SW9PA

# PROCEEDINGS

## 1975 Public Meetings on Hazardous Waste Management

Volume I

*This publication (SW-9p) was compiled*
*under the direction of Alan S. Corson,*
*by Patricia A. Savage, Cynthia A. Baggatts, and Tawanna Holloway.*
*It constitutes the official record of the meetings*
*announced September 17, 1975, in the Federal Register*
*and held by the Office of Solid Waste Management Programs,*
*December 2 (Newark, N.J.), December 4 (Rosemont, Ill.),*
*December 9 (Houston), and December 11 (San Francisco).*

U.S. ENVIRONMENTAL PROTECTION AGENCY

1976

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## FOREWORD

Last December the Office of Solid Waste Management Programs held a series of public meetings on hazardous waste issues. The purpose was to gain a better national perspective on whatever guidance might be needed from EPA for the proper management of these particularly dangerous discards of our highly industrialized society. Hazardous wastes are the toxic chemical, biological, radioactive, flammable and explosive byproducts generated primarily in extracting and processing the raw materials used by our Nation. Hazardous wastes constitute an overwhelming disposal burden and threaten the public health and the quality of our environment.

The meetings were announced in the Federal Register, September 17, 1975, and were well attended by members of the public, representatives of the industrial firms that generate hazardous wastes as well as those that dispose of them, by representatives of other Federal agencies, and by environmentalists. Rather than making only a single record of the meetings available for public inspection in our Washington headquarters (as stated in the Federal Register), the following proceedings, which include the transcripts of the four meetings together with copies of all documents presented and all written submissions, are being printed in limited quantity for sale by the Superintendent of Documents, and for inspection at the EPA regional libraries and State solid waste management agencies. We hope the official record of these important meetings is thus being made widely available across the Nation.

Sheldon Meyers
Deputy Assistant Administrator
for Solid Waste Management Programs

federal register

WEDNESDAY, SEPTEMBER 17, 1975

PART IV:

# ENVIRONMENTAL PROTECTION AGENCY

## HAZARDOUS WASTE MANAGEMENT

Public Meetings

## ENVIRONMENTAL PROTECTION AGENCY

[FRL 432-5]

### HAZARDOUS WASTE MANAGEMENT

#### Public Meetings

Hazardous wastes are the particularly dangerous discards of any highly industrialized, technology-based society. These wastes are the toxic chemical, biological, radioactive, flammable and explosive byproducts generated primarily by the Nation's extractive, conversion, and other process industries as well as Federal facilities. Growing industry production, bans and cancellations of toxic substances, and the effectiveness of air and water pollution controls (along with ocean dumping restrictions) are increasing the pressure for hazardous waste disposal to the land. The generation rate for nonradioactive hazardous wastes is estimated at well over 10 million tons yearly and increasing. At present, Federal, State, and local regulations dealing with the treatment and disposal of nonradioactive hazardous wastes are generally spotty or nonexistent. Consideration is currently being given in Congress to new legislation providing more positive control over hazardous wastes.

In order to gain a better National perspective on needed guidance for the proper management of hazardous wastes, and pursuant to Section 204 of the Solid Waste Disposal Act, as amended, wherein the Administrator may gather and disseminate information and recommendations on waste management issues, notice is hereby given of four public meetings to solicit information as to the scope and nature of the hazardous waste management problem and related topics. The meetings will begin at 8:30 a.m., December 2, 1975, at the Gateway Motel, Newark, N.J.; December 4, 1975, at the O'Hare-Kennedy Expressway Holiday Inn, Rosemont, Illinois; December 9, 1975, at the Holiday Inn-Medical Center, Houston, Texas; and December 11, 1975, at the Sheraton-Fisherman's Wharf, San Francisco, California. A second day may be scheduled at each location should the response warrant.

The purpose of each meeting is to solicit public, industry, labor, and other Federal agency comment in order to assist the Agency in determining the types and character of any advice and guidance which should be developed for the environmentally safe management of hazardous wastes. Members of the interested public, representatives of industrial firms that generate as well as those that treat and dispose of these wastes, labor unions representing individuals who work with such wastes, and Federal agencies are urged to attend and respond to any or all of the Discussion Topics listed below as well as any other issues of concern.

The meetings are open to the public and will be conducted by a panel from the Environmental Protection Agency. The following procedural rules will apply. The Chairman of the panel is empowered to conduct the meeting in a manner that in his judgment will facilitate the orderly conduct of business, to schedule presentations by participatnts, and to exclude material which is irrelevant, extraneous, or repetitious. The time allotment for oral statements shall be at the discretion of the Chairman, but shall not ordinarily exceed 15 minutes. With the permission of any person offering a statement, questions may be asked by members of the panel. At the discretion of the Chairman, a procedure may be made available for presentation of pertinent questions from other persons to participants. Individuals with prepared statements are requsted to bring 20 copies. Persons unable to attend, but wishing to comment on the Discussion Topics, are invited to send written comments to the address below by January 31, 1976.

A transcript of the meetings will be made and a copy of the transcript, together with copies of all documents presented at the hearings and all written submissions, will constitute the record of the meetings. A copy of the record of the meetings will be available for public inspection by March 30, 1976, at the U.S. Environmental Protection Agency, Public Information Reference Unit, Rm. 2404, 401 M Street, S.W., Washington, D.C. 20460.

Anyone desiring additional information on the meeting or wishing to be placed on the program to present a statement is requested to contact: Mr. John P. Lehman, Director, Hazardous Waste Management Division, Office of Solid Waste Management Programs (AW-565), Environmental Protection Agency, Washington, D.C. 20460, telephone (202) 254-6837 or, after September 22, 1975, (202) 755-9185.

DISCUSSION TOPICS

1. What is a hazardous waste? What criteria should be used to identify hazardous vs. non-hazardous wastes? What are proper methods for collection of waste samples for analysis? What analytic/laboratory methods have been useful or efficient in analyzing wastes for characteristics relevant to this decision process?

2. What responsibilities and liabilities should rest with the generator, the treater, and/or the disposer of hazardous waste for its ultimate environmentally acceptable disposal? Who should bear the costs of assuring environmentally safe disposal?

3. For which wastes, if any, should (a) recovery and reuse, (b) incineration, (c) chemical treatment, (d) physical treatment, (e) biological treatment, or (f) land emplacement be required? For which wastes, if any, should (a), (b), (c), (d), (e), or (f) above be prohibited?

4. Which practices, for certain specified wastes, are particularly effective in detoxifying, neutralizing or otherwise rendering such wastes harmless?

5. To what extent are cost data available for the variety of processes and techniques useful in treating and disposing of hazardous wastes?

6. What are the minimal safety and security precautions for hazardous waste treatment, storage, and disposal sites (including packaging and containerization, fire safety, site security, employee training, incident reporting, etc.) which are necessary for environmentally sound management?

7. What provisions for site monitoring, recordkeeping, and reporting are necessary and prudent to insure the integrity of hazardous waste storage, treatment, and disposal sites?

8. What has been the availability and price of insurance and other mechanisms to reduce the risks of operation to operators of private hazardous waste management facilities?

9 What are necessary and sufficient requirements to assure the long-term integrity and care of operating as well as closed hazardous waste storage/disposal sites?

10. What are feasible methodologies, if any, to set limits on the amounts of specified hazardous wastes permitted to be emplaced in the land at specific sites?

11. To what extent are existing transportation safety regulations and definitions useful and sufficient to govern the transport (both interstate and intrastate) of hazardous *wastes*, as distinguished from substances?

12 To what degree should labeling and placarding of waste shipments be required? What are the most effective and accepted systems for such labeling and placarding?

13. To what extent are the damages or costs of improper hazardous waste management evident? To what extent have they been investigated?

14. What mechanisms and experiences are effective for soliciting citizen acceptance of hazardous waste management facilities?

15. What Federal facilities typically generate what types and amount of hazardous wastes?

16. To what extent and by what mechanisms should the private sector be involved in the treatment and disposal of hazardous wastes, especially those from Federal facilities?

Dated: September 11, 1975.

EDWARD TUERK,
*Assistant Administrator, for Air and Waste Management.*

[FR Doc.75-24776 Filed 9-16-75;8:45 am]

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* - This indicates that additional information, either submitted at the meetings or raised at the meeting, has been included at an appropriate location in the record.

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PUBLIC MEETING

held at the

GATEWAY DOWNTOWNER MOTOR INN

NEWARK, NEW JERSEY

Tuesday
December 2, 1975
8:30 A.M.

PANEL MEMBERS

John P. Lehman, Director
Hazardous Waste Management Division (HWMD)
Office of Solid Waste Management Programs, EPA

Walter W. Kovalick, Jr., Chief
Guidelines Branch, HWMD
Office of Solid Waste Management Programs, EPA

Alfred W. Lindsey, Program Manager
Technology Assessment, Technology Branch, HWMD
Office of Solid Waste Management Programs, EPA

Murray Newton, Program Manager
State Programs, Implementation Branch, HWMD
Office of Solid Waste Management Programs, EPA

William Sanjour, Chief
Technology Branch, HWMD
Office of Solid Waste Management Programs, EPA

Michael F. DeBonis, Chief
Solid Waste Management Branch
EPA Region II

MR. JOHN P. LEHMAN: I call this public meeting to order. Good morning, ladies and gentlemen, my name is John P. Lehman, I'm the Director of the Hazardous Waste Management Division, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency, Washington, D.C.

I would like to welcome you on behalf of the Agency, I think it is noteworthy that this particular meeting is taking place exactly on the 5th birthday of EPA. We are starting our 5th year today.

The purpose of this public meeting as announced in the Federal Register of September 17, 1975, is to gather information and data for the Agency as to the scope and nature of the hazardous waste management problem in this country and the need for and extent of guidance that should be developed by the Agency to help cope with this problem.

For the purpose of this meeting, hazardous wastes are the non-radioactive discards of our technology based society. They include the toxic, chemical, biological, flammable and explosive byproducts of the nation's extractive, conversion and process industries.

This is not a rule making or regulatory hearing. The Agency does not have a proposal or a statement to issue for comment. Rather, this is a meeting on the record to solicit input from industry, labor, Federal, state and local government and other members of the public as to the extent of mismanagement of hazardous wastes and the available or anticipated systems and technologies to abate this problem.

In order to provide a framework for discussion today, the Federal Register Notice announcing this meeting suggested 16 discussion topics that reflect issues of concern to the Agency. Commentary on these and any other related topics are what we are most interested in hearing today. Copies of this Federal Register are available on the table at the back of the room marked "Publication." I also am submitting a copy of the Federal Register notice for the record.

The panel here with me is composed of staff of the Hazardous Waste Management Division in Washington and EPA's Regional office, Region 2, in New York City. Now these gentlemen specialize in certain subject areas related to this issue. They are from your left Mr. Michael DeBonis, Chief, Solid Waste Management Branch in EPA Region II. Mr. William Sanjour, Chief of the Technology Branch in the Hazardous Waste Management Division. And, on my left, Mr. Walter Kovalick, Chief of the Guidelines Branch, Hazardous Waste Management Division. Mr. Alfred Lindsey, Program Manager for Technology

Assessment in the Division. And, lastly, Mr. Murray Newton who is Program Manager for State Programs, also with the Hazardous Waste Management Division.

In addition to this meeting in Newark today, three other identical sessions are being held in Chicago, Houston and San Francisco during these first two weeks of December. Persons not wishing to deliver a statement here, may send a statement, a written statement to the address noted in the Federal Register before January 31, 1976.

As our time here is limited, I would now like to describe the procedural rules for this meeting which I feel will maximize the opportunity for persons interested in speaking to be heard and yet make the best use of all of our time.

Persons wishing to make an oral statement who have not made an advanced request by telephone or in writing, should indicate their interest on the registration card. If you have not indicated your intention to give a statement and you decide to do so, please return to the registration table, fill out another card and give it to one of the staff.

As we call upon an individual to make a statement, he should come up to the lectern and after identifying himself for the court reporter, deliver his statement and at the beginning of the statement I will inquire as to whether the speaker is willing to entertain questions from the panel and from the audience for that matter. He is under no obligation to do so although within the spirit of this information sharing meeting, it would be of great assistance to the Agency if questions were permitted.

It is expected that statements will not exceed fifteen minutes in length. For extraordinarily long written statements, I would suggest a brief oral summary and submission of the full text for the record. The chairman reserves the right to close off statements which are excessively long, irrelevant, extraneous or repetitive.

Assuming that the speaker is permitting questions, members of the audience will not be permitted to directly question the speaker. Members of the audience may obtain a 3 x 5 card from a member of the staff upon which questions may be written. These cards will be collected by the staff and returned to the panel for consideration during the question period. If a written question from the audience is not presented to the speaker because we run short of time, I will ask the speaker to respond to those questions in writing for the record.

Now, a transcript of the meeting is being taken. A copy of the transcript, together with copies of all documents presented at the hearing and all written submissions, will constitute the record of the meeting. A copy of the record will be available for public inspection by March 30, 1976, at the U.S. Environmental Protection Agency Public Information Reference Unit, Room 2404, 401 M Street S.W., Washington, D.C. 20460.

Finally I would like to describe the day's activities as we currently see them. We will recess for a fifteen minute break at 10:30 A.M., a one hour luncheon break at 12:15 P.M. and reconvene at 1:15 P.M. Another fifteen minute break will be held at 3:30 P.M. Depending on our progress, I will announce plans for a dinner break after lunch. At this time we plan to conclude this meeting today. We may have to run past dinnertime to do this, however, because we have a large number of people who wish to give statements.

In order to facilitate the comfort of all, I suggest that smokers sit on the left side of the room facing front and non-smokers towards the right.

This concludes my opening remarks. I would like to at this time introduce Mr. Conrad Simon, Director of the Environmental Programs Division for Region II of the U.S. Environmental Protection Agency. Mr. Simon please.

MR. CONRAD SIMON: Good morning, ladies and gentlemen, on behalf of the Regional Office of EPA, I would like to welcome you here to this meeting and to welcome our colleagues from headquarters here to Newark.

Over the past few years, the intensive Federal and states' efforts to control and clean up air and water pollution has steadily led to an increasing demand for disposal of waste on land. Many of these wastes have been labeled "hazardous" by a definition currently in use. This condition has led to a new strong thrust by the Federal government and EPA to bring hazardous wastes under control whether under our current authorities or under proposed new legislation and in order to do this we believe that Federal involvement is necessary.

Hazardous wastes by our definition include toxic chemicals, pesticides, acids, caustics, flammables, explosives, biological and radiological residuals. Many of these, of course, are carcinogenic or cancer forming. Their primary source is the industrial sector but many institutions, particularly hospitals and laboratories generate significant amounts of hazardous wastes.

In our Report to Congress in 1973, we estimated the total amount of non-radioactive hazardous wastes generated in the United States to be approximately 10 million tons per year or roughly 10% of all industrial wastes. Recent information indicates that this number may be on the low side. We estimate that about 40% of these wastes by weight in organic material and about 60% is organic, that about 90% occurs in liquid or semi-liquid form and over 70% of the hazardous waste generated is generated in the somewhat highly industrialized areas of the Mid-Atlantic states, Great Lakes, Gulf Coast areas.

