenango County	10/03	/92	County of Chenango	Ed Umbach	607-337-1790	Laidlaw ENvironmenta	508-683-1002	0.00	67 drums	2
New York		Massapequa	10/17	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		2

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
New York	$‡	Broome County	10/24	/92	Broome County					0.00		?
New York	$#	Westchester County	10/24	/92	Westchester County					0.00		?
New York		Eastern Rensselaer C	10/24	/92	Eastern Rensselaer C					0.00		?
New York	‡‡	Westchester	11/07	/92	Westchester					0.00		0
New York		Old Bethpage	11/14	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		0
New York	#‡	Putnam Cnty	11/14	/92	Putnam Cnty					0.00		?
New York		Syosset	12/12	/92	Town of Oyster Bay	Andrea Reiss	516-921-7347			0.00		?
North Carolina	@C	Cary		/92	Town of Cary	Cheryl Hannah	919-469-4098	Noble Oil Services	800-662-5364	0.00	8.35 tons	?
North Carolina		Raleigh	04/04	/92	Raleigh & Wake Cnty	Carol Bond	919-890-3400	Laidlaw	Doug Meurs	166823.75	1475 Gal	3456
North Carolina		Winston-Salem	10/17	/92	Winston-Salem County	Ellis Cayton	919-733-0692			0.00		?
North Carolina		Greensboro	10/31	/92	Greesboro	Ellis Cayton	919-733-0692			0.00		?
North Carolina		Raleigh	11/07	/92	Raleigh & Wake Cnty	Carol Bond	919-890-3400	AETC	Jeff Page	0.00		0
North Dakota	#	Bismark(2 dys)	07/28	/92	N. Dakota Agricultur	Ted Keller	701-224-2980	Special Resource Mgt	701-281-3903	0.00	80910 lbs	396
North Dakota	#	Bismark	08/04	/92	N. Dakota Agricultur	Ted Keller	701-224-2980	Special Resource Mgt	701-281-3903	0.00		?
North Dakota	#	Bismarck	08/11	/92	N Dakota Agriculture	Ted Keller	701-224-2980	Special Resource Mgt	701-281-3903	0.00		?
Ohio		Clinton-Warren Cnty		/92		Randy Hartman				0.00		?
Ohio		Franklin County	03/21	/92	Solid Waste Authorit	Tina Redmen	614-871-8105	Chem Waste Mgt		1000000.00		7000
Ohio	^$B	3 Sites	06/05	/92	Montgomery County	Eric Keefer	800-543-3670	Clark Processing	800-543-3670	0.00	200 tons	2122
Ohio		Allen County	09/26	/92	Clark Processing	Michael Lally	513-268-6501	Clark Processing	513-268-6501	0.00	24.2 tons	900
Ohio		Painesville	10/26	/92	Lake County SW Distr	John Radebaugh	216-357-2645	Laidlaw Environmental	800-251-1227	70000.00		700
Ohio		Painesville	10/31	/92	Lake Cnty Board Comm	John Radebaugh	216-357-2645	Laidlaw		0.00	56 tons	1025
Oregon	*	Seattle-Metro South		/92	Metro Service Distri	Jim Quinn	503-221-1646			277770.00	993 55-gal drums,255	5146
Oregon		Eugene	11/02	/92	Lane County Waste Mg	Leslie Antkoviak	503-687-4119			0.00		?
Oregon		Cascade Locks	Sprin	/92	DEQ					10288.00	4460 lbs	48
Oregon		Astoria	Sprin	/92	DEQ					62064.00	57154 lbs	562
Oregon		Seaside	Sprin	/92	DEQ					36386.00	29108 lbs	215
Oregon		Cannon Beach	Sprin	/92	DEQ					26310.00	9734 lbs	151
Oregon		Grants Pass	Sprin	/92	DEQ					73500.00	42239 lbs	452
Oregon		Medford	Sprin	/92	DEQ					66559.00	40955 lbs	435
Oregon		Ashland	Sprin	/92	DEQ					55989.00	34377 lbs	545
Oregon		McMinnville	Sprin	/92	DEQ					55819.00	40035 lbs	331
Oregon		Newberg	Sprin	/92	DEQ					40921.00	30035 lbs	251
Oregon		Moro	Sprin	/92	DEQ					10785.00	9027 lbs	34
Oregon		Maupin	Sprin	/92	DEQ					7658.00	3130 lbs	20
Oregon		Hood River	Sprin	/92	DEQ					37046.00	27318 lbs	215
Oregon		The Dalles	Sprin	/92	DEQ					40607.00	32705 lbs	230
Pennsylvania	**	Bradford		/92	Northern Tier SWA	Lori Kobbe	717-638-2107	Laidlaw Envir. Serv.	301-953-9583	7964.00		?
Pennsylvania	*	Blossburg		/92	Northern Tier SWA	Lori Kobbe	717-638-2107	Laidlaw Environment	301-953-9583	20580.00		0
Pennsylvania	*@C	Lancaster County		/92	Lancaster Cnty SW Mg	Rachel Rosenzwig	717-397-9966	Laidlaw Environmenta	800-638-4443	519780.00	113146 lbs	5302
Pennsylvania		Bucks County	12/	/92	County of Bucks	Lale Byers	215-249-0467			134780.00		1221
Pennsylvania	#	6 counties	Fall	/92	Dept of Agriculture	Dave Bingaman	717-787-4843			0.00		?
Rhode Island	BR	Charlestown		/92	Town of Charlestown	Alan Arsenault	401-364-1230	NERECO	518-785-1703	500.00		3900
Tennessee		Knoxville	04/25	/92	TVA	Terry Kiraly	615-632-2537			0.00		0
Tennessee		Chattanooga	04/25	/92	TVA	Terry Kiraly	615-632-2537			0.00		?
Texas	*	Austin		/92	City of Austin Envir	Jim Eldred	512-416-8998	Laidlaw Environmenta	713-476-0645	531600.00	10200 gal	3300
Texas		Houston	03/07	/92	City of Houston	John Halet	713-640-4293	Chem Waste Mgt	800-247-2643	37468.00	611 gal	154
Texas		Pasadena	04/11	/92	ARCO Chemical Co	Jacinta Jacob	713-474-1726	varies between 4		3195.00	1255 gal,37775 lbs	65
Texas		Deer Park	04/11	/92	East Harris Manuf. A	Russell Dunn	713-930-2420	Rollins Enviro. Serv	713-930-2420	25000.00	16930 lbs	154
Texas		Freeport	04/11	/92	Dow Chemical Co	Marlies Greenwood	409-238-2805	Dow Chemical Co	409-238-2805	0.00	35517 lbs	411
Texas	>	Terrell(3 dys)	04/22	/92	City of Terrell	Sandra Lee	214-551-6100	Gibraltar Chemical R	214-905-8020	0.20	2015 gal	95
Texas		Austin	05/30	/92	Lower Colorado River	Rusty Ray	512-397-6793	Chem Waste Mgt	404-951-6700	50425.00	731 gal,13199 lbs	135
Utah	R!	Salt Lake City	05/02	/92	Salt Lake City-Cnty	Dorothy Adams	801-534-4598	APTUS	801-521-9240	0.00		800
Utah		Tooele Cnty	09/12	/92	Tooele Cnty	Dorothy Adams	801-534-4588	APTUS/USPCI		0.00		500
Vermont	*>	Burlington		/92	Town of Burlington	Aaron Frank	802-862-0488			0.00		0
Vermont	*>	Rutland District		/92	City of Rutland	Steve Parker	802-775-7209			0.00		?
Vermont	*	Hartford		/92	City of Hartford	Jim Gruber	802-295-3245			0.00		0
Vermont	>	Various		/92	Chittenden County	Jen Holliday	802-655-9801			0.00		0
Vermont	@C	Hartford		/92	Town of Hartford	Paul Alcantar	802-295-5740	Total Waste Mgt	603-431-2420	84400.32	1135 gal	3000
Vermont	**	White River Junction		/92	White River Junction	Paul Alcantar	802-			0.00		?

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
Vermont	*D	Morrisville	04/25	/92	Lamoille Regional SW	Teri White	802-888-7317			0.00		0
Vermont	*D	Hardwick	05/23	/92	Central VT SWMD	Ben Rose	802-229-1350			0.00		0
Vermont		Waitsfield(2 sites)	06/20	/92	City of Waitsfield	Ben Rose	802-229-1350			0.00		0
Vermont	$S	Brattleboro	08/15	/92	Windham County SWMD	Jan Ameer	802-257-0272	Laidlaw Environmenta	508-683-1002	0.00	72 drums	0
Vermont		Northfield(2 sites)	09/26	/92	Central VT SWMD	Ben Rose	802-229-1350			0.00		0
Vermont	$/S		10/00	/92	Windham County SWMD	Jan Ameer	802-257-0272			0.00		0
Vermont		Northeast Kingdom	10/17	/92	Northeast Kingdom SW	Irene	802-748-4602			0.00		0
Vermont	$/	Brattleboro	11/07	/92	Brattleboro	Andrea Cohen	802-244-7831			0.00		0
Virginia	B*	Arlington		/92	Arlington Cnty Pollu	Sandy Conley	703-358-6832	Laidlaw Environmenta	800-638-44404	46206.00	1410 gal,1043 lbs	243
Virginia	*	Loudoun County		/92	Loudoun County		703-777-0372			0.00		0
Virginia	*	Fairfax(2 sites)		/92	Fairfax Cnty DPW	Elliott Gross	703-324-5230	Laidlaw Environmenta	800-638-4449	655000.00		6000
Virginia	*	Chespeake		/92	SE Public Serv Auth	Jennifer Ladd	804-420-4700	Chem Waste Mgt	201-465-6848	167412.00	6767 lbs,1205 gal	0
Virginia	*	Virginia Beach		/92	SE Public Serv Autho	Jennifer Ladd	804-420-4700	Chem Waste Mgt	201-465-6848	0.00		0
Virginia	*	Franklin		/92	SE Public Serv Autho	Jennifer Ladd	804-420-4700	Chem Waste Mgt	201-465-6848	0.00		0
Virginia	*	Prince Williams		/92	Prince William Count	Paul Campbell	703-335-6255	Laidlaw Environmenta	800-845-1019	0.00		0
Virginia	*	Suffolk		/92	SPSA	Jennifer Ladd	804-420-4700			0.00		0
Virginia	*	Arlington		/92	Water Pollution Cont	Sandy Conley	703-358-6832			0.00		0
Washington	*	Whatcom County		/92	City of Bellingham	Bill Englander	206-676-6850			50000.00		1500
Washington	*	Coupeville		/92	Island County SW Dep	Jerry Minyo	206-679-7386	Burlington Envir Inc	206-682-0550	0.00		2000
Washington	*	Seattle		/92	King County SW Divis	Vicki Holt	206-296-4464	Burlington Envir Inc	206-654-0381	1506379.00	1485578 lbs	24364
Washington	*	Seattle		/92	Seattle Sb Utility	Shirli Axelrod	206-684-7884			62500.00	355 tons	5000
Washington	*	Spokane(3 sites)		/92	City of Spokane	Monica Hairston	509-625-7899	Chem Safe Inc	509-968-3973	1101501.00	59 lab pack,94500 lb	15317
Washington	*	Kelso		/92	Cowlitz Public Works	Don Olson	206-577-3030			0.00		0
Washington		Peperey		/92	Garfield Cnty PW	Steve Langdon	206-577-3041			0.00		0
Washington	$/	Whatcom County		/92	City of Bellingham	William Englander	206-676-6962	Burlington Environme	206-682-0550	101050.00	4007 gal	516
Washington	*>@	Pierce County		/92	City of Tacoma Refus	Doug Pierce	206-591-5543			895000.00	122295 gal,2000 CB	5000
Washington	@C	Kennewick		/92	Benton Cnty	Bill Henager	509-786-4600	Waste Mgt		0.00		0
Washington	@C	Prosser		/92	Benton Cnty	Bill Henager	509-786-4600	Waste Mgt		0.00		0
Washington	@C	Clark Cnty		/92	Vancouver	Brian Carlson	206-699-2375	Tidewater Barge		0.00		0