During the past two or three years the public health and environmental consequences of a proper waste disposal to the land have become an area of growing concern with the recognition of the high potential for growing water contamination, by leachate from landfills, surface water contamination by run off from landfills, air pollution by open burning and evaporation and, of course, personal injury by way of direct contact and explosions which may result from the mixing of wastes in landfill operations.

We see an increasing opportunity for adverse impacts from hazardous waste disposal from three primary sources; the first is the expansion of industrial production which is tied directly to hazardous waste generation. Next is the transfer of hazardous materials from other media to the land as a result of air-water pollution controls, third is the increase in hazardous waste materials destined to the land as a result of controls on ocean dumping and cancellation of the use of certain materials such as DDT.

Taking these factors into consideration, we estimate that the growth of hazardous waste generation in the United States in the next few years will be in the order of 5 to 10% per year.

We believe that technology is adequate for the treatment of most hazardous wastes by physical, chemical, thermal or biological means. Especially designed landfills which isolate hazardous wastes from the environment by way of natural or artificial membranes with gas and leachate collection where necessary, can be and have been built.

There are secure storage facilities available for those few wastes to which current treatment and disposal technology does not apply. The main problem appears to be that the use of this technology is expensive and far exceeds the cost of current practices.

For example, the cost of incineration of hazardous wastes can run as high

as $50 per ton whereas the current inappropriate practices of open dumping may cost only $3 or $4 a ton. Because of this wide disparity between the cost of proper disposal practices and the harmful practices currently allowed in many places, there is generally no obvious or direct economic incentives for using environmentally acceptable practices.

Unfortunately, the land disposal of hazardous wastes is essentially unregulated at the Federal level and in most states. There are only two areas in which Federal authority exists to deal with parts of the hazardous wastes management problem. These are the Federal Insecticide, Fungicide and Rodenticide Act, that's the pesticide act, which provides for EPA regulation of the storage and disposal of wastes, pesticides and containers and the Atomic Energy Act of 1954 as amended which provides for Federal regulation of radioactive wastes produced in fision reactions.

Although most pesticide and radioactive wastes can be labeled hazardous, in aggregate they represent only a small fraction of the total hazardous waste problem.

It is our current position that environmental insult and the hazard of improper waste management will continue in the absence of strong, uniform regulation of land disposal on a national basis and vigorous enforcement of regulations on a state and local basis.

As long as the economic pressures tilt the balance toward improper disposal, as long as no consistent and uniform rules exist for public and private operation, as long as offending sites cannot be closed because no alternatives exist, the necessary transition from poor envirnnmental management to optimum management will not take place.

With this in mind, we have scheduled these series of meetings, as Mr. Lehman has mentioned, in order to elicit your ideas, the ideas, comments, opinions, recommendations, etc. of representatives of government, industry, labor and the public at large, in order to assist the Agency in developing guidelines for hazardous waste management.

We thought Newark would be a suitable site for such a meeting and for this first meeting because the Northeast and New Jersey in particular is one of the most highly industrialized areas in the country and is therefore faced with a particularly serious hazardous waste management problem. In addition, a number of other states in the area are generating hazardous wastes and can take advantage of the accessibility of Newark by transportation means to get here.

I'm glad to see that we have a rather large turn out and I'm very happy that you could come here today and I hope that you will take this opportunity to give us your opinions whether they are pro EPA, EPA ideas or otherwise.

Thanks a lot for coming.

MR. LEHMAN: Thank you, Mr. Simon, Let me add my welcome to all of you, to that of Mr. Simon. I now call upon Mr. William Philipbar of Rollins Environmental Services to deliver the first statement. Mr. Philipbar, will you take questions?

MR. WILLIAM B. PHILIPBAR: Sure.

We want to thank Jack Lehman and the Federal EPA for allowing us to make these statements.

The management of hazardous wastes in regional treatment plants has passed from the sound concept stage to proven, practical, available technology. Rollins Environmental Services, Inc. has pioneered the business of treatment, disposal, and recovery of hazardous wastes. Having started this industry in 1969, Rollins Environmental Services is a wholly owned subsidiary of RLC Corp. which is a $180,000,000 company whose stock is traded on the American Stock Exchange.

To date, Rollins has invested some $6,000,000 in the development of technology and $18,000,000 for construction of three regional hazardous waste treatment plants. Rollins is the acknowledged leader in this pioneer industry. The $18,000,000 in construction costs have provided sound base facilities for the treatment of hazardous waste pollutants while the development expenditures have provided extensive in-house technology and know-how for the economical treatment of hazardous wastes.

The Rollins Plants located in Logan Township, New Jersey, Baton Rouge, Louisiana, and Houston, Texas, offer indemnified hazardous waste disposal service to the Mid-Atlantic and the South Central region which, according to the EPA June, 1973, "Report to Congress on Disposal of Hazardous Wastes" represents over 47 percent of the hazardous waste generated in the United States. These plants also receive wastes from New England, South Atlantic, North Central and Southwest regions. The existing plants have a total capacity to incinerate, biodegrade, and chemically treat about 360,000 tons of waste per year and are now operating at less than 40 percent of this capacity. These plants, in operation for almost seven years represent accumulative operating knowledge of over 20 years. These plants utilize treatment processes to perform volume reduction, component separation and detoxification. Usually, several processes are required to handle a given waste stream.

These treatment processes, or unit operations, are basically thermal biological oxidation and chemical treatment. Material recovery is also carried out but at a much lower level because of the lack of further development funds.

We are a private company whose whole function is the management of hazardous wastes. We have not had the benefit of any public financing and, therefore, the cost of management is being borne by those who generate the wastes.

The critical problems that we faced are:

1. That the volume of business offered to the three regional plants is not sufficient to make the Rollins Environmental Services a profitable company.

2. The lack of return on the Rollins investment reduces the ability of Rollins to improve performance of present plans and to expand to other areas which require this type of coverage.

These problems stem from the fact that land dumping and deep well disposal practices are prevalent and are continuing. Because wastes, generally, have little or no intrinsic value, getting rid of them in the cheapest way is a route that will prevail even though it is environmentally unsound until there is adequate legislation and enforcement to prevent these practices.

The cost of treatment at a regional plant varies from fifteen to more than one hundred dollars per ton depending on the treatment methods required. These costs, although higher than dumping or deep welling are not, we feel, prohibitive. As incremental costs in the processing and manufacturing industries, they are but a tiny fraction of the total operating costs which are dominated by large fixed costs, raw materials, labor and distribution expenses.

As was stated at the start of this presentation, regional treatment of hazardous wastes has passed from a sound concept stage to proven, practical, available technology, but without sound legislation and enforcement, private capital will not be allotted to this need. It is felt that Federal legislation is required to set the overall guidelines for the management of hazardous wastes with the states having the ultimate responsibility, similar to the present Clean Air and Water Acts.

Control of the hazardous wastes from the generator to the ultimate disposer is a must.

A manifest system is recommended where, for each load of waste, the generator initiates a manifest describing the waste, the hauler and the disposer. The hauler fills in the portion of the manifest outlining that he has completed his job and the disposer completes this document outlining treatment and disposal procedures and dates. These are all funneled back to the state for control purposes.

Let's now go to the discussion topics as outlined in the Federal Register that announced this meeting. Unfortunately, time does not permit a thorough discussion of each question and we would be happy to discuss these questions in detail with those interested.

1. On the definition of hazardous wastes. It is felt that the definition of hazardous wastes given in the EPA "Report to Congress.." is a good one, and I won't repeat it here, but I think is one that most of the people

in the industry subscribe to.

The sampling of hazardous wastes is another question that is asked and this is a difficult problem. Sampling, as any chemist or chemical engineer knows, even a virgin material, is difficult. We would not take into our plants a waste stream until samples are collected, analyzed and a treatment procedure outlined. Every truck load of material coming into the plant is again analyzed.

Samples from tanks, the customer's tanks and the tank trucks are thiefed so that the bottom, middle and upper portions are sampled.

Waste in the lagoon is a tough problem as far as sampling. We try to take samples from a number of different spots and depths in an attempt to obtain representative samples.

Analytical-laboratory methods used are important as the waste profile must be pretty well outlined. Basic wet chemistry analytical methods are used along with atomic absorption techniques for metals, calorimeter for BTU measurements as well as mass spectrograph and infrared for more definitive analysis.

Setting criteria for the identification of hazardous waste versus non-hazardous waste, which is another question that was asked in the Federal Register, is a difficult problem. In order to have effective legislation and enforcement, criteria have to be set and identification should be relatively simple and yet it is not a simple problem.

A suggested approach is as follows where all materials falling in the following categories would have to be detoxified before ultimate disposal: And, here again is a list.

A) Halogenated hydrocarbons except those compounds and concentrations that are generally accepted as non-toxic to man or animal.

B) Toxic metal salts or other compounds which have appreciable solubility in ground waters at normal pH ranges that are greater than the potable water standards including arsenic, barium, beryllium, cadmium, copper, chromium, lead, selenium, silver, zinc and mercury.

C) Cyanides and sulfides including, but not limited to sodium and potassium cyanide, the metal cyanide from plating operations such as copper.

D) Water soluble phenolic compounds that have been shown to exert toxic effects including phenols, cresols, cresylic acids and their derivatives which are water soluble to levels higher than acceptable potable water standards.

E) Explosives.

F) Water soluble dyes and byproducts of the manufacture of water soluble dyes including dye stuff which might be solubilized by variations in ground water acidity.

G. Pesticides and herbicides as well as containers contaminated with these products.

H. Acid wastes and aqueous acidic solutions that would adversely alter ground water and surface water properties to an extent that would make them unsuitable for public use.

I. Flammable materials falling into the NFPA category four.

The next question asked was the recovery and reuse of hazardous material. We feel that this is almost totally an economic consideration. If a waste stream can be more cheaply recovered and reused than disposed of in other ways, it generally finds its way into a recovery situation. Most solvents are recovered this way. A large amount of metals, both ferrous and non-ferrous also go the recovery and reuse route.

However, the vast majority of materials that find their way into a plant such as ours are not recovery candidates. It is felt that all hazardous organic materials that cannot be economically recovered should be incinerated. This includes aqueous organics with BOD's at a level that cannot be readily biodegraded as well as highly concentrated cyanide compounds. When you get to inorganic materials you have chemical and physical treatment that are intended to reduce volume, detoxify, change the physical form, separate and isolate the hazardous portion of the waste streams. Low order of aqueous organics can be economically treated through biological degradation. The land placement of hazardous wastes should only be done after they have been detoxified or stabilized so that they no longer pose a hazardous problem.

The next portion of the question had to do with cost data. And, having been in the business as long as we have, we have extensive cost data on a number of different unit operations and these can be made available for interested people. Costs per pound are obviously a function of the number of pounds processed, type of materials, treatment methods, etc. Overall, as I said before, the costs of handling hazardous wastes can range from fifteen to well over one hundred dollars per ton.

Safety precautions. The safety precautions that are required in the handling of hazardous wastes are similar or the same as those in any chemical plant that is handling the virgin materials. These precautions are well defined and have been a practice for a number of years. Control of material is a key word in safe handling. Knowledge of what the composition of material is and then assigning proper control methods is essential.

For the overall government control of the management of hazardous wastes, we feel the manifest system, as previously discussed, is a must with the haulers and the disposal sites licensed and inspected by the state with stringent requirements for all who are involved in hazardous waste management.

Insurance. Insurance has not been a problem, as far as we are concerned. We accept complete responsibility for the waste when it leaves the generator's plant if it is in one of our trucks and if the waste has been properly identified. Our umbrella policy for this type of indemnification is over $20 million.

Strict control over what is to be landfilled and what pretreatments are needed to detoxify materials to be landfilled have to be set and enforced. The basis for these criteria were previously outlined. Again, the manifest system is the surveillance tool needed to give you the enforcement power.

Another question was on the transportation labeling of hazardous waste. The Department of Transportation has jurisdiction over the hauling of both intra and interstate hazardous wastes hauls. The D.O.T. regulations covering the hauling of these materials are presently adequate in our opinion and if properly enforced, should insure safe transportation. The same regulations cover labeling and placarding of wastes for shipment.

It is strongly felt that the private sector should be the mechanism for the management of hazardous wastes, being responsible for the transportation, treatment and ultimate disposal. Most of the technology and know-how is available and the private sector will meet this demand when proper legislation and enforcement creates it.

MR. LEHMAN: Thank you, Mr. Philpbar. I would like to point out that Mr. Alan Corson of our staff, in the dark suit in the back, he has the 3 x 5 cards and will pass them out or collect them if you have any questions. Why don't you raise your hand if you want to fill out a card to ask questions.

Meanwhile, does any of the panel have a question of Mr. Philipbar? Yes, Mr. Sanjour.

MR. SANJOUR: Mr. Philipbar, you were commenting about the, if I could focus in on the information that you need to treat waste and trying to match that up with what we know about the Department of Transportation labeling and placarding is it your opinion that the information on the label and in this case the label is sufficient for you to operate on?

MR. PHILIPBAR: On the placard or on the bill of lading?

MR. SANJOUR: Well, on the label hopefully, if it is properly labeled.

MR. PHILIPBAR: On a drum or something like that.

MR. SANJOUR: Right. Is that usually sufficient for you to treat?

MR. PHILIPBAR: No, we get a full run down of the analysis or we try to from the generator, and then we analyze it ourself. We certainly wouldn't go with what is on the label itself. We feel as far as transportation and any problem on route, that usually the labeling is sufficient to find what's going on.

MR. SANJOUR: Thank you.

MR. LEHMAN: If you wouldn't mind just standing there, Mr. Philipbar, while we collect the written questions. I just want to alert the next two speakers in order so that they will be prepared to come up. We intend to have Mr. Conner and Mr. Santoleri, in that order, following Mr. Philipbar. We have some questions now. Mr. Kovalick, do you want to read the questions?

MR. KOVALICK: Mr. Philipbar, how does your legal responsibility change if the delivery to your plant is made in the generators or the originator's vehicles versus your own?

MR. PHILIPBAR: Well, we, again, take title of the waste if it is our own vehicle when the truck leaves the generators plant. If it is sent in their vehicle, we will take title when it comes on our property. Now, this is still a moot point on whether or not you can or can't take title. We take responsibility, full title.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: Mr. Philipbar, can sulfuric containing wastes be handled by incineration and if so are SOX emissions a problem?

MR. PHILIPBAR: We handle organic sulfur from wastes in several of our plants, and our scrubbing equipment has been sufficient to handle SOX. We are careful on how much we burn at any given time.

MR. LEHMAN: Are there any other questions? If not, thank you very much, Mr. Philipbar. I would ask that each speaker who has a prepared statement, that is a written type version of his recitation, that he make that available to the panel and also the press table before he gives his speech.

I might point out here, in amongst the questions that were brought up, there was one addressed to me, and I want to reiterate that we are here to listen, not to orate, so please address your questions to the people who have made their own presentations and not to EPA, if you will please.

Our next speaker is Mr. Jesse Conner of Chemfix, Inc. Mr. Conner, please.