Washington	*	Shilshole Bay		/92	Port of Seattle	Frank Harmon	509-728-3385	Northwest Enviro Ser	509-622-1090	24500.00	150 gal	1502
Washington	*	Yakima		/92	Yakima Cnty PWD, SWD	Mark Nedrow	509-575-4076			86639.05	172 drums	0
Washington	*	Ole Elum		/92	Ole Elum Transfer St					0.00		0
Washington	*	Olympia		/92	Hawks Prarie					0.00		0
Washington	*	Seattle		/92	Fisherman's Terminal					0.00		0
Washington	*>	Cowlitz & Wahkiakum		/92	Cowlitz & Wahkiakum	Jim Mansfield	206-577-3126			0.00		0
Washington	*>	Wastemobile		/92	King County					0.00		0
Washington	>	Asotin/Nez Pierce Cn		/92	Asotin/Nez Pierce Cn	Stephen Becker	509-243-4174			0.00		0
Washington	>	Chelan-Douglas Cnty		/92	Chelan-Douglas Cnty	Ron Draggoo	509-886-0899			0.00		0
Washington	>	Klickitat Cnty		/92	Klickitat Cnty	Frank Ensell	509-773-4616			0.00		0
Washington	*	Thurston County		/92	Thurston County	Michelle Arnold	206-786-5485			0.00		0
Washington	*	Wahkiakum		/92	Chemical Processors	Al Kakevich	206-223-0508	Chemical Processors		0.00		0
Washington		Fairgrounds/Morton	04/00	/92	Lewis County	Melody Armstrong	206-748-9121			70000.00		0
Washington		Snohomish Cnty	04/23	/92	Snohomish Cnty Syste	Steve Goldstein	206-388-6493	Burlington		127000.00		0
Washington		Kittitas Cnty	04/25	/92	Ellensburg Transfer			Burlington		70000.00		2
Washington		Olympia	05/16	/92	Thurston Cnty Health	Marie Suroske	206-786-5457	Burlington Enviro.	206-682-0550	18500.00	320 drums,316 car ba	1179
Washington		Stevenson	05/16	/92	Skamania County			NW Environmental		45000.00		2
Washington		Lacey/Yelm	05/16	/92	Thurston County	Michelle Arnold	206-786-5485	Burlington		49000.00		2
Washington		Chelan	05/12	/92	Chelan County	Ron Draggoo	509-886-0899	NW Environmental		50000.00		2
Washington	2dy	Friday Harbor	07/18	/92	San Juan County	Helen Winters	206-378-3421	Chem-Safe Services	509-968-3973	16821.00		300
Washington		Longview	08/29	/92	Cowlitz County	Jim Mansfield	206-577-3126	Burlington		135000.00		0
Washington		Kitsap County	09/00	/92	Kitsap County	Angie Bringloe	206-478-5285	Burlington		117000.00		2
Washington		Fairgrounds/Morton	09/00	/92	Lewis County	Melody Armstrong	206-748-9121			70000.00		2
Washington		Orcas/Lopez/San Juan	09/00	/92	San Juan County	Kevin Barry	206-378-4474	Burlington		92000.00		0
Washington		Mason County	09/09	/92	Shelton/Mason Cnty	Gary Vando	206-427-9670			0.00		0
Washington	*D	Port Angeles	05/16	/92	Clallam County	Andy Brastad	206-452-7831	Burlington Environme	206-243-6776	0.00	115 drums	372
Washington		Republic	05/26	/92	Ferry County	Dede Osgood	509-775-5217	Special Resource Mgt		15000.00		2
Washington		Newport	09/26	/92	Pend Oreille County	Steve Melocke	509-447-4513	Special Resource Mgt		24000.00		2
Washington		Montesano	10/03	/92	Grays Harbor County	Jim Hanna	206-249-4222	Burlington Environme	206-682-0550	107601.00	21412 gal	712
Washington		Chimacum(2 dys)	10/22	/92	Jefferson County	Jeff Prettingham	206-385-9160	Burlington		36000.00		2

STATE	KEY	LOCATION	DATE	YEAR	SPONSOR	CONTACT	CPHONE	HAULER	HPHONE	COST	WASTE	PARTICIP
West Virginia	*D	Richmond	05/04	/92	Richmond	Whitey Ferell	304-348-6350			0.00	4 gallons	250
Wisconsin		Oak Creek		/92	City of Oak Creek	Tom Yurick	414-764-6000	Chem Waste Mgt	708-369-9543	0.00		[illegible]
Wisconsin		Menomonee		/92	Dunn County	Chad Hass	715-232-4017	Chem Waste Mgt	708-369-9543	0.00		[illegible]
Wisconsin		Siren		/92	Burnett County	Rick Schnider	715-635-2197	Chem Waste Mgt	708-369-9543	0.00		[illegible]
Wisconsin		Madalin Island		/92	Ashland County	Dan O'Neil	715-682-7017	Chem Waste Mgt	708-369-9543	0.00		[illegible]
Wisconsin		Marathon County	04/00	/92	Marathon County	Jim Pelliteri	715-446-3339	Chem Waste Mgt	708-369-9543	55386.00	7279 gal	345
Wisconsin		Outagamie County	04/00	/92	Outagamie County	Sue Rundquist	414-788-2377	Chem Waste Mgt	708-369-9543	34964.00	2569 gal	551
Wisconsin		Waupaca	04/00	/92	Waupaca County	Roger Holman	715-256-6240	Chem Waste Mgt	708-369-9543	16170.00	1114 gal	75
Wisconsin		West Allis	04/00	/92	City of West Allis	Terry Brandenburg	414-256-8400			0.00		?
Wisconsin		Ashland/Bayfield	05/00	/92	Ashland/Bayfield	Tim Kane	715-682-7017	Chem Waste Mgt	708-369-9543	10113.20	1947 lbs	75
Wisconsin		Brown County	05/23	/92	Brown County	Charles Larsheid	414-448-4475	Laidlaw Environmenta		0.00	5153 lbs	625
Wisconsin		Iron County	05/00	/92	Iron County	Cathy Techtmann	715-561-2695	Chem Waste Mgt	708-369-9543	5057.20	375 lbs	11
Wisconsin		Manitowoc County	05/00	/92	Manitowoc County	Jeff Beyers	414-683-4085	Chem Waste Mgt	708-369-9543	43000.00	2240 gal	885
Wisconsin		Washington County	05/20	/92	Washington County	James Pamperin	414-335-4399	Laidlaw Environmenta		124000.00	13265 gal	932
Wisconsin		Waukesha	05/00	/92	Waukesha County	Karen Feidler	414-896-8812	Chem Waste Mgt	708-369-9543	105769.00	6415 gal	981
Wisconsin		Adams County	06/22	/92	Adams County	Jeffery Breuer	608-339-4237	Chem Waste Mgt	708-369-9543	26793.00	5167 lbs	149
Wisconsin		Fond du Lac County	06/00	/92	Fond du Lac County	Robert Venne	414-929-3173	Laidlaw Environmenta		24534.00	2730 gal	285
Wisconsin		Portage County	06/00	/92	Portage County	David Ankely	715-345-1316	Chem Waste Mgt	708-369-9543	0.00		?
Wisconsin		Walworth County	08/08	/92	Walworth County	Wade Scheel	414-741-3394			0.00		?
Wisconsin		Whitewater	08/09	/92	City of Whitewater	Dean Fischer	414-473-0540			0.00		?
Wisconsin		Oneida County	08/15	/92	Oneida County	Linda Boelter	715-369-6160			0.00		?
Wisconsin		Washburn County	08/22	/92	Washburn County	Richard Schneider	715-635-2197			0.00		?
Wisconsin		Jefferson County	08/29	/92	Jefferson County	Dave Such	414-674-7295	Chem Waste Mgt	708-369-9543	0.00		?
Wisconsin		Dane County	09/00	/92	Dane County	Honora Kraemer	609-226-4821			0.00		?
Wisconsin		Eau Claire County	09/00	/92	Eau Claire County	Ruth Schulze	715-839-6198	Chem Waste Mht	708-369-9543	0.00		?
Wisconsin		Outagamie County	09/12	/92	Outagamie County	Sue Rundquist	414-788-2377	Chem Waste Mgt	708-369-9543	0.00		?
Wisconsin		Milwaukee	09/19	/92	City of Milwaukee	Constance Lindhelm	414-278-2845	Chem Waste Mgt	708-369-9543	0.00		?
Wisconsin		Vernon County	Fall	/92	Vernon County	Gail Frie	608-637-7414			0.00		?
Wyoming		Casper	08/22	/92	City of Casper	Richard Barela	307-235-8246	USPCI	801-534-0054	0.00		500
Wyoming		Laramie	09/12	/92	City of Laramie	Chris Sanborn	307-721-5200	USPCI	801-534-0054	0.00		?
Wyoming		Gillette	09/20	/92	Campbell County	Martell Hilderbrand	307-687-6255	Laidlaw Environmental	800-845-1019	0.00		?
										34436655.62		762543