Will you accept questions, Mr. Conner?

MR. CONNER: Yes.

Thank you. It is a pleasure to be here this morning.

As a representative of an industrial firm engaged in the treatment and disposal of hazardous waste residues, I would like to address my comments toward Discussion Topics 3, 4, 5 and 16 as listed in the notice of this meeting published in the Federal Register, September 17, 1975.

These topics deal with: What types of treatment can be applied to various wastes? Which processes or practices are most effective? What should be the extent and mechanism of involvement by the private sector in the treatment and disposal of hazardous wastes?

In spite of wishful thinking on the parts of the public, regulatory agencies, and much of industry, it is obvious that the large bulk of waste residues, hazardous and non-hazardous, will eventually go to the land. Much of the recovery or reuse which is presently economically feasible is already being done before these materials become residues.

Future process improvements will have some effect on reducing the amount of waste generated per unit of product. Some wastes can be thermally or chemically transformed into only water and carbon dioxide. Volume reduction can be practiced to some extent, certainly more so than presently being done. However, even with these various possibilities, the phasing out of ocean dumping, deep well injection, and permanent lagooning as disposal methods, will, in the balance, put greater pressures on the land. Therefore, it is essential that we find ways to place these materials on or in the land in such fashion that they are either non-hazardous and environmentally acceptable when such disposition is made, or if this is not possible the wastes must be secured under perpetual care so that the probability of release into the environment is eliminated.

One of the newest and potentially most useful unit processes in the hazardous waste disposal field is "chemical fixation and solidification". In this approach, hazardous components of the waste are chemically altered, encapsulated, or otherwise immobilized so that they are not available to the environment under planned disposal conditions. In addition, this results in a material which is sufficiently solid so that when disposed on land, it does not destroy the useful physical properties of the land. Solidification of liquid, hazardous materials also assures that the waste can be located and recovered for some future positive economic use, or for further treatment.

This latter consideration - being able to locate and recover waste material at a later date - has never been more pertinent than at this point in time, when we are discovering that many substances previously believed to be harmless are potentially hazardous.

There is no possible way that we can know the full effects of all the tremendous spectrum of modern synthetic chemicals and other materials on human beings, plant, animals and aquatic life. Therefore, if through lack of available information or technical capabilities we are unable at this time to proceed further in the treatment of a waste, it is essential that we be able in the future to rectify such mistakes with minimal environmental damage. This cannot be done if a potentially hazardous material is dispersed in a nonrecoverable fashion, such as in ocean dumping, deep well disposal, or land spreading.

Specifically, chemical fixation and solidification techniques are capable of dealing with most inorganic, water based, solutions, slurries or sludges. The Chemfix Process can tie up toxic heavy metals in chemically insoluble forms that remain inert under acid and alkaline ground water conditions and under the influence of other environmental factors such as ultra-violet light, biological action, and weathering.

By proper application of these techniques, the wastes can be rendered harmless for a specific intended disposal program. For example, treated wastes can be placed in sanitary landfills (often replacing dirt as cover material) or used for structural landfill in certain applications.

In the case of sewage sludge, chemical fixation provides a safe means for utilizing the fertilizing and soil conditioning capabilities of this material while minimizing its detrimental attributes which have prevented widespread use for this purpose in the United States.

Chemical fixation and solidification techniques also apply to certain organic wastes. Water based sludges containing large quantities of organics, e.g., sewage sludges, refinery sludges, etc., can be successfully treated to produce an environmentally safe fill material. More difficult organics such as pesticides can be completely encapsulated in much more expensive, but still useful organic polymeric systems.

The Chemfix Process is a proven commercial process which has been used to treat more than 110,000,000 gallons of industrial and municipal liquid wastes. It is available as a mobile service for on-site treatment, as a unit process at central treatment sites, and as a customer operated, in-plant, treatment facility. The mobile service and in-plant facility are available anywhere in the United States (also in France, Japan and the United Kingdom). Central site treatment is available in several locations now, and is being expanded under license.

Chemical fixation and solidification can be, and frequently is, the least expensive environmentally acceptable method for the disposal of waste residues, especially those occurring in very large volumes.

Typical costs for large scale treatment presently range from 4¢ to 10¢ per gallon. Treatment costs for materials not capable of being handled in this fashion generally range upward from 10¢ to $1.00 per gallon or more.

Accurate and meaningful cost data are available from private companies doing this type of work. In almost all cases, costs for proper disposal are higher than those previously encountered for indiscriminate dumping, just as it is much cheaper to discharge dirty water or contaminated air than to apply the appropriate water or air pollution control measures.

As long as cheap, "non-control" disposal techniques are available to industry, we can expect that they will be used regardless of the effect on the environment. As with any other segment of the environmental control picture, Federal, State and Local legislation, regulation and enforcement are essential before any real control of hazardous wastes is accomplished.

In almost all cases the private sector is capable of handling the treatment and disposal of hazardous wastes from any source, including radioactive materials. Private companies have already paid the price (both in development costs and in poor profitability) during the last five years to form the nucleus of an emergent industry treating hazardous waste residues.

In spite of the economic difficulties and risks with which it has had to contend, the private sector has at this time more than sufficient capacity to handle the existing level of business in the hazardous waste area, and in my opinion, it stands ready to expand as soon as it has reason to do so.

However, such procrastination as is presently taking place in the passage of the proposed Federal hazardous waste legislation will eventually weaken the Industry's ability and willingness to provide the necessary capital to prepare for the needs of the future. This procrastination is not primarily the fault of the regulatory agencies. Without enabling legislation, funds and other resources necessary to do their job, they cannot be expected to assure proper disposal of hazardous materials in the future.

Thank you.

MR. LEHMAN: Thank you, Mr. Conner. Will those who wish to submit a question please raise their hand. Meanwhile, Mr. Lindsey?

MR. LINDSEY: Mr. Conner, you discussed certain structural properties, I believe, of Chemfix materials. Can you comment somewhat on the normal load bearing capacity of normally Chemfix wastes?

MR. CONNER: Yes, they vary quite a bit, depending upon the material being treated and also the aim being used because this process as other solidification processes can be varied to meet these requirements. In general, we end up with load bearing capabilities that range from as low as half a ton per square foot to five tons a square foot or more. I'm not a soil mechanics man but I understand 5 tons per square foot is reasonable soil load bearing capacity.

However, these materials are not soils, they have different properties and so the testing procedures are somewhat open to question.

MR. LINDSEY: I have a written question here. How long after chemical fixation in landfill is the landfill available for use, capable of bearing structures, how long after?

MR. CONNER: Generally within a week and

more often within several days it has achieved perhaps 90% of its final bearing strength and general physical properties.

MR. LEHMAN: Mr. Sanjour.

MR. SANJOUR: I've got a question here for you, Mr. Conner. Cost of 4¢ to 10¢ a gallon, does that include hauling costs?

MR. CONNER: It does not include hauling costs,no.

MR. LINDSEY: One more here. Are there any materials that you process is either unable to handle or less readily able to handle than others?

MR. CONNER: In general the process is only capable of handling water based residues. Solvent based residues are not handable with this process. And, also, there are a number of water soluble organic hazarouds materials which we do not handle. The solidification can be accomplished, but the material remains hazardous due to leaching of these kind of materials, so it is not suitable for these.

MR. LEHMAN: Mr. Conner, I have another written question. It says, you cite lack of dollars as the reason for lack of EPA regulations, isn't it really a lack of closer coordination by EPA officials?

MR. CONNER: Well, I don't think I said

that the lack of dollars was the reason for the lack of EPA regulations, necessarily. I think what I was trying to say is that first you need enabling legislation and then you need the funds to allow whatever regulatory agency that is involved to in fact do the regulations, to hire the people and spend the money to do regulation, this is what I was trying to say.

MR. LEHMAN: Are there any other written questions? We have one more coming here.

Mr. Conner, you have indicated that you may do business in a variety of states around the country, what has your experience been as far as effects on your ability to do business in states that have regulations versus those who do not, they are in substantial difference, would you like to comment on that?

MR. CONNER: Well, in general there is relatively little impetus for anybody to engage in a more expensive process such as Chemfix as opposed to just land dumping of material in a state that has no regulations or in which the regulations aren't being enforced, so we find that where the regulations are there, where they are being enforced we are able to do business, where they aren't, it is only possible to do business where the individual company essentially has adopted the good neighbor policy on its own, and this is rather difficult for an individual company, especially an individual plant to do because it makes them uncompetitive with other people who aren't doing this.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: I have a question here, who do you feel should make the decision on what specific products should be or should not be chemically fixed, who do you feel should do that?

MR. CONNER: I think the general guidelines as to what materials are hazardous, what materials are suitable for this kind of treatment in a general way should be done by EPA. I think when you get down to specifics, it will have to be and will be done by the individual states, but I think they need the guidelines, they do not and probably will not from my experience have the technical capability to really make these kind of judgments.

MR. LEHMAN: Are there any other questions? Thank you very much, Mr. Conner. At this time I would like to call Mr. J. J. Santoleri from Trane Thermal Co., and just to alert the next speaker, Mr. Palmer from the DuPont Company. Mr. Santoleri, will you accept questions?

MR. SANTOLERI: Yes.

MR. LEHMAN: Mr. Santoleri, will you please identify your company and its location.

MR. SANTOLERI: I am with the Trane Thermal

Company, formerly Thermal Research & Engineering Corporation out of Conshohocken, Pa.

I want to thank the U.S. Environmental Protection Agency for allowing us to give this discussion this morning.

Technological advances over the past thirty years have created many new industrial processes which have enabled all of us to live much more comfortably, but at the same time have created wastes which, in most cases, can be considered hazardous to human health and the environment.

We are talking about hazardous wastes this morning, I will attempt to give our experiences in the thermal processing of these hazardous wastes.

The first installation we put in was approximately twenty-five years ago and since then we have put in well over 400 installations for processes which we consider as hazardous wastes.

The companies we dealt with were companies who were concerned about the protection of their own personnel, the handling of the materials within their plant properties, as well as the local community. These responsible people were concerned about how to dispose of these wastes and we were called in in many cases to determine whether this could be done by thermal processing.

I will list some of the processes that we have looked at, some of the solutions we have accomplished and give you some idea of the different areas that you can find hazardous wastes.

In Chemical processes we looked at the Acrylonitrile process. This contains fumes with acetyl chloride and hydrogen cyanide.

Caprolactam process contains wastes with aqueous liquids containing adipic acid, also tars and sodium compounds.

In the agricultural industry we find in the past couple of years there has been a great growth in any process involved in the agricultural industry, primarily with the production of herbicides, pesticides and insecticides. Here we find wastes containing chlorinated hydrocarbon liquids and gases, also aqueous wastes containing organic and inorganic materials, some of these containing sodium and phosphorous compounds.

In the Freon process we have handled fluorinated hydrocarbon liquids and gases.

Phthalic Anhydride process. Here we find fumes containing phthalic and maleic anhydride, carbon monoxide and air. Also waste liquids containing phthalic and maleic anhydride.

In the plastics industry, phenolic tars and fumes; polyvinyl chloride, chlorinated hydrocarbon liquids and gases.

In the Vinyl Chloride process, chlorinated hydrocarbon liquids, ethylene dichloride liquids and fumes.

In the Amunition Plants we have handled trinitor toluene; which is a waste from their process; nitrogenated compounds, both gases and liquids.

Asphalt Plants, Gases containing hydrocarbons, steam and air, as well as liquids.

Coal Gasification Plants and Coal Liquefaction Plants. Most of these are in the pilot stage now but these also generate wastes which are toxic and hazardous.

Food Plants. People consider the odors from coffee roasters as toxic or at least injurious to the neighborhood, we find many people in the area like the odor, they know the plant is running when they smell it, but they still have to take care of it.

Fiberglass Plants. Phenolic fumes are usually generated in the operation of the fiberglass plants.

Paint Plants. Aqueous wastes and caustic and latex.

Pharmaceutical Plants. Both fumes and liquids from drug drying processes, solvents containing toluene, diethyl ether and acetone; aqueous wastes containing caustic, also phosphorous and sodium compounds.

Rubber Plants. Fumes containing hydrocarbons, polystyrene tars.

In the Space Industry, liquid wastes containing unsymmetrical dimethyl hydrazine and nitrogen tetraoxide.

Sulfuric Acid Plants. Gases containing hydrogen sulfide and sulfur dioxide.

Tobacco Plants. Fumes containing nicotine ammonia with steam.

Wire Enamelling Processes. Both fumes and liquids containing phenol.

And, in the automotive industry, primarily aqueous wastes containing oils and tars from the machine operations.

These are only a few of the problem areas which we have been exposed to over the years. In order to handle the problem from a thermal processing standpoint, we first must know whether it is solid, liquid or gaseous. In all cases, these wastes, if they are organics can be considered as combustible and can be thermally processed.

Second, we will want to know whether the waste is all organic or a percentage is organic, and whether the inorganic portion is water, inorganic compounds or a combination.

Third, we need to know why the waste is

hazardous and to what degree. This is necessary for the material handling step prior to incineration, as well as determining the conditions for incineration.

Depending upon the nature of the material, temperature and residence time must be determined to insure complete destruction of the hazardous components.

Finally, in order to optimize the process design of the thermal processing system, we must know the precise chemical formula and the concentrations of the materials involved. This is necessary to simplify the prediction of the results of the processing operation.

What I would like to spend a little time on this morning is Chlorinated Hydrocarbons. We have had quite a bit of experience in handling chlorinated hydrocarbons and we find that this presents problems in many plants.

In recent months a great deal of discussion has been directed toward the processing which takes place in the vinyl chloride monomer plants. In this area we have installed quite a number of thermal units. This is in the disposal of waste fumes from venting of various parts of the process and liquid wastes from various parts of the operation.

In approaching a problem we know the composition of the waste, the quantity of the waste and what variations you will have in the disposal of these wastes. When it is a liquid waste normally this can be tanked and stored so that you can have a continuous level of operation of your waste disposal system. However, if this is a venting operation, it is very difficult to try to vent and store gases, so your system must be able to take swings and be able to handle the vent gases as they are generated and properly destroy them.

The composition of the waste is critical in determining what will occur in the incineration step. Physical data determines the reaction, the temperature and the products of combustion. Normally this can be determined prior to the design of the system. However, in cases where this physical data is not available, we recommend that tests be run on the materials, especially in the case of the liquid wastes.

If the composition is such that it will sustain combustion, auciliary fuel will not be required. However, if the waste is essentially all water with some chlorinated materials, auxiliary fuel is necessary and it is also important to determine the quantity of chlorine that is available in the waste and also the hydrogen available for hydrolizing the chlorine to HCl. This is important so that chlorine will not go right on through the system and be discharged through the atmosphere.

In combining chlorine with hydrogen to form hydrogen chloride, this becomes a combustion product at high temperatures and can be readily quenched and absorbed in downstream equipment, scrubbers and absorption systems.

The conversion of the chloride portion to HCl depends upon the operating temperature, the availability of hydrogen in the waste material or hydrogen in the form of fuel or water that can be added to the system.

In our experience we have found that it is critical to design the system to minimize this chlorine release and at the same time minimize the amount of fuel necessary to dispose of the waste, especially in these days of energy shortages.