Appendix VII

HHW Management State Agency Contacts

HHW Management State Agency Contacts
-1992-

ALASKA

eoff Kany
Hazardous Waste Program Manager
Alaska DEC
10 Willoughby Ave
uneau, AK 99801-1795
907-465-5150
07-465-5164

ALABAMA

Dixie Beatty
Land Division
AL Dept. of Environmental Management
1751 Congressman Dickinson Drive
Montgomery, AL 36130
205-271-7797

ARKANSAS

onna Etchieson
olid Waste Management Division
AR Dept of Pollution Control/Ecology
.O. Box 9583
ittle Rock, AR 72219
501-562-6533

ARIZONA

Betsey Westell
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Aaron Frank
Solid Waste Manager
Public Works Department
P.O. Box 849
Burlington, VT 05402
802-863-9094
802-863-0466 F

Paul Alcantar
Facility Superintendent
Municipal Building
15 Bridge Street
White River Junction, VT 05001
802-295-9353

WASHINGTON

Shirli Axelrod
HW Project Coordinator
City of Seattle, Solid Waste Utility
710 Second Ave, 505 Dexter Horton Bldg
Seattle, WA 98104-1709
206-684-7804 P
206-684-7755 F

Hal Williams
Chemical Processors,Inc./Burlington
2203 Airport Way South
Seattle, WA 98134
206-223-0500

William H. Englander
Solid Waste Program Manager
City of Bellingham
2221 Pacific Street
Bellingham, WA 98226
206-676-6961

Jerry Mingo
Recycling/Hazardous Waste Coordinato
Island Co. Solid Waste Dept.
P.O. Box 5000
Coupeville, WA 98239
206-679-7386
206-678-3449 F

Elijah Washington
Marina Maintenence Supervisor
Fisherman Terminal - Port of Seattle
3919 18th Avenue, West
Seattle, WA 98119
206-728-3398

Frank Harman
Marina Maintenence Supervisor
Shilshole Marina - Port of Seattle
7001 Seaview Avenue, NW
Seattle, WA 98117
206-728-3389

Monica Hairston
Hazard., Infectious Waste Coordinator
City of Spokane
East 1225 Marietta
Spokane, WA 99207
509-625-7878 P
509-625-7899 F

Victoria Holt
HHW Project Manager
King County Solid Waste Division
400 Yesler Way, 6th Floor
Seattle, WA 98104
206-296-4464

Michelle Arnold
Solid Waste Specialist
Thurston County DPW
2000 Lakeridge Drive
Olympia, WA 98502
206-786-5485

Al Kakovich
Sales Manager
Chemical Processors, Inc.
P.O. Box 222
Washougal, WA 98671
206-223-0500

Doug Pierce
City of Tacoma PWD
3510 South Mullen Street
Tacoma, WA 98409
206-591-5543 P
206-591-5547

Mark Nedrow
Solid Waste Program Coordinator
Yakima County Public Works Departmen
128 N. 2nd Street, Rm 408 Courthouse
Yakima, WA 98901
509-575-4076

WISCONSIN

Elaine Andrews
UWEX
Environmental Resources Center
1450 Linden Drive, Room 216
Madison, WI 53706
608-262-0142

Appendix IX

Collection Program Contractors

HHW Collection Program Contractors
-1992-

APTUS
21750 Cedar Avenue
Lakeville, MN 55041
Bruce Bernice
Sales Representative
612-469-3475 P
612-469-5140 F

Advanced Environmental Technology Corp
Metro Park West - 398 Cedar Hill St.
Marlboro, MA 01752
Jim Sullivan
Sales Representative
508-460-9960

Burlington Environmental
2203 Airport Way
Seattle, WA 98134
Tim Ritchie
206-654-0301

Chem-Safe Services, Inc.
P.O. Box 616
Kittitas, WA 98934
Pat McGinty
Field Scientist
509-968-4680

Chemical Management
340 Eastern Pkwy.
Farmingdale, NY 11735
Keith Bullock
Lab Pack Manager
516-454-6766

Chemical Pollution Control
120 South 4th Street
Bay Shore, Long Isla, NY 11706
Danny Carr
Safety Officer
516-586-0333 P
516-586-0727 F

Chemical Processors
2203 Airport Way South
Seattle, WA 98134
Jack Wolfin
Account Rep. of HHW & SQG Services
206-223-0500

Chemical Waste Management
41-85 Doremus Ave.
Newark, NJ 07105
Dave Carson
Regional Operations Manager
201-465-6848

Chemical Waste Management
4185 Doremus Ave
Newark, NJ 07105
Lorissa Dashkiewicz
201-344-8469 P
201-465-7313 F

Chemical Waste Management
4277 Technology Drive
Fremont, CA 94538
Hallie Fraser
HHW Coordinator
510-651-2964

Source: The Waste Watch Center
(MAC\WWC\ADMIN\HHW PUB)

11/11/92

Chemical Waste Management
1621 Auburn Avenue
Naperville, IL 60565
Eric Laut
Project Developement Manager
708-369-9543

Chemical Waste Management
1156 Catherine Ave
Naperville, IL 60540
A.J. Novak
Project Development Manager
708-305-0877

Chemical Waste Management
1090 NorthChase Pkwy. - Suite 290
Marietta, GA 30067
Jerry Strub
Regional Sales Manager
404-951-6700

Clark Processing, Inc.
300 South West End Ave.
Dayton, OH 45427
Eric Keifer
800-543-3670

Clean Harbors
12 Mercer Rd.
Natick, MA 01760
Patrick O'Tocle
Sales Representative
508-655-8863

Crosby and Overton
1610 West 17th Street
Long Beach, CA 90813
Larry Boyle
General Manager
310-432-5447

DYNEX Industries, Inc.
4751 Mustang Circle
St. Paul, MN 55112
Robin Shaw
800-733-9639 P
612-784-5397 F

Disposal Control Service
1369 West Ninth Street
Upland, CA 91786
Phil Gentile Sr.
VP of Management/Sales
714-981-0998

Drug and Laboratory Disposal, Inc.
331 Broad Street
Plainwell, MI 49080
Rhonda Sybesma
Administrative Assistant
616-685-9824

Findley Chemical Disposal
10720 Redwood Avenue
Fontana, CA 92335
Laura Canney
714-823-3939

Franklin Pumping Service
Industrial Park
Wrentham, MA 02093
Gary Benham
Sales Representitive
617-384-6151

Green Alternatives, Inc.
1609 A Regatta Lane
San Jose, CA 95112
Tobi Romero
Program Manager
800-345-3363 P
408-441-0245 F

Greenfield Environmental
5964 LaPlace Court, Ste #150
Carlsbad, CA 92008
Laura Jamayo
619-431-5500

Heritage Remediation/Engineering
1175 Western Drive
Indianapolis, IN 46241
Joel Hall
Sales Representative
317-243-7475 P
317-486-2984 F

Laidlaw Env. Services(North East),Inc.
221 Sutton Street
North Andover, MA 01845
LeeAnn Merashoff
HHW Manager
508-683-1002

McDonald and Watson
Pole 12 Green Hill Road
Johnston, RI 02919
Fran Slade
401-946-0200

New England Marine Contractors
13 Dorset Lane
Williston, VT 05495
Charles Peterson
President
802-879-8800

Northwest Enviroservice, Inc.
5333 Fairbanks St. - Suite 6
Anchorage, AK 99518
Larry Wilkinson
Chemical Engineer
907-272-9007

Pleasant Hill Bayshore Disposal
P.O. Box 23164
Pleasant Hill, CA 94523
Patricia Mehaouchi
510-685-4716

Pollution Solution
237 Spear St.
Burlington, VT 05403
Amy Page
802-860-1200

Quadrex Environmental
1940 NW 67th Pl.
Gainesville, FL 32606
Wilson Anthony
904-373-6066

Radiac Research Company
261 Kent Avenue
Brooklyn, NY 11211
Keith Foley
718-963-2233

Rinchen Co.
6133 Edith Blvd, NE
Albuquerque, NM 87107
Mike Loustanau
Technical Representative
505-824-0164

Rollins CHEMPACK Inc.
1 Rollins Plaza
Wilmington, DE 19803
Bob Coffey
Administrative Marketing Manager
302-479-2700

SET Environmental
450 Sumac Road
Wheeling, IL 60090
Steve Schmitz
Project Manager
708-537-9221

Solvent Services
Berryessa Road
San Jose, CA 95133
408-251-7554

Special Resource Management, Inc.
917 Island Avenue
Boise, ID 83706
Idaho Branch Manager
800-654-2504 P
208-345-3725 F

Special Resource Management, Inc.
4500 Dell Range Blvd.
Cheyene, WY 82009
Charles Porter
Wyoming Branch Manager
800-237-2647 P
307-635-9248 F

Special Resource Management, Inc.
P.O. Box 86, HC 31 - Box 132
Pierre, SD 57501
Kevin Tviedt
Dakota Branch Manager
800-822-0287 P
605-224-9538 F