Therefore, this is one of the main reasons why we have to know the composition of the waste material which will enable the incinerator designer to set the operating temperature and the auxiliary fuel requirements.

Since this is a hazardous waste, it is also important to the plant operator, as well as the designer, to know the composition of the waste material so that the handling equipment, the piping, the valves, pumps are designed properly, with the proper materials to prevent corrosion and leakage of the material into the environment prior to its injection into the incenerator.

The incinerator also must be designed properly to withstand the temperatures of operation, the swings because of flows or temperatures and the corrosion resulting from the exposure of the lining to the variations in temperature from start-up to shut-down.

In burning a chlorinated hydrocarbon the products of combustion will normally contain carbon dioxide, water vapor, oxygen, nitrogen and $CO_2$ as well as HCl. Improper combustion will result in the formation of chlorine and hydrocarbons in the stack gases discharged to the atmosphere.

Therefore, proper dèsign of the incinerator as well as proper instrumentation and control is a definite requirement to insure complete oxidation of the hazardous materials and the discharge of a pollution free gas to the atmosphere.

In cases where we have incinerated chlorinated hydrocarbons,systems have been designed in which the hot gases are reduced in temperature to permit scrubbing of HCl from the gases. This hydrogen chloride can be absorbed in water very easily and this water solution neutralized with caustic so we will end up with a salt water stream.

Additional equipment can be provided to permit concentration of the HCl gases to acid, to any concentration up to anhydrous HCl. This will permit discharge from the system to contain only stack gases with $CO_2$, water vapor and nitrogen with some oxygen and the liquid discharge to essentially the HCl acid at some concentration level.

In more recent installations, heat recovery equipment has also been added to utilize the heat available from the combustion of the chlorinated hydrocarbons. This, of course, involves proper selection of materials in your waste heat recovery equipment.

We must realize that the main problem in all cases is the disposal of this hazardous toxic waste. The addition of equipment to recover heat, or to recover valuable chemicals, is secondary and must be considered only if it is economically feasible and does not become the primary reason for the system. The system must always be designed to operate so that the hazardous waste is disposed of properly.

In many applications where the process is only on the drawing board, the waste disposal problem is handled by testing a synthetic material which approximates the final waste product. We have done this in many cases where the plant hasn't even been built but this is a typical composition of waste product, how do you take care of it.

If we haven't done it before, we suggest a test be run to determine what the handling problems are, what the injection problems are for the atomizer and also what the temperature and residence time in the incinerator.

However, when the plant does get into operation, we often find that the synthetic material that was used is nowhere near what the final waste product actually is. So, it is necessary to determine how flexible a system has to be before it is put into operation, determine what additional equipment should be installed to take care of the difference between the synthetic and the actual waste. This should be an agreement between the user and the designer.

It is also necessary to determine in the test the amount of fuel required. This becomes a big part of the operating cost of the system. If it is a self-sustaining fuel, how much auxiliary fuel will be needed in the event the fuel does change in composition. These are all questions that must be answered prior to the final design of the system.

Tests are also necessary to determine the products of combustion by gas analysis and also the particulate analysis in the stack discharge, especially when handling inorganic materials along with the organics.

Many times the synthetic waste I mentioned does not approach the final process waste from the system, and we must be flexible enough to permit variations in composition.

In any hazardous waste problem, it is best to review the process as much as possible to determine if there is any way to reduce the waste that is being discharged. We found in many cases that the waste was being discharged but there is no care given to how it was being generated, we have a waste problem, how can you take care of it.

Many times we have found upon investigation that there were other uses for the waste, minimized the waste problem and also efficiencies were made in the operating process to minimize the total waste that was generated. When this is done, we found a lot of times that where somebody has a thousand pounds an hour waste, he can reduce this to maybe half by going back into his process, adding equipment which can reduce his waste problem.

We feel it is very important when you do have a situation like this to determine whether you can handle this at a neighboring facility or whether you should go into your own total facility. In going into your own total facility you have total control, at the same time you must be sure that you have qualified people designing and installing the system.

With this hazardous waste problem growing as it has in the past few years, many people are getting involved, many problems have resulted and many catastrophies have also resulted. Therefore, it is best to work with a qualified organization, someone who has had the experience, someone who has been exposed to the problems of corrosion, operation, maintenance, high temperatures, incineration.

Since I am running out of time, I would like to again thank you for the opportunity to present our experiences in thermal processing.

# THERMAL PROCESSING OF ORGANIC HAZARDOUS WASTES

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United States Environmental
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# THERMAL PROCESSING OF ORGANIC HAZARDOUS WASTES

Technological advances over the past thirty years have created many new industrial processes which have enabled all of us to live more comfortably, but at the same time have created wastes which, in most cases, can be considered hazardous to human health and the environment. The discussions which are being held this morning will enable us to have a better understanding of the term "hazardous wastes". I will attempt to give you our experiences in the thermal processing of these hazardous wastes.

Trane Thermal Company, formerly Thermal Research and Engineering Corp., receives inquiries almost daily from companies presently involved in a waste disposal problem, or planning a process which will require process waste control. Over the past 25 years we have been exposed to many industrial processes which generate wastes in all forms - solid, liquid and gaseous. The easiest way to solve the problem is to minimize the amount of wastes that are formed in the process by increasing the overall efficiency of the process. In the past few years many companies have approached the problem in this manner. However, since it is impossible to get a process to operate at 100% efficiency, there will always be wastes generated in the manufacture of any commodity. In the areas in which we have been involved, most of the applications can be considered as the disposal of hazardous wastes.

I will list below the various processes that we have looked at and the types of waste that are generated in these processes.

| Process | Waste |
|---|---|
| 1. Chemical | |
| Acrylonitrile | Fumes containing acetyl chloride and hydrogen cyanide. |
| Caprolactam | Aqueous liquids containing adipic acid; aqueous liquids containing tars and salts. |
| Herbicides & Insecticides | Chlorinated hydrocarbon liquids and gases; aqueous wastes containing organics and inorganic materials such as sodium and phosphorous. |
| Freon | Fluorinated hydrocarbon liquids and gases. |

| | Process | Waste |
|---|---|---|
| | Phthalic Anhydride | Fumes containing phthalic and maleic anhydride, carbon monoxide and air; liquids containing phthalic and maleic anhydride. |
| | Plastics | Phenolic tars and fumes; polyvinyl chloride; chlorinated hydrocarbon liquids and gases. |
| | Pesticides | Solvents, fumes, chlorinated hydrocarbons, eldrin. |
| | Vinyl chloride | Chlorinated hydrocarbon liquids; ethylene dichloride liquids and fumes. |
| 2. | Ammunition Plants | Liquids - trinitro toluene; nitrogenated gaseous compounds. |
| 3. | Asphalt Plants | Gases containing hydrocarbons, steam and air. |
| 4. | Coal Gasification Plants | Fumes containing coal dust, water vapor and air. |
| | Coal Liquefaction Plants | Waste tars containing hydrocarbons. |
| 5. | Food Plants | Fumes from coffee roasters and other food drying systems. |
| 6. | Fiberglass | Phenolic fumes. |
| 7. | Paints | Aqueous wastes with caustic and latex. |
| 8. | Pharmaceutical | Fumes from drug drying processes; solvents containing toluene, diethyl ether and acetone; aqueous caustic wastes containing phosphorous and sodium compounds. |
| 9. | Rubber | Fumes containing hydrocarbons; polystyrene tars. |
| 10. | Space | Liquid wastes containing unsymmetrical dimethyl hydrazine and nitrogen tetraoxide. |
| 11. | Sulfuric Acid Plants | Gases containing hydrogen sulfide and sulfur dioxide. |
| 12. | Tobacco | Fumes containing nicotine, ammonia and steam. |
| 13. | Wire Enamelling | Fumes and liquids containing phenol. |
| 14. | Automotive | Aqueous wastes containing tars from machine operations. |

These are only a few of the problem areas which we have been exposed to over the years. In order to handle the problem from a thermal processing standpoint, we must know first whether the waste is liquid, solid or gaseous, since organics in all three states can be thermally processed. Second, we will want to know whether the waste is all organic, or the percentage, and whether the inorganic portion is water, inorganic compounds, or a combination. Third, we need to know why the waste is hazardous and to what degree. This is necessary for the material handling step prior to incineration, as well as determining the conditions for incineration. Depending upon the nature of the material, temperature and residence time must be determined to insure complete destruction of the hazardous components. Finally, in order to optimize the process design of the thermal processing system, we must know the precise chemical formula and the concentrations of the materials involved. This is necessary to simplify the prediction of the results of the processing operation.

Chlorinated Hydrocarbons

In recent months a great deal of discussion has been directed toward the processing which takes place in the vinyl chloride monomer plants. This is one area where we have had a great deal of experience. That is, in the disposal of waste fumes and liquids from this type of operation. In approaching the problem we must know the composition of the waste, the quantity of the waste, and what variations in process waste flow can be expected during operation. When the system has only a liquid waste disposal problem, the variations can be satisfactorily handled by storage of the liquid in tanks, and the incineration system designed to operate at a constant rate of disposal. However, in a gaseous system it is very difficult to consider storage of gases that are being vented and the system must be able to handle the wide swings that may occur in the process.

The composition of the waste is critical in determining what will occur in the incineration step. In many cases the waste has sufficient heating value and auxiliary fuel is not required. However, when the composition is such that the waste will not sustain combustion, auxiliary fuel will be required. The amount will depend upon the composition of the waste material. It is important in disposing of a chlorinated hydrocarbon material to insure complete conversion of the chlorine to hydrogen chloride. This prevents the discharge of chlorine into the atmosphere. Hydrogen chloride can be readily absorbed in downstream absorption and scrubbing equipment. The conversion of the chloride portion of the chlorinated hydrocarbon to HCl depends upon the operating temperature and the availability of hydrogen in the waste material or by the addition of hydrogen in either the fuel or water which may be necessary. In our experience we have found that it is critical to design the system to minimize this chlorine release and at the same time minimize the amount of fuel necessary to dispose of the waste, especially in these days when energy requirements must be reduced. Therefore it is very important to know the composition of the waste material, which will enable the incinerator designer to set the operating temperature and the auxiliary fuel requirements. Since this is a hazardous waste, it is also important to the operator and the designer to know the composition of the waste material so that the piping, pumps and valves handling this material will not cause corrosion or leakage of the material into the environment prior to its injection into the incinerator. The incinerator also must be designed properly to withstand the temperatures and the corrosion resulting from the exposure of the lining to the materials being incinerated and the products of combustion resulting from the incineration step. In burning a chlorinated hydrocarbon the products of combustion will normally contain nitrogen, $CO_2$, water vapor and HCl. Improper combustion will result in the formation of chlorine and hydrocarbons which, when discharged to the atmosphere, will create a pollution problem. Therefore, proper design of the incineration equipment, as well as proper instrumentation and control, is a definite requirement to insure complete oxidation of the hazardous materials and the discharge of a pollution-free gas to the atmosphere.

In cases where we have incinerated chlorinated hydrocarbons, systems have been designed in which the hot gases are reduced in temperature to permit the scrubbing of HCl from the gases. The HCl can be absorbed in water very easily and this water solution neutralized with caustic so we will end up with a salt water stream. Additional equipment can be provided to permit the concentration of the HCl acid to a point where anhydrous HCl gas can be generated. This will permit the discharge from the system to contain only stack gases with $CO_2$, water vapor and nitrogen with some oxygen, and the liquid discharge to contain HCl at some concentrated level. In some installations more recent, heat recovery equipment has also been added to utilize the heat available from the combustion of these chlorinated hydrocarbons. We must realize that the main problem in all cases is the disposal of this hazardous, toxic waste. The addition of equipment to recover heat, or to recover valuable chemicals, is secondary and must be considered only if it is economically feasible and does not become the primary reason for the system. The system must always be designed to operate so that the hazardous waste is disposed of properly.

In many applications where the process is only on the drawing board, the waste disposal problem is handled by testing a synthetic material which approximates the final waste product. We find it extremely important for a test program to be run on the actual waste material to determine its handling problems, corrosion problems, and the conditions which are optimum for efficient disposal of the material. This includes operation of the incinerator at varying temperature levels and residence times. This is necessary to minimize the amount of fuel required if the material is not a self-sustaining waste fuel. At the same time tests are necessary to determine the products of combustion by gas analysis and particulate analysis in the stack discharge. This is necessary to permit the designer of the system to select proper equipment for air pollution control. Many times the synthetic waste does not approach the final process waste from the system and the equipment must be flexible enough to permit variations in composition. However, this must be determined prior to the final design of the equipment. We have found from many years of experience with the various process industries and the process waste streams that are being generated, what to expect in plant operations. But there are still those unexpected surprises which occur even though both the plant operator and the system designer use their best efforts in finalizing a proper disposal system.

In any hazardous waste problem it is best to review the process as much as possible to determine if there are any means by which the waste discharge can be reduced, and this is of prime importance. The more efficient the process, the less waste will be generated and the problems of disposal will be minimized. Next, a good understanding of the waste material is necessary by the plant operator. What are the rates and composition of the material? If the rates are minimal, is it possible that this can be handled through a neighboring facility having the capabilities of disposing of this waste, or is there a local, central disposal facility having the experience to handle this waste? It is critical that the operator review the capabilities of the ultimate disposal site. Even though you may release this material to a disposer, since you have generated the waste, you will still be responsible for the method of its ultimate disposal. If you decide on an in-plant disposal system, be sure that you fully understand the qualifications of the system designer. Since the hazardous waste disposal business has been expanding at a rapid rate over the past few years, many companies have become involved and many failures have occurred. It is extremely important that an experienced company be contacted and a review of their installations be made. Find out if the present users of the equipment are satisfied and determine what problems can be expected from a maintenance standpoint. No equipment used in hazardous, toxic waste disposal is maintenance-free. This material is toxic and will cause problems in the material handling area from a corrosion standpoint, as well as in the refractory and construction of the incinerator due to the high temperatures at which this equipment will operate. If a plant operator is looking for the cheapest method of disposal, he is making his first mistake. Most times the waste disposal equipment is necessary for the plant to continue operation. If the waste disposal system is inoperative, the plant may be forced to shut down, with the subsequent loss of revenue. From past experience the system designer who has been exposed to these problems will know where quality is necessary and from our own experience, we insist on proper materials to insure long, safe operation of the equipment. A system designer should also have available a test facility where the materials to be disposed of can be tested and proper evaluation made of the disposal techniques prior to the final design and construction of the system.

I hope that I have passed along some of our experiences in the field of hazardous waste material. There are solutions to many of these problems and I feel that with increased support from industry and the government, in many critical areas the problem of hazardous waste disposal can be minimized. It is a capital investment that will be required of many industries and many of these investments can be justified economically if recovery of the heat being generated or the material being disposed of can be made. We find this to be true in more than half the cases with which we deal.

MR. LEHMAN: Thank you, Mr. Santoleri. Mr. Lindsey?

MR. LINDSEY: I have a two part question here. Number 1, in the thermal processing of TVC, what pollution control equipment for the gas do you recommend? And, Number 2, what materials of construction are used in this pollution control equipment to resist HCl corrosion?

MR. SANTOLERI: In the incineration of any chlorinated hydrocarbon say from a PVC plant, number 1, the incinerator is designed with refractories which will operate at temperatures as high as 3000°. We find the higher the temperature, the less chance you have of chlorine discharge. The equilibrium reaction between chlorine, HCl, O2, etc., will tend to give you less chlorine the higher the temperature. The refractory, therefore, is normally designed with a very high aluminum shock resistant for swings in temperature, also very dense to permit, prevent the pentration of HCl to the refractory. The lining of the incinerator is usually held to a temperature high enough so that condensation of HCl will not affect the steel liner during start up or shut down. And most times we recommend that the unit be purged with a clean stream, such as water or air, prior to the injection of the waste at the same time during shutdown, so that any HCL that is in the system can be purged out.

As far as the clean-up equipment, normally this is a quench system which will quench the gases and scrub the gases out. These are usually acid brick lined tanks and towers with a rubber lining on a shell so that the cooling which will take place and generate HCl acid, when it does get back to the shell because of the low temperatures, will not cause corrosion of the steel liner.

The quench system is usually either a submerged exhaust system where the gases are quenched down to saturation temperature of about 190 and then it goes through a stack tower which contains saddles which are resistant to the HCl.

MR. LEHMAN: Mr. Newton?

MR. NEWTON: Mr. Santoleri, your prepared statement contains the statement that even though you may release this material to a disposer, since you have generated the waste, you will still be responsible for the method of its ultimate disposal. Could you elaborate upon that?

MR. SANTOLERI: Yes, I can give you an example, you take and hire a contractor to haul your waste and he tells you he is going to haul it off to a disposal site. You pay him and you figure you are clean, he's taking care of your problem. You should know exactly where that waste is going, how it is going to be treated and be sure that the final disposer is going to clean it up so that it goes into the atmosphere clean or if it is in a land disposal site it doesn't leach out into the ground.

This responsibility, I feel, is the responsibility of the waste generator, whoever is generating the waste. There was a case where a plant had a contractor haul his waste, he was paid, he took it to a farm down in South Jersey, left it there, it was never disposed of. A few years later this leaked out into the ground, and the drums were still marked with the plant owner. And, whoever found these drums went right back to him. The contractor who hauled it away was gone.

So, whoever is generating the waste should know where it is going and how it is being taken care of.

MR. DeBONIS: I have a two part question here, it basically addresses itself to energy considerations, it says, don't you consider your thermal disposal methods too energy intensive since they use natural gas and shouldn't you restrict the, your processing to things which will support combustion by themselves. I think you did address that but perhaps you could reiterate.

MR. SANTOIERI: Yes, in most cases the organics which are disposed of are combustible, require natural gas or fuel only for warm up to get the system in operation. However, there are a lot of waste, aqueous wastes containing organics where the concentration of the aqueous is so high that it will take a lot of fuel. There it is best to look at a concentration step utilizing the heat that is available from the incinerator. In other words, you have a waste that might be 90% water, 10% organics, the organics are toxic and hazardous. You have to get rid of this by incineration, getting it up to a high enough temperature.

But, to take say a thousand pounds of water up to 1800 degrees, is going to require 5 million BTU's of heat, not taking into consideration the heat available from the organics. That's 5,000 CFH of gas. If you can concentrate that 90% down to a point where you only have a 50% concentration, you save a tremendous amount of gas. This requires additional capital equipment but there is equipment available for this.

So, in many cases people, say five years ago, were not concerned because gas was running 30 or 60¢ a million BTU's. Now when it is a dollar to two and a half a million, they can spend the additional capital money for the evaporation equipment.

MR. LEHMAN: Mr. Sanjour, you have a question?

MR. SANJOUR: A question from the audience here. What is the ultimate disposal of the scrubber solution or salts?

MR. SANTOLERI: Many times this is used back in the plant process itself, we have wastes that are generated from Caprolactam processes where the waste or the solution that is leaving the process is a sodium carbonate solution. This is often used in neutralization of other acid streams.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: I have a number of questions, written questions here, I don't think we are going to have time to ask them all. What I would like to do is ask you, I have one that I am going to ask you, and then the rest of them I would like to give you and ask you to answer them in writing if possible. The one question I want to ask is, you discussed a number of waste types and industries from which wastes are generated and you mentioned in design you must know the characteristics and the composition of the waste. In your experience then, has it been possible to design one incinerator capable of handling a wide variety of wastes or must we have a different model or design for each waste.

MR. SANTOLERI: We find that every case is a special case. People always wonder why you can't have a standard incinerator to handle 15 different types of wastes. Each problem is a different problem in itself.

There may be possibilities that a standard shell size may fit different conditions, in other words, if you have a certain heat release, this ends up with a certain size incinerator, but you have to worry about the construction of the piping, the refractories, the nozzle. In one case you might be able to get away with a 3/16 stainless steel nozzle and in another case you would have to use hastoloid.

The refractories, you may be able to use 60% aluminum in one unit because of the type of materials you are handling, in other cases you have to go to 95% aluminum. So, you can't say that you can design a standard incinerator to handle many different wastes

MR. LEHMAN: Okay, we have one last question, Mr. Santoleri. Mr. Kovalick?

MR. KOVALICK: This is from the audience. Has or does your company feel that hazardous waste legislation is necessary to remain profitable?

MR. SANTOLERI: Yes, I think it -- for us to remain profitable?

MR. KOVALICK: Yes.

MR. SANTOLERI: Not necessarily because this is not the only business we are in, this is part of our total operation. But, hazardous waste legislation, I feel, will help the public, the environment, especially in those places where people are just hiding behind the fact that there is no legislation, they are continuing to create a problem.

We have found that most of the companies we have dealt with are responsible companies, they are concerned not only with the local community but also their own plant people. This is most critical.

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December 22, 1975

Mr. John P. Lehman, Director
Hazardous Wastes Management Division
Office of Solid Waste Management Programs (AW-565)
Environmental Protection Agency
Washington, DC 20460

Dear Mr. Lehman:

I want to again thank you and the U.S. EPA for giving Trane Thermal the opportunity to present our experience in the thermal processing of hazardous wastes. The attendance at the meeting shows the interest from all areas in this particular problem, and I'm sure that after having heard the discussions, and after subsequent meetings at the other locations, those in your organization directly associated with hazardous wastes will realize the impact that hazardous waste disposal is making on the nation.

I have responses to the questions which were asked on the cards distributed at the meeting, and I am enclosing them for your review. The questions are as follows.

1. When burning sulphate bearing waste, don't you end up with $SO_2$ in your stack? What provisions do you have for controlling $SO_2$ emission to some stringent state requirements?

   Yes, we do have $SO_2$ resulting from burning wastes with sulfur bearing compounds. If the incinerator is operating with a sodium compound initially, and the amount of $SO_2$ generated is minor, additional caustic may be injected into the incinerator to cause the formation of sodium sulfate. This, of course, will mix with the other sodium compounds leaving the incinerator as ash and be collected normally in a wet solution. If the quantity is great and the incinerator is not operating with sodium bearing compounds, and not designed for the addition of caustic, a scrubber will usually be added to the system to scrub out the $SO_2$ before leaving the stack. This, of course, will result in a sodium sulfate solution which will then have to be concentrated and disposed of. In some areas the stack height requirements are sometimes sufficient to cause dispersion so that the ground level concentration is well within the requirements of the particular locality. Each case has to be reviewed on its own merits and with the total quantities of $SO_2$ that are being generated. This aids in determining whether the solution is a simple stack extension or requires the addition of scrubbers.

2. You mentioned the incineration of sodium compounds. Have you solved the problem of preventing reaction between sodium and refractory?

We are licensed at the present time by the Nittetu Chemical Engineering Company for their process of disposing of aqueous wastes containing organic and inorganic compounds. The inorganic compounds normally contain ash, and we also become involved in organics which are caustic organics and salt bearing organics. These incinerators are downfired and the temperature of the incinerator is such that the reaction with refractory is minimal. There will always be a reaction between the sodium and the $CO_2$ generated in the incinerator which will form a sodium carbonate. Sodium carbonate and sodium oxide will react with refractories, especially the silicon refractory, to form sodium silicate, which is a glass and melts at temperatures in the range of 1800-1900°F. Using a downfired system, any molten salt that comes in contact with the walls will run down the surface of the walls into a quench tank which is located directly beneath the incinerator. There will be some attack on the refractory, but the refractory used in this system is designed to operate satisfactorily for at least one year in the worst instances - where sodium carbonate is a product of combustion - and as long as two to three years where other sodium compounds are in the products. Papers have been presented as follows:

"Incineration of Waste Liquids Containing Organic Compounds and Inorganic Salts" by J. J. Santoleri, presented at the Second National Conference on Complete WateReuse in Chicago, May 4-8, 1975. "Industrial Liquid Waste Disposal and Valuable Recovery Systems" by Yen-Hsiung Kiang, presented at the AIChE 68th Annual Meeting in Los Angeles, November 16-20, 1975.

3. What residues remain for landfilling after incineration? Must they be treated before landfill?

In most cases the residues from the quench system where we are burning an aqueous containing organics and inorganics, the solution leaving the quench tank is usually a salt solution containing sodium carbonate and/or sodium sulfate and sodium chloride at a concentration of 15-20% in water. This is a neutral solution and can be concentrated further if necessary, or discharged to the sea if location of the plant is along the shores. If concentration can be accomplished economically, this will allow collecting of the final residue (which is inert) to a landfill. When chlorinated hydrocarbons are burned and the effluent is a weak solution of HCl, this can be treated with a caustic or lime solution to generate a salt solution and water. This can be treated as described above.

4. Do you use condensation techniques to liquefy suitable gaseous wastes and thus simplify disposal. For example, heat exchangers using ambient air as the condensing medium and recovering useable heat.

We do use a condensing type heat exchanger after gases are quenched in a water solution. The gases leaving the quench tank are saturated at temperatures in the range of 185-200°F. At this temperature level the gases leaving the system are approximately 50% inert, containing $CO_2$, nitrogen and oxygen, and the other 50% water vapor. The heat generated in the incinerator system is carried in the water vapor leaving the quench tank. Therefore there is a considerable amount of heat that can be gained by condensing this water vapor. We do this by using a shell and tube heat exchanger with the process waste on the one side and a gaseous effluent on the other. The process waste can then be concentrated and heat recovered by this method. Another method of recovering heat is to take these saturated gases and preheat another liquid stream. By condensing the water out of these gases, the requirements of the scrubber system downstream to provide a clean effluent to the atmosphere are reduced. Without the condenser we find that sub-micron particulates will require 60-80" W.C. pressure drop across the venturi scrubber.

By using a condenser ahead of the scrubber the total pressure drop requirement of the scrubber drops to 30-40" W.C., thereby reducing the total horsepower of the system. We have not considered the air cooled heat exchanger, only because of the high surface requirements with the gas-to-gas heat transfer.

5. At 3000°F it is not possible to avoid the formation of chlorine and nitrogen oxides? This is another form of pollution. How can you therefore recommend such operating conditions?

   The 3000°F was mentioned as the maximum temperature at which we operate the chlorinated hydrocarbon incinerator. We limit the operation to 3000° primarily from a refractory maintenance standpoint. We have been able to incinerate chlorinated hydrocarbons as low as 2000°F; however we find that with our type of burner and the ability to reach high temperatures has permitted us to get very close to the equilibrium conditions for the incineration of these chlorinated hydrocarbons. Lower temperatures require much more residence time and normally this occurs with less mixing and turbulence. The ability to reach equilibrium conditions is directly related to the turbulence and temperature of a system. The paper entitled "Chlorinated Hydrocarbon Waste Recovery and Pollution Abatement" goes into the details of the equilibrium conditions of chlorine, water vapor, oxygen and CO2, and relates the equilibrium of this reaction to temperature. You will note that at the higher temperature, higher equilibrium will take place. This essentially will reduce chlorine to its minimum condition at that particular temperature. Again we have found that with the Vortex burner we have been able to approach very close to equilibrium conditions because of the reaction taking place at very high temperatures and excellent mixing.

   With respect to nitrogen generating $NO_x$, this is true. The higher the temperature the more $NO_x$ will be generated. However, with the combustion air alone containing nitrogen, we have not found the incineration of chlorinated hydrocarbons to present any problems regarding $NO_x$ emissions. However, we have handled chlorinated hydrocarbons which had nitrogen bound in the waste. In this case we had to be very careful regarding the operating temperature of the unit and we had to reduce this. This was able to be done by the injection of water into the liquid waste, which permitted two reactions to take place; one, the lowering of the combustion temperature which aided in the reduction of $NO_x$ formed, and at the same time, a reduction of chlorine due to the additional hydrogen that was generated to complete the reaction to HCl. By doing this no additional air had to be injected to maintain lower temperatures and we were able to operate as close to stoichiometric as practical, which minimized the $NO_x$ formation from the combustion air, as well as the nitrogen from the waste.

6. The scrubbed material is neutral or should be so. How could you use it for further chemical neutralization reactions?

   When I was describing the scrubber effluent used for neutralization of acids, this was from a system where the quench water contained salts from the incineration of an organic-inorganic material. The products from the incinerator are quenched in a water bath and the inorganic materials which are normally salts such as sodium chloride, sodium carbonate and sodium sulfate are carried out in a15-20% solution. This solution is normally basic and has been used in neutralization of acid streams within a plant. However, if the Ph of the quench water is neutral, this would not be possible. Each system has to be reviewed on its own.

7. In referring to your ammunition plant installation - (1) is it in operation; (2) where is the location; (3) the capacity and lbs. per hour; (4) the capital investment required; (5) the operating cost.

   An installation was supplied to the Badger Army Ammunition Plant in Baraboo, Wisconsin, in mid 1966. At the present time, due to the cutback in operation of munitions plants, this system is no longer in operation. However, the unit was designed to burn a stream consisting of 65% dinitrotoluene, 25% dibutyl phthalate, and 10% diphenylamine. This system operated with the waste material being injected directly into a Vortex burner having a capacity of 10 MM Btu/hr. The gases from the reaction were scrubbed by use of a submerged exhaust system so that the gases were cooled and scrubbed before entering the exhaust stack.

   The total capacity of the system was for 1 GPM of the waste material. As far as operating cost, the only costs were involved with the 30 HP blower which was used to supply combustion air to the system. No fuel was needed other than for the initial light-off with a natural gas pilot. The waste was a self-sustaining material so that no auxiliary fuel was required. The only other operating expense would be the water required for cooling the gases and this would be dependent upon whether a hot water stream is generated or the gases are allowed to go out saturated with water vapor. In one case where the system will take and heat water approximately 100°F, approximately 200 GPM will be required. However, if the heat will be used to evaporate water, only 20 GPM will be required. The total cost for this system as supplied by Trane Thermal Company in 1966 was approximately $22,000, and the total installed cost approximated $40,000. These numbers would probably double based on today's prices.

This covers all the questions that were presented at the end of my discussion. If any other information is required, please contact me.