Special Resource Management, Inc.
I-90 & Rocker Interchange, P.O. 4168
Butte, MT 59701
Steve Wright
Manager, Business Development
800-334-8911 P
406-782-9968 F

Special Resources Management, Inc.
1447 44th Street, North
Fargo, ND 58102-2854
Larry Wadsworth
Operations Supervisor
800-445-4404 P
701-281-9399 F

Specialty Resource Management
1131 Westrac Dr. - Suite 201
Fargo, ND 58103
Anne Harri
Branch Manager
701-234-9394

Triumvirate Environmental, Inc.
345 Dorchester Avenue
Boston, MA 02127
Caroline Gallagher
Office Manager
617-269-9080 P
617-269-9110 F

U.S. Pollution Control, Inc.
515 West Greens Road Suite 500
Houston, TX 77067
Carl Shuler
303-938-5503

Vallejo Garbage Service
P.O. Box 3157
Vallejo, CA 94590
Pete Friesen
707-552-3110

Wade Salvage
293 Jackson Road
Atco, NJ 08004
Andrew Wade
President
609-767-2760 P
609-767-0698 F

Western Waste
310 West 190th Street, Suite 100
Gardena, CA 90248
310-329-1425

Yuba Sutter Disposal Inc
3001 N. Levee Dr.
Marysville, CA 95991
Dorman Steele
916-743-6933 F

Appendix X

WWC Publications Order Form

HHWMVII Audio Tape Order Form

U.S. EPA Order Form

WASTE WATCH CENTER

Household Hazardous Waste Publications

The following items have been prepared by the Waste Watch Center to support your efforts in managing household hazardous waste (HHW). Price includes cost of copying, postage and handling.

	PRICE	QUANTITY
Household HazardousWaste Management News **(Quarterly newsletter)** Contribution: ___ $10.00 (Individual) ___ $35.00 (Agency) ___ $75.00 (Corporate)		
HHWM News — back issues: No. 1-15 (complete set) including postage —	*$14.00*	
Back #'s 1___ 2___ 3___ 4___ 5___ 9___ ($1.60 each) 6___ 7___ 8___ 10___ 11___ 12___ 13___ 14___ 15___ ($1.00 each)		
HHW Collection Programs in the U.S. — 1992	*$10.50*	
HHW Collection Programs in the U.S. — 1991	*$9.50*	
HHW Collection Programs in the U.S. — 1990	*$7.50*	
HHW Collection Programs in the U.S. — 1988-89	*$7.50*	
HHW Collection Programs in the U.S. — 1980-87	*$6.50*	
HHW Management State Agency Contacts (1992)	*$6.50*	
Permanent HHW Management Programs in Operation — 1992	*$13.50*	
Permanent HHW Management Program Managers (1992)	*$6.50*	
Education Contacts (1992)	*$5.00*	
Source Reduction Contacts (1992)	*$5.00*	
Household Battery Collection Programs in the U.S. — 1992	*$5.00*	
Dry Cell (Household) Battery Contacts (1992)	*$5.00*	
Lead-Acid (Car) Battery Contacts (1992)	*$5.00*	
CESQG Collection Program Contacts (1992)	*$5.00*	
Farm Pesticide Collection Program Contacts (1992)	*$5.00*	
Pesticide Use and Management Program Contacts (1992)	*$5.00*	
Pesticide Reduction Contacts (1992)	*$5.00*	
Fluorescent Light Contacts [Recyclers, Ballasts Servicers etc.] (1992)	*$10.00*	
Household Cleaning Product Contacts (1992)	*$5.00*	
Used Oil Collection and Management Contacts (1992)	*$5.00*	
Curbside Used Oil Collection Programs in the U.S. — 1992	*$5.00*	
Used Oil Filter Management Equipment Contacts (1992)	*$5.00*	

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January 29, 1993

Paint Collection and Recycling Contacts (1992)	*$5.00*	_____
HHW Collection Program Contractors (1992)	*$5.00*	_____
Manufacturers of Prefabricated HHW Buildings (1992)	*$5.00*	_____
Bibliography on HHW (1992)	*$13.50*	_____
Lawn Care: Alternatives to Chemicals — Resource List (1991)	*$2.50*	_____
Proceedings of 5th National HHW Management Conference (1991)	*$45.00**	_____
Proceedings of 7th National HHW Management Conference (1993)	*$TBA**	_____

(For other year Proceedings of U.S. EPA HHWM Conferences, contact NTIS: 703-487-4650)

Copies of Articles and Speeches as itemized below — $5.00, 1st 10 pages, $.20 per additional page. _____

Packets of information are available on:

- What is HHW?, How Much is There?, Why be Concerned? _____
- How to Set-Up a Collection Program _____
- HHW Education _____
- Household Batteries _____
- Paint _____
- Fluorescent Lights _____
- HHW Source Reduction _____
- Household Cleaners _____
- Pesticides _____
- Used Oil _____
- Permanent Programs _____
- CESQG _____

Specific issue prices are available on request.