Very truly yours,

J. J. Santoleri

J. J. Santoleri, Vice Pres.

BROCHURE DETACHED AND RETAINED IN SOLID WASTE MANAGEMENT FILES

MR. LEHMAN: Thank you very much, Mr. Santoleri. Next may I call upon Mr. Philip A. Palmer of the DuPont Company. And just to alert the next speaker, Mr. David W. Miller of Geraghty & Miller. In that case, the next speaker following Mr. Palmer would be David A. Boltz, AISI. Mr. Palmer.

MR. PHILIP A. PALMER: Mr. Chairman,

members of the panel, my name is Philip A. Palmer. I am a Solid Waste Management Consultant for the Engineering Service Division of the DuPont Company. Thank you for the opportunity to present our views on this important topic. We share your concern that all wastes, including hazardous wastes, should be disposed of in a safe and orderly manner without damage to the environment and that the recovery of energy or materials should be encouraged where technically and economically feasible.

The problem of hazardous waste management is of direct concern to us for, as a major chemical manufacturer, we produce wastes which would be classified as hazardous. We all recognize that the complex problem of hazardous waste management is not an easy one to deal with.

Although the DuPont Company does not have expertise in all areas of hazardous waste management most of the current waste disposal techniques are used in some manner within the Company. Therefore, we would like to focus our attention on a number of the issues to which these hearings are addressed and share with you some of our observations.

There appear to be differing views on how a hazardous waste should be defined. Much of this can be attributed to the lack of defining the waste characteristics relevant to the problem and then matching the required control to that specific characteristic.

As we see it, effective hazardous waste management should insure that the waste is: collected and handled in a safe manner; transported safely; disposed of without hazard to the disposer or the community; and disposed of in a manner that protects the quality of usable ground waters, surface water and air.

Some states are proposing hazardous waste criteria similar to those shown in Table 1 of Appendix I, attached to this testimony.

Typically, once a waste has been designated hazardous by any one of these several criteria, the control requirement is that it be placed in a landfill which has an impermeable liner with leachate collection and treatment facilities.

For example, a waste containing nitrocellulose may be classified hazardous according to the flammability category, and indeed, must be transported in a safe manner, however, these landfill requirements are not at all necessary for this compound.

Consideration must be given to the objective of the hazardous waste classification and the kind and degree of control needed to meet that objective.

Table 1 contains a great many criteria which would require extensive testing and classification.

We believe that rather than defining a waste by this expensive and time-consuming approach, that technical criteria be adopted which are concise and focus on the highest priority problems.

For example, our proposal for criteria important to transportation would be flammability and acute toxicity. Criteria important to safe disposal site operation would be flammability, acute toxicity and reactivity while criteria important to ultimate disposal requirements would be based on the acute toxicity of components in the leachate.

We believe that recently proposed hazardous waste criteria are not appropriate, because they are overly restrictive and broad.

A more detailed discussion of these criteria is included in Appendix I.

A major consideration in determining the hazard of any waste should be its potential for polluting potable ground or surface waters. We believe all leachable wastes may be a hazard to ground water supply and that industrial wastes should not be discriminated against with respect to ultimate disposal requirements. The same degree of control should be required of all wastes which have potential for contaminating potable ground water supplies, or surface water.

If the quality of a waste's leachate is used to determine the potential for ground water pollution, as we believe it should be, industrial and municipal wastes are potentially equally hazardous. This was highlighted by a recent proposal in one state for defining the relative hazard of a waste based upon the concentration and toxicity of materials in the

This method is described in Table 2 of Appendix II where this method is described, depending upon the assumptions made for the organic content of municipal waste's leachate, it ranked in the most hazardous classifications.

I believe most waste generators and regulatory agencies agree that the most pressing problem is adequate ultimate disposal of all wastes.

It must be recognized that the actual hazard that a waste may pose is a function of the site characteristics as well as the waste characteristics. Sophisticated land disposal systems with linings or double linings, leachate collection and treatment may be necessary where the potential for contaminating potable or otherwise usable ground water supplies or surface water is great. Less stringent requirements are in order where the site is more secure. In these cases, we find use of such sophisticated systems may not offer a reasonable increase in protection and are unnecessarily costly.

It is nearly impossible to make generalizations on proper methods of processing or disposal of industrial or so-called hazardous wastes because of the unique properties of each waste produced within the chemical industry. These unique properties require engineered solutions, which must be economically as well as technically sound.

A number of basic treatment and disposal techniques exist, all of which are used singularly or in combination in some manner within the DuPont Company. General cost information is available in the literature and through many of the EPA contractor reports on hazardous waste management to which DuPont has contributed treatment, disposal and cost information.

Caution should be used, however, in using such data on specific wastes which may require specialized handling or unusual designs. Methods used to treat wastes include:

1. Incineration or thermal processing of combustible wastes or those which decompose with heat. This may be accomplished with heat recovery or materials recovery. For example, heat is recovered by burning waste liquids and tars in power house boilers, HCl is recovered when burning chlorinated hydrocarbons.

2. Chemical fixation to physically

stabilize wastes and decrease leaching characteristics.

3. Neutralization, precipitation and filtration to physically stabilize wastes and retard leaching of metals.

4. Assimilation on or in the ground.

Major disposal methods within DuPont include:

1. Sanitary landfill or burial in low permeability soil strata.

2. Landfills or storage piles with impermeable liners and leachate collection.

Considering the complexity of the waste produced by our industry and the evaluation that must be given to the proper method of treatment and/or disposal for each waste, we feel it would be virtually impossible for an agency such as the EPA to establish pretreatment or processing requirements or standards for solid waste which could be uniformly applied and have the desired effect of minimizing environmental impact. We believe that the greatest emphasis should be placed on establishing standards which assure that the ultimate disposal method is satisfactory.

Within the industry, numerous processes or process modifications are made to allow recycle or reuse of waste materials. Many of these processes are regarded as trade secrets. In addition, we are always actively seeking secondary markets for waste materials and have been reasonably successful to date. We believe the economic incentive alone should determine the degree of waste recycle and recovery. For this reason, we are opposed to regulations specifying the kind and amount of processing and recycle of wastes.

In the instances where adequate waste treatment and disposal facilities are not available on the site for a particular waste, the materials are processed by waste treatment and disposal firms.

There has been a desire on the part of State regulatory agencies in recent years to fix the responsibility for transport and ultimate disposal of a waste on the waste generator. We agree that the generator has some responsibility in the area, however, the waste hauler and disposer have responsibility to assure, respectively, that the wastes are delivered for disposal at the proper location and properly disposed.

Irresponsible action is invited if the person holding the waste has no responsibility for it. A major portion of the industrial waste disposal contracts written in our Company pass ownership of the waste to the waste disposer when it is acquired by him for disposal. If irresponsible handling does occur and there are damages, legal remedies are available which may ultimately hold the disposer, hauler, or waste generator liable. We feel that this system is adequate and proper and that responsibility for the waste cannot rest solely on the generator.

The major responsibilities in waste disposal as we see them are these:

1. The generator should adequately label and describe the wastes so that the transporter and disposer are aware of properties which may be important to safe transportation and proper disposal. He should identify the disposer and make some determination that the disposer is competent and has the proper permits for disposal. Regulatory requirements that the wastes be adequately labeled and that records of disposition of the wastes be kept are reasonable. The generator should not be required to obtain a permit for waste generation.

2. The transporter should be required to transport the wastes which are properly labeled and described in a safe manner. We believe that the authority of DOT is adequate in this area. DOT methods for classifying materials are suitable for classifying wastes for transportation. We believe that additional regulations by the Federal Government or states would be duplicative and confusing. We are in favor of a reasonable transportation reporting system which allows a state to monitor waste

movement and disposition.

3. The waste disposer should be required to dispose of the wastes in an environmentally sound manner. This can best be handled through a waste disposal permit system. Record keeping on the part of the disposer to define the quantity and types of waste disposed seem reasonable. Some form of bonding may be necessary to require that the land disposal site is retired in a satisfactory manner. We believe that such regulations should best be written by the states under guidelines provided by the Federal government.

We fail to see any significant national need for additional regulations or standards for fire-safety, employee training, or incident reporting.

Until the waste is at the transport and disposal stage, it is indistinguishable from any other material (raw material, intermediate, product) being processed, and, therefore, it is subject to the same OSHA regulations for fire-safety and worker protection, and to spill prevention control requirements.

Additional employee safety standards, labeling requirements, etc., would conflict with the existing OSHA regulations. These OSHA regulations also apply to workers handling the material in transport or at the disposal site.

Treatment, recycle and recovery should be at the discretion of the waste generator and he should be free to choose the most economical environmentally sound disposal method. Great caution must be exercised to prevent conflict of requirements under DOT, OSHA, the Air, Water and Drinking Water Act as well as toxic substances legislation.

In summary, we believe that only a disposal permit system is needed. Disposal requirements should be applied to all wastes, industrial or municipal and should vary depending upon the degree of hazard represented by the waste. A system for reporting the transportation of the hazardous wastes would be beneficial. We believe this is all that is necessary to assure that wastes are disposed in an orderly, safe and environmentally sound manner.

Looking ahead, we see some problems if some states implement more stringent solid and hazardous waste disposal regulations than called for in Federal guidelines. As individual states become more restrictive, wastes will be forced to less strict neighboring states for disposal. These states in turn may respond by developing yet more stringent regulations.

We believe that the Federal government has a role to play in bringing a degree of uniformity in state disposal requirements and insuring that no state can prevent importation of wastes for disposal. We believe that private enterprise must be allowed to develop disposal capacity to the greatest degree possible.

Additionally, we foresee problems where large central disposal facilities will be needed but will be denied permission to build on a highly desirable site for waste disposal because of local and state opposition.

It may be necessary for the Federal government to obtain central waste disposal lands and lease them to private waste disposers. With retirement of the disposal facility, the Federal government would retain the site and be responsible for environmental monitoring.

We have touched upon only a few of the issues involved in hazardous waste management. Certainly, more detailed and thorough consideration must be given to many of these areas. We hope that these hearings will be just the beginning of dialogue among all parties interested in solid waste management. We would be pleased to participate in future forums on this subject.

I will be pleased to answer questions, and thank you for the opportunity to present our views.

## APPENDIX I

## HAZARDOUS WASTES - DEFINITION AND CRITERIA

There are a number of considerations in defining a waste as hazardous. As discussed in the body of the statement, there must be a concise definition of the hazard to be guarded against and then appropriate controls must be placed on transportation, disposal site operations, and ultimate disposal.

We believe the waste can be classified primarily by the physical and chemical properties of the total waste material and the chemical composition of the waste's leachate. The quality of the leachate produced is an important consideration in determining the potential environmental hazard. This is recognized in the Report to Congress on Hazardous Waste Disposal (U.S. EPA, June 30, 1973, page 13) which states:

> "The form of a hazardous waste is also very critical because it determines if a toxic substance is releasable to the ambient environment. As an example, an insoluble salt of a toxic metal bound up within a sludge mass that is to be disposed of at a landfill does not present the same degree of immediate threat to public health and the environment as a soluble salt of the same metal that is unbound going to the same landfill."

There has been a tendency on the part of some states to adopt lists of hazardous materials without recognizing that wastes are seldom a pure compound, or that the presence of a "hazardous material" in the waste does not necessarily make the waste hazardous. We believe there is a lower limit of concentration of these materials in a waste at which the probability of release into the environment in harmful concentrations would be diminishingly small. Consequently, there must be some practical upper concentration limit set which puts the waste in the hazardous category if a listing system is used.

The list of criteria in Table 1 is an attempt to cover all possible routes of exposure and types of hazard under every conceivable circumstance. This list was abstracted by a state from Figure C1, "Graphic Representation of Hazardous Waste Screening Model" of the June 30, 1973 Report to Congress on Hazardous Waste Disposal. Some of the criteria are important only to specific aspects of hazardous waste management. Other criteria, we believe, are unnecessary or of relatively minor importance.

Our thoughts on these criteria are discussed below.

Flash Point Less than 175°F

This criterion is most important with respect to shipping of waste and waste handling at the disposal site. It is difficult to understand why such a high flash point is used. The DOT criteria for flammable liquids is a flash point of 80°F or below.

Infectious Waste

The handling, transport and disposal of infectious waste is a recognized problem. We believe that the precautions which should be taken with this waste are different than those for other wastes and the disposal of such wastes is often regulated by the states under their present regulatory systems.

Lethal Chemical

This term is vague and unnecessary considering other criteria on the list which referred to $LD_{50}$'s or inhalation toxicities. Many materials are lethal if administered in large enough dosages. Consequently, this term, unless better defined, has no meaning and should be dropped. If lethal chemical refers to chemical or biological warfare agents, this distinction should be made.

Material Which Becomes Hazardous When Wet

We agree this is an important criterion for waste disposal. However, the type of hazards should be more clearly defined, such as explosive, etc. This is a property which we feel must be disclosed by the generator of the waste when it is given to a shipper or disposer.

pH Less Than 4 or More than 9

We question whether this criterion is germane with respect to shipping and suggest that the DOT criteria for acids and corrosive liquids is more appropriate. While this information may be necessary for a disposer to determine if neutralization is required or the type of land disposal facility which should be used, we question whether the pH range shown defines a hazardous material. For example, the rain water falling on the east coast may have a pH of 4 or less. Simple antacids for gastric upset produce a pH in water approaching 9.

Radioactive Waste

This term as used by some states is so vague as to be meaningless. This definition gives no quantity or degree of radioactivity which is hazardous. A discarded luminous dial from a wrist watch would be considered a hazardous radioactive waste under the present definition. The use of Maximum Permissible Concentrations Levels may be useful.

Waste Subject to Bioconcentration

This term has been broadly and incorrectly used in virtuall_ every proposed law or regulation in hazardous waste management. We wish to emphasize that the simple bioconcentration of a material is not a criterion for the hazardous nature of the material. Every living organism bioconcentrates certain materials. For example, iron in blood or calcium in bone - such bioconcentration is necessary for the well being of the organism. Any criteria on bioconcentration must be because of toxic effects which are linked to such bioconcentration. If this criterion is used, it should be applied primarily to the ultimate disposal requirements. It is of minor importance with respect to transportation and waste handling.

Waste Flammability in NFPA Category 4

The NFPA category referred to is that given in NFPA Standar No. 704M. The intent of this standard is to broadly characterize materials so that they may be labeled to give an indication of the hazards to which public and private fire-fighting personnel may be exposed during fire emergencies. The criteria are not numerical in nature and, consequently, unsuitable for a regulatory definition. We believe these categories are useful in labeling of fixed storage containers, but the labeling required under DOT should be the overriding transportation labeling requirement.

Waste Reactivity in NFPA Category 4

The same comments apply as to the flammability category discussed above.

Waste Having an Oral $LD_{50}$ of Less than 50 mg/kg

This is the criteria used by DOT in defining Class B poisonous materials. We believe it is a useful and proper criterion for defining a hazardous waste with respect to shipment and handling requirements. It may be an acceptable criterion for determining hazardous waste ultimate disposal requirements, however, we believe that the characteristics of the leachate are more important than the lethal does of the waste itself.

Waste Having an Inhalation Toxicity $\leq$200 ppm as a Gas or Mist or $LC_{50}$ $\leq$ Than 2 mg/l as Dust

The $LC_{50}$ criterion is also the same as that for Class B poisons. We believe it is also useful with respect to regulation of transportation and handling and operation at a disposal site. The inhalation toxicity requirement is vague. We assume this also refers to $LC_{50}$ which would then be similar to the 2 mg/l limit. If this is so it would be reasonable to use the 2 mg/l limit for both gases and dust. We fail to see, however, how these criteria relate to ultimate disposal requirements as the contamination of ground or surface waters.

Waste Having Dermal Penetration Toxicity $LD_{50}$ of Less Than 200 mg/kg

Our comments are similar to those for the oral toxicity criteria.

Waste Having Dermal Irritation Reaction Less than Grade 8

We believe this criterion is of minor significance compared to others and should not be included. While we realize that it may be important with respect to exposure of people handling and disposing of these wastes, this is not a reason for classifying a waste as hazardous. Dermal penetration toxicity would be a more meaningful measure of hazard in handling.

Waste Having Aquatic 96-Hour TLM of Less than 1000 mg/l

We question the importance of this criteria with respect to transportation and general handling. It also has little bearing on the ultimate land disposal of a waste, unless the waste is dumped directly in surface waters. Since most state regulations prohibit direct dumping, we believe aquatic toxicity is of minor significance. In general, we feel the emphasis should be placed on protecting human health and potable ground water supplies. If such a criterion is used, it should apply to the leachate produced by a waste rather than the waste itself.

Waste Phytotoxicity $IL_{50}$ Less Than 1000 mg/l

We believe that inclusion of this criterion is an unnecessary complication which would add unnecessarily to the cost of defining the waste characteristics without significantly clarifying the definition of a hazardous waste.

Waste Known to or Suspected to be a Carcinogen

This is an extraordinarily broad definition which does not define the criteria to be used. Does this mean a human carcinogen, experimental carcinogen, or suspect carcinogen? What is the test method? We question whether such criteria should require all wastes be tested for carcinogicity and if such a criterion is used, we would recommend that a restricted list of recognized substances as those cancer suspect agents regulated under OSHA (Federal Register Vol. 39, No. 20 - Tuesday, January 29, 1974) be used. In addition, it should be pointed out that even under the OSHA rules and regulations, the material is not recognized as a cancer suspect agent unless the concentration of these compounds is above a specified level in the material We feel strongly that such criteria cannot be used unless concentration limits in the waste or leachate are clearly defined.

Waste Known or Suspected to Cause Genetic Changes

Our comments are basically the same as those for suspected carcinogens. We question whether this is a high priority criterion with respect to hazardous waste management and would recommend that it not be adopted.

## TABLE 1

LIST OF HAZARDOUS WASTE INDICATORS

Flash point less than 175°F

Infectious Waste

Lethal Chemical

Material which becomes hazardous when wet

pH less than 4 or more than 9

Radioactive Waste

Waste subject to bioconcentration

Waste flammability in NFPA Category 4

Waste reactivity in NFPA Category 4

Waste having an oral $LD_{50} < 50$ mg/kg

Waste having inhalation toxicity 200 ppm as gas or mist, or $LC_{50} < 2$ mg/liter as dust

Waste having dermal penetration toxicity $LD_{50} < 200$ mg/kg

Waste having dermal irritation reaction < Grade 8

Waste having aquatic 96-hr. TLM < 1,000 mg/liter

Waste Phytotoxicity $IL_{50} < 1,000$ mg/liter

Waste known to or suspected to be a carcinogen

Waste known to or suspected to cause genetic changes

NOTE: See next page for definitions.

ABSTRACTED FROM: Report to Congress, Disposal of Hazardous Waste
U.S. Environmental Protection Agency 1974

Appendix C - Decision Model for Screening and Selecting Hazardous Compounds and Ranking Hazardous Wastes

Definitions of Abbreviations Used in the Screening Model

Bioconcentration (bioaccumulation, biomagnification): The process by which living organisms concentrate an element or compound to levels in excess of those in the surrounding environment.

National Fire Protection Association (NFPA) category 4 flammable materials: Materials including very flammable gases, very volatile flammable liquids, and materials that in the form of dusts or mists readily form explosive mixtures when dispersed in air.

NFPA category 4 reactive materials: Materials which in themselves are readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.

Lethal dose fifty ($LD_{50}$): A calculated dose of a chemical substance which is expected to kill 50 percent of a population of experimental animals exposed through a route other than respiration. Dose concentration is expressed in milligrams per kilogram of body weight.

Lethal concentration fifty ($LC_{50}$): A calculated concentration which when administered by the respiratory route is expected to kill 50 percent of a population of experimental animals during an exposure of 4 hours. Ambient concentration is expressed in milligrams per liter.

Grade 8 dermal irritation: An indication of necrosis resulting from skin irritation caused by application of a 1-percent chemical solution.

Median threshold limit (96-hour TLm): That concentration of a material at which it is lethal to 50 percent of a test population over a 96-hour exposure period. Ambient concentration is expressed in milligrams per liter.

Phytotoxicity: Ability to cause poisonous or toxic reactions in plants.

Median inhibitory limit (ILm): That concentration at which a 50 percent reduction in the biomass, cell count, or photosynthetic activity of the test culture occurs compared to a control culture over a 14-day period. Ambient concentration is expressed in milligrams per liter.

Genetic changes: Molecular alterations of the deoxyribonucleic or ribonucleic acids of mitotic or meiotic cells resulting from chemicals or electromagnetic or particulate radiation.

# APPENDIX II

The following classification system is from a proposed Texas hazardous waste regulation. The calculation method was modified so that leachate analysis as ppm of various cations and anions could be used, rather than concentrations of a specific compound. This was done by choosing a compound with the toxicologically active ion and multiplying the compound's $LD_{50}$ by the weight fraction (f) of the ion in the compound. The active ion in each chosen compound is underlined in Table 2.

3. Class A refers to waste materials which are of a high strength, toxic or hazardous nature and which require the imposition of stringent standards to insure the proper collection, handling, storage and disposal of these wastes. By definition, Class A wastes include waste materials not susceptible to classification in classes B and C. Class A non-commercial (4f) industrial solid wastes are sub-classified in terms of the hazardous index (HI)* of the waste materials as follows:

   a. Class A-1 exists where HI is less than or equal to 1.

   b. Class A-2 exists where HI is greater than 1 but less than 100.

   c. Class A-3 exists where HI is greater than 100 but the waste material contains one or more of

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* The HI or hazardous index is a measurement designated by the Texas Water Quality Board to indicate a waste material's combined degree of solubility and toxicity. As the HI for a particular waste material increases, the lesser the potential for its escape into the environment and the lesser the demand for stringent environmental safeguards. HI measurement techniques are described below.

the following hazardous or heavy metals: arsenic, barium, baron, cadmium, copper, chromium, lead, manganese, mercury, nickel selenium, silver and zinc.

d. Class A-4 exists where HI is greater than 100 and the waste material contains none of the above-referenced hazardous or heavy metals.

B. For determining a noncommercial (4f) industrial solid waste material's hazardous index or HI, the following formula and laboratory procedure should be used:

$$HI = \frac{50}{\sum_{1}^{N} \frac{CC_i}{\text{Toxicity}}}$$

Where $CC_1$ is the concentration of component (1) in mg/l
Toxicity is either the Oral $LD_{50}$, the Oral LDLo, or the Oral TDLo, in mg/kg.
Where Toxicity is:

Oral $LD_{50}$ is a calculated dose of chemical substance which is expected to kill 50 percent of a population of experimental animal exposed through an oral route.

Oral LDLo is Oral Lethal Dose Low -- the lowest dose of a substance introduced by an oral route over any given period of time and reported to have caused death in man, or the lowest single dose introduced in one or more divided portions and reported to have caused death in animals.

Oral TDLo is Oral Toxic Dose Low -- the lowest dose of a substance introduced by an oral route over any given period of time and reported to produce any toxic effect in man or to produce carcinogenic, tetratogenic, mutagenic or neoplastigenic toxic effect in animals or humans.

NOTE: If more than one of the toxicity values is available the preferred order of use in the hazardous index calculation is Oral $LD_{50}$ before Oral LDLo before Oral TDLo.

The hazardous index calculated using the above formula is equal to the number of liters of the liquid waste or leachate solution obtained from a solid material that would deliver a lethal amount of material to an average adult human being.

## TABLE 2

## CALCULATION OF HAZARD INDEX FOR LEACHATE FROM A LANDFILL FOR MUNICIPAL WASTE[1]

| Leachate Constituent | Concentration (mg/l) | Compound Selected | Toxicity (mg/kg) | Active Species Factor f | $\frac{C}{(f)\ (LD_{50})}$ |
|---|---|---|---|---|---|
| COD | 22,000 | NA | NA | | |
| $BOD_5$ | 10,000 | NA | NA | | |
| TOC | 13,840 | Methanol | $LD_{LO}$ 340 | 1.0 | 40.70 or |
| | | Ethanol | $LD_{LO}$ 1400 | 1.0 | 4.94 |
| Total Solids | 14,000 | NA | NA | | |
| TDS | 14,000 | NA | NA | | |
| Sp. Cond. | 9,000 | NA | NA | | |
| Alkalinity | 4,000 | NA | NA | | |
| Hardness | 5,000 | NA | NA | | |
| $NH_4$-N | 247.7 | $NH_4Cl$ | $LD_{50}$-1650 | .318 | .472 |
| $NO_3+NO_2$-N | 0.8 | $NaNO_3$ | $LD_{LO}$-200 | .729 | .00549 |
| Calcium | 1,700 | $CaCl_2$ | $LD_{50}$-1000 | .360 | 4.72 |
| Chloride | 800 | NaCl | $LD_{50}$-3000 | .607 | .439 |
| K | 500 | K Cl | $LD_{LO}$-2430 | .524 | .393 |
| $SO_4$ | 650 | $Na_2SO_4$ | $LD_{LO}$-4470 | .606 | .240 |
| Mn | 125 | $MnCl_2$ | $LD_{LO}$-210 | .436 | 1.37 |
| Mg | 250 | $MgCl_2$ | $LD_{50}$-2800 | .255 | .350 |
| Fe | 325 | $FeCl_3$ | $LD_{50}$-260 | .344 | 3.64 |
| Zn | 30 | $ZnSO_4$ | $LD_{50}$-40 | .405 | 1.85 |
| Cu | 0.5 | $CuSO_4$ | $LD_{50}$-300 | .398 | 0.00418 |
| Cd | 0.4 | $CdCl_2$ | $LD_{50}$-88 | .613 | 0.00742 |
| Pb | 1.6 | $PbCl_2$ | $LD_{LO}$-2000 | .745 | 0.00107 |
| pH | | NA | NA | | |
| | | | | | 54.19 or 18.43 |

HI = .923 if TOC is as Methanol or

HI = 2.71 if TOC is as Ethanol

[1] Garland, George A, Dale C. Mosher, "Leachate Effects of Improper Land Disposal", Waste Age March, 1975, pp 42-48. (Taken from Table 3, Municipal Solid Waste Leachate Composition, Boone County Field Test Cell.)

For details on calculation of the "Hazard Index" refer to the preceding pages.

MR. LEHMAN: Thank you, Mr. Palmer. I have one question that actually came in at the end of the last speaker, but I think you have touched upon this issue as well and so I will ask it of you. The question is, has, I guess it is to your knowledge, have there been any recent legal decisions concerning responsibility for hazardous waste disposal?

MR. PALMER: I am not a lawyer and to my knowledge I am not aware of any.

MR. LEHMAN: Do we have any questions?

MR. KOVALICK: Mr. Palmer, if I may ask a question, in your statement, back several pages, you made a comment about the kinds of guidelines that you thought were appropriate, if I may read these two sentences.

MR. PALMER: What page?

MR. KOVALICK: Page 5. You said, "We feel it would be virtually impossible for an agency such as the EPA to establish pretreatment or processing requirements or standards for solid wastes which could be uniformly applied and have the desired effect of minimizing environmental impact. We believe that the greatest emphasis should be placed on establishing standards which assure that the ultimate disposal method is satisfactory." I'm really interested in having you expand on that. That last sentence.

MR. PALMER: I think we are all ultimately interested in performance standards and that is that the waste disposal method be one which does not contaminate, for example, ground water supplies. And this performance can be obtained in a number of ways and one way can certainly be by providing a very secure landfill site. Another method may be by performing a certain degree of treatment and providing a less secure landfill site, yet nonetheless adequate.

And, I think this decision is one that has to be made for almost each waste, particularly for disposal of wastes on a plant's own property. You have to realize that, for example, there are many ways that a waste could be treated. If we were to take an organic tarring waste which had, for example, a heavy metal in it the waste could be solid or virtually solid, not leachable, particularly of the heavy metals and could probably be landfilled properly in a relatively, I shouldn't say insecure but less than totally secure landfill site without contamination of the environment.

If the restriction came or the regulation came that all wastes of this variety had to be incinerated, for example, we could wind up with a less desirable situation, in which we had to burn the waste, the heavy metals would then be released as an ash, which in turn would become a water pollution problem, which in turn would have to be removed from the water as a sludge which in turn might have to be further treated and which in turn may have to be further treated and which in turn may still not be going into a very secure landfill.

So when you look at the variety of wastes that we are faced with, this is why I made the statement that standards for treatment may not be fully applicable or could apply across the broad spectrum.

MR. LEHMAN: Mr. DeBonis?

MR. DeBONIS: Mr. Palmer, you referred to the Federal Government insuring that states -- prevention of waste across state borders and I think in light of the recent State Supreme Court decision, I was wondering if you would share your views with us on what effect that would have potentially if it is allowed to stand and stay as ultimately resolved.

MR. PALMER: You are talking about New Jersey?

MR. DeBONIS: Right.

MR. PALMER: We are still trying to assess the effect in New Jersey. As we understand it, this decision only relates to really a municipal type waste and wastes which are disposed of in a facility, a treatment facility in New Jersey, are exempted. Consequently, I believe our industrial wastes probably will not be affected by this. But it would be a very serious problem if the movement of industrial waste were restricted to cross batteries, because there certainly is some degree of scaling economics available in a central waste disposal facility and particularly for small companies who just have a few barrels of something to get rid of, it is very helpful for them to have a centralized waste disposal facility to send those two or three drums or tank cars a month. And I think it can only be supported on a regional basis really.

MR. DeBONIS: I appreciate your view but I think that you are not correct in terms of the industrial waste being excluded from that ban, I think it is excluded, as well as the municipal wastes. The intent of the ban is to ban land disposal and not reprocessing or reuse.

MR. PALMER: Well, as I said, we are still assessing the problem, but I believe most of the waste which we send into New Jersey are processed prior to disposal.

MR. LEHMAN: Mr. Sanjour?

MR. SANJOUR: A question from the audience. You stressed that acute toxicity is a criterion that you use to define hazards. Are you suggesting that chronic toxicity should not be used as a criterion?