**Plus additional postage for non-U.S. orders*

TOTAL _____

DATE: _____ Please Make Check Payable to: **WASTE WATCH CENTER.**

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ORGANIZATION _____ PHONE _____

ADDRESS _____ FAX _____

CITY _____ STATE _____ ZIP _____

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January 29, 1993

U.S. EPA HOUSEHOLD HAZARDOUS WASTE MANAGEMENT CONFERENCE
AUDIO CASSETTE ORDER FORM

TUESDAY, DECEMBER 8, 1992
G-1 Minnesota Issues Session
Session 1A-Management of HHW and problem materials
Session 1B-Reducing Problem Materials
Session 1C-Minnesota HHW Programs
Session 1D-Problem Materials Management
Session 2A-HHW Education Programs
Session 2B-Minnesota HHW Programs
Session 2C-Problem Materials Management

WEDNESDAY, DECEMBER 9, 1992
G-1 Opening Plenary Session-
Moderator: Dana Duxbury, WWC, MA
Greetings from the State-Tim Scherkenbach, MPCA, MN
Greetings from the County-John Derus, Hennepin County
Keynote: HHW and Municipal Solid Waste-Terry Grogan, US EPA, DC
Design for the Environment-Walter Stahel, Product Life Institute, Switzerland

G-2 "An Overview of CESQG Issues"
David Galvin, Seattle, METRO, WA.
"Source Reduction Priorities"
Philip Dickey, Washington Toxics Coalition, WA.
Mercury in MSW Incinerator Emissions-Mike Winka, NJ DEP
New Initiatives in Science Education-Herbert Thier, CEPUP, CA

Lunch- "Legislative Initiatives to Reduce Toxicity of Municipal Solid Waste" Rep. Jean Wagenius, MN
Workshop 1-A "How To's"
Workshop 1-B "Paint I"
Workshop 1-C "Household Batteries"
Workshop 1-D "Other Problem Wastes"
Workshop 1-E "Indoor Air" *ADDED TO 1A*

Workshop 2-A "How To's"
Workshop 2-B "Paint II Market Issues"
Workshop 2-C "U.S. Household Battery"
Workshop 2-D "Fluorescent Lamps"
Workshop 2-E "Collection Case Studies I"

THURSDAY, DECEMBER 10, 1992
Workshop 3-A "How To's"
Workshop 3-B "Pesticide Use, Collection and Reduction"
Workshop 3-C "Education I-Schools Implementation and Evaluation"
Workshop 3-D "Used Oil & Filters"
Workshop 3-E "Waste Management I:Waste Types and Management"
Workshop 4-A "How To's"
Workshop 4-B "CESQG I"
Workshop 4-C "Education II-General Public"
Workshop 4-D "Source Reduction I:Labeling"
Workshop 4-E "Waste Management II:Options"
Lunch Speaker- Hubert Humphrey III, Attorney General, State of MN
Workshop 5-A "How To's"
Workshop 5-B "CESQG II-Collection Program Case Studies"
Workshop 5-C "Collection Case Studies II"
Workshop 5-D "Source Reduction II:How To Measure Results"
Workshop 6-A "Rural Programs"
Workshop 6-B "CESQG III-Information"
Workshop 6-C "Permanent Programs I"
Workshop 6-D "Source Reduction III: Effectiveness of Alternatives"

FRIDAY, DECEMBER 11, 1992
Workshop 7-A "Waste Management III:Controlling the destiny of your waste"
Workshop 7-B "CESQG IV-Technical Assistance"
Workshop 7-C "Permanent Programs II-Case Studies"
Workshop 7-D "Source Reduction IV: Reformulation"
Plenary Session: Q & A with HHW, Manufacturer and Contractor Panels
Closing Remarks: Charlotte Mooney, US EPA, WA

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ORDER FORM

EPA Announces Three Publications On Household Hazardous Waste and Used Dry Cell Battery Collection Programs

For the General Public

1. ***Household Hazardous Waste: Steps to Safe Management.***

A flyer providing information to households about how to identify household hazardous waste (HHW); the dangers of improper disposal; and safe management methods for HHW households.

For Public Officials, & Community Leaders

2. ***Household Hazardous Waste Management: A Manual for One-Day Collection Programs***

Designed to help communities plan and operate a successful household hazardous waste collection day, this manual provides guidance for all aspects of planning, organizing, and publicizing the event.

3. ***Used Dry Cell Batteries: Is a Collection Program Right for Your Community?***

This handbook helps communities determine whether establishing a battery collection program is appropriate for them. It is organized around ten key issues, from determining the types and amounts of batteries being discarded, to estimating the likely costs of collection.

Please send me the following publication(s) (check boxes that apply)

- ☐ *HHW: Steps to Safe Management* (Flyer) (EPA530-F-92-031)
- ☐ *HHW: A Manual for One-Day Collection Programs* (EPA530-R-92-026)
- ☐ *Used Dry Cell Batteries: Is a Collection Program Right for Your Community?* (EPA530-K-92-006)

Name:_____

Address:_____

City:_____ State:_____ Zip:_____

Please leave completed form at the Conference Registration Desk

or mail to:
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United States Environmental Protection Agency
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