MR. PALMER: For certain limited and specified components, this may be the case. However, looking at the broad spectrum of wastes we have that by and large the acute toxicity data which is available is available in quantity, it is relatively determined for a specific waste and by and large I believe would cover a very large majority of waste.

MR. LEHMAN: Mr. Kovalick, do you have a question?

MR. KOVALICK: Yes. I could perhaps, you heard my question to Mr. Philipbar earlier on the sufficiency of labeling for understanding how to treat hazardous wastes and on page 7 of your statement you suggested, for transportation purposes DOT classifications are sufficient, are suitable, and we believe this is your quote, that additional regulations by the Federal government or the States would be duplicative and confusing. Would you care to comment on Mr. Philipbar's point of view as a receiver of wastes, that labeling information is insufficient vis a vis your comment?

MR. PALMER: I was talking specifically about transportation in this sense and would share the view of Mr. Philipbar. As far as the safe transportation of the wastes from one point to another, the specifications and the criteria of DOT I think are perfectly adequate in determining the waste be properly classified for transportation, be packaged adequately, be labeled adequately, so that it can be transported in a safe manner.

Now, certainly the waste disposer must know somewhat more than that for certain wastes and it is the responsibility, I believe, of the generator to define the wastes in adequate detail, so that the person that he writes a contract with to dispose of the waste is absolutely sure of what he is getting and how he must handle it. I think that's his decision on handling, however, but he must know the characteristics of the waste, important to disposal.

But, what I am trying to bring out is that if you classify a broad range of wastes hazardous and then require some specialized transportation requirements, which are overlapping with DOT, you get into a real nightmare.

MR. KOVALICK: But you are distinguishing between transportation requirements and treatment of disposal requirements.

MR. PALMER: Yes, indeed.

MR. LEHMAN: Mr. Newton?

MR. NEWTON: Mr. Palmer, a question from the audience, please. Does DuPont send a representative along with each waste load from generation to the disposal or recycling site and at what point in time does DuPont feel it loses responsibility for the waste?

MR. PALMER: We do not send a representative along. We are cautious in our selection of contractors to determine if they are doing a proper job in disposal and if they have the required permit. And we specify where the waste is going to go, to which disposer.

If you have an adequate permitting system for waste disposal, which the state enforces, then the fact that we send it to this type of facility should be adequate.

MR. LEHMAN: Are there any other questions? Yes, Mr. Sanjour?

MR. SANJOUR: The previous three speakers are all in the business of treating wastes and you are the first generator of wastes that we have had up here, and several of them have commented on the fact that business is bad and industries in general don't take adequate precautions with their wastes because they are not required to do so and to do so would put them at a disadvantage. Could you comment on that general train of thinking?

MR. PALMER: I would think that a major proportion of their business comes from the DuPont Company, so we are not responsible for their problems.

Again, I think if we get into transportation reporting and if there is some regulatory ability to make sure that a waste goes to a licensed and properly permitted disposal and treatment facility, this will solve some of the problems involved in waste being inadequately disposed.

MR. LEHMAN: Thank you, Mr. Palmer. I don't believe we have any further questions at this time. In view of the fact that Mr. Miller was unable to be here from the firm of Geraghty & Miller and will submit a statement for the record, I think it would be an appropriate time for us to take a break now rather than to wait ten minutes as we originally planned. I would like to now adjourn the meeting for a fifteen minute break. Please be prompt. We will be starting up again at approximately 10:35. Thank you.

(Whereupon a short recess was taken.)

MR. LEHMAN: All right, ladies and gentlemen, I think we are about ready to start. I would like to call at this time Mr. David A. Boltz, representing the American Iron & Steel Institute. Mr. Boltz, will you accept questions, sir?

MR. BOLTZ: Yes.

Mr. Lehman and members of the EPA panel, my name is David G. Boltz, Solid Waste Control Engineer in the Environmental Quality Control Division of the

Industrial Relations Department, Bethlehem Steel Corporation. I also represent the Technical Committee on Environmental Quality Control of the American Iron and Steel Institute, a non-profit trade association composed of 66 member companies in the United States. These companies account for approximately 95 percent of domestic steel production and employ some 700,000 persons in the United States.

During 1974 the steel industry produced 145,700,000 tons of raw steel. For every ton of raw steel that is produced, approximately 1200-1500 pounds of by-product solid, semi-solid, and liquid material (excluding iron and steel scrap) is generated. Much of this by-product material is recycled, reused or sold, but a significant quantity ends up as waste which must be disposed of either on site or at municipal or private disposal facilities. Thus, any legislation affecting waste disposal is of major significance to our industry.

There is no question about the desirability of disposing of hazardous wastes in a manner that minimizes the threat to human health. We know that EPA has been studying the hazardous wastes problem for several years and that the Hazardous Waste Management Division of EPA has developed a conceptual plan for identifying hazardous wastes and determining if a particular waste requires special disposal technology. We understand that this plan is based on the provisions of S.2150, Sen. Randolph's proposed Solid Waste Utiliziation Act of 1975, on the assumption that future legislative action to regulate hazardous wastes will contain some form of these provisions.

In the absence of specific proposed regulations, the following comments will reflect our reaction to EPA's conceptual plan as it was explained to industry representatives at a workshop held in Washington, D.C. on October 9, 1975.

Regulation of hazardous wastes requires a procedure for evaluating all wastes and selecting those which, according to EPA's definition, "pose a substantial danger, immediately or over time, to human, plant, or animal life and which, therefore, must be handled or disposed of with special precautions."

As we understand the conceptual plan, the initial waste evaluation phase would be a series of standard generic tests for flammability, explosivity, corrosivity, etc., to identify those wastes which possess obvious hazard characteristics. The wastes would then be subjected to a solvent-acid leaching test to determine if toxic substances can be leached. If the resulting leachate shows the presence of more than a trace amount of any toxic substance, the waste would be classified as "hazardous" and therefore subject, at a minimum, to a "management control system" whereby records would be required for every movement of the waste.

Finally, those wastes which become classified as "hazardous" as a result of the leaching test would be evaluated further by use of a Standard Attenuation Procedure, a site-specific test to approximate the net effect of a given waste at a specific disposal site.

There appears to be a need for standard generic tests to identify those wastes which possess flammable or explosive characteristics. Furthermore, we appreciate the fact that for administrative purposes, EPA must develop criteria to identify those wastes which could, if improperly disposed of, pose a substantial danger to human health or living organisms.

We do not agree, however, with the plan to classify as "hazardous" every waste which fails the standard leaching test screening procedure as conceived by EPA. The presence of toxic substances in what amounts to a "worst case" leachate does not necessarily prove that the waste is actually hazardous.

Rather than the rigorous dual solvent-acid screening procedure, a test more representative of natural conditions should be used. We suggest that EPA study test methods already in use by regulatory agencies such as the Pennsylvania Department of Environmental Resources. This test involves the mixing of a 500 gram sample with 2000 ml distilled, deionized water and agitating for 48 hours. After 24 hours settling, the supernatant is decanted, analyzed, and reported as mg/l by weight.

We therefore recommend that wastes be classified as "potentially hazardous" and included in a management control system only if: (1) the leaching test for the waste material in question reveals the presence of toxic substances in the leachate in concentrations sufficient to cause harm, and (2) disposal in a local sanitary or industrial landfill would contaminate ground or surface water to the point of creating substantial danger to human health.

Such criteria would allow EPA (or the state, if certified) to concentrate on monitoring those wastes which possess significant hazard potential, while eliminating those wastes whose hazard potential is negligible. Under EPA's very stringent test criteria, we fear that most industrial wastes would eventually be classified as "hazardous," thereby creating an administrative nightmare for both the regulatory agency and the company involved without significant benefit to the environment.

We also recommend that EPA exempt from

regulation storage areas within plants which are not final disposal areas. In many cases materials must be temporarily accumulated or stored prior to their use, recycle, or transport to final disposal areas and should not be subject to regulation during their interim stockpiling.

We recognize that our reoommendation for determining which wastes should be classified as "hazardous" does not address the problem of deciding the levels of pollutants in the leachate which would be hazardous or how much toxic material a given aquifer can accept before a substantial danger to human health is created. But from the discussion at the October 9 workshop, it would appear that EPA is not close to an answer to these problems either. Since these are obviously key technical issues in determining the hazard potential of a given waste, it would be appropriate for EPA to engage two or three contractors to make independent studies of the problems and present recommendations.

We take this opportunity to offer EPA our cooperation with regard to the future work that will be required to develop reasonable hazardous waste regulations. In using the term "reasonable hazardous waste regulations," we refer to regulations where the costs to achieve the requirements (1) are not prohibitive, (2) are rationally related to the expected environmental gain, and (3) give recognition to the wise use of already scarce fuel and energy reserves.

We believe that our historical experience in managing waste materials is a logical and necessary complement to EPA's technical expertise. Our recent work with Calspan Corporation to assess waste disposal practices in the steel industry shows our interest in cooperating with EPA and its contractors. In this particular study, we recommended that the proposed "grab" sampling program be replaced by a program of daily sampling for four weeks at each of the plants, with the daily samples consolidated each week to provide four representative samples for subsequent analysis. The manpower for the four-week sampling program was contributed by each of the steel plants involved in the survey.

We look forward to working with you and your associates on this matter in the near future.

Thank you.

MR. LEHMAN: Thank you, Mr. Boltz.

Mr. Sanjour?

MR. SANJOUR: First of all, let me thank your Institute for their cooperation on that Calspan study, we really appreciate that.

On the issues you raise on page 3, about the classification of a waste as hazardous, as you point out, this was drawn up under the umbrella of S.2150, which, for the benefit of the audience, this is Senator' Randolph's proposed solid waste bill in the Senate now. Now, under that provision, if a waste is not defined as hazardous, then EPA has no regulatory authority over that waste. Therefore, you point out a management control system only if disposal in a local sanitary or industrial landfill would contaminate ground or surface water to the point of creating subsantial danger to human health. Well, if we do not first, under that law, if we do not first classify a waste as a hazardous waste, then we have nothing to say about its disposal.

So, then, my question to you then is, are you advocating the bill that would give EPA regulatory authority over all wastes and not just hazardous wastes?

MR. BOLTZ. I think in my opening statement, we recognize that all waste materials that are generated by industry need to be examined and evaluated to determine their hazard potential. I understand what you are saying, as far as 2150 only allowing you to regulate hazardous wastes, but our feeling on that is that S.2150 is not currently the law and certainly before any kind of hazardous waste law is passed, we would expect EPA to thoroughly express their views and perhaps reservations about such a limitation. I don't know if this adequately addresses your question or not.

MR. LEHMAN: Mr. Kovalick?

MR. KOVALICK: Mr. Boltz, on page 4 you comment on the subject of storage areas, which is also a problem that we have thought about and you suggest that storage areas, should there be some kind of regulatory program at a state or Federal level, should not be subject to regulation because of the fact that they are interim stockpiling? Has your institute given any thought to distinguishing between what is interim stockpiling and what is in fact disposal, that is a condition that either affects the ground, the surface or the air?

Some criteria to distinguish? We are certainly interested if you have given it some thought and if you care to respond in writing later, we would be most interested in that.

MR. BOLTZ: I think at this point we have not studied the problem sufficiently to comment on that. The whole subject of solid waste disposal and the regulation of waste disposal is really new and as we would distinguish between disposal and stockpiling, our thoughts, our collective thoughts are not sufficient to compile to be able to answer that.

I think the comment rose out of a concern for undue regulation of storage piles. If you have ever been to a steel plant, you can't help but be impressed with the huge piles of raw materials that we of necessity have to accumulate and store prior to their use. And, we have visions of extreme regulation over those stockpiles, I guess I'm taking a pretty cautious viewpoint at this juncture.

We recognize there is the need for perhaps surface water control and that kind of thing. But, we have had a lot of experience with the Air & Water Pollution Control laws and maybe you will understand our reluctance at this point.

MR. KOVALICK: How would you suggest dealing with wastes which might not now be considered hazardous but may be found later to be hazardous once they are in the water supply? I suppose that means if they were exposed to the water supply.

MR. BOLTZ: I guess that means if a waste that had been just landfilled in past years and are there as a potential for ground water contamination. I don't know, I don't have a lot of experience in retrofitting a sanitary landfill or even an ordinary landfill such as we operate in the steel plants. It would be a gigantic job. Solid waste really departs from air and water pollution right here because you can stop air and water pollution by putting proper controls on the stack gases and treating the water, but past practices that have put hazardous wastes or wastes that might in the future be classified as hazardous into the ground, and this includes the millions and millions of tons of municipal wastes as well, which have been perhaps landfilled improperly, is a collective problem that we, I guess human beings all over the world, have been guilty of. And, I can't imagine the kind of system whereby you could go back and unearth all of these potentially hazardous wastes and try to rectify those problems. It's a mind boggling kind of thing and I'm afraid that I could probably talk for five minutes and still not answer the question really, what they are getting at there, I don't know how to do it.

MR. LEHMAN: I had a point to make and also a question. You mentioned at long length that EPA's conceptual plan, as it was explained to industry representatives at a workshop held in Washington, D.C. on October 9, 1975, I just wanted to point out to the audience that this was one of a series of workshops that was held, first with all of the state government representatives, next with the industrial representatives and also in November with the, well the trade associations were all included in the October meeting, and then in November with the public interest groups, labor and representatives of academia. Now; you comment that one of our concepts that we provided at that meeting was the possibility of a standard test using a solvent and an acid as a screening mechanism and that you would recommend a test more representative of natural conditions should be used and yet the example that you gave, in the State of Pennsylvania, which uses distilled water, and I would just ask you if you feel distilled water represents natural conditions that wastes are likely to see?

MR. BOLTZ: No, the test that we recommend is first of all a screening test. We don't argue with the concept of a standard leachate test. Our problem comes in that if you choose your acids and your solvents and the strengths of each, we feel that there is no industry represented by people in this room that is going to be, going to escape having 95% or plus of their waste categorized as hazardous.

We feel that the solvent acid leachate test, as we understand it, is too rigorous. What we are trying to do is have you consider other approaches to this leachate test. We are not recommending the distilled water test per se. I think maybe you might consider going to the opposite extreme, somewhere in between is probably appropriate.

We recognize too that a leachate test in and of itself is not sufficient to deal with quantities of wastes that is generated. I think this was brought out pretty clearly at the October 9 workshop. If you have a couple of tons of waste generated per year, that's a lot different from the problem that we have, where we have thousands of tons of wastes.

So, you have to have a test criteria developed where you would do a laboratory type analysis of the waste and then go out to the field and look at the sites that this waste is going to be disposed at, and what the acidity of the rain water is, what other kinds of waste are in the landfill, and develop this standard procedure test to reflect site specific characteristics. We are not advocating a distilled water test per se.

MR. LEHMAN: Mr. Boltz, I just want to make a general comment here that we have had a number of questions from the floor that deal with the basic issue of how do you define a hazardous waste and you have attempted to throw some light on that in your remarks and I just want to point out that we're here to get the public's help on how to answer that question, and arrive at a definition which is a proper one from all points of view. Another subset of that was a question that in the context of today's hearing, what is the definition of a toxic substance and here again, I think the distinction we are attempting to make at these meetings is between a pure chemical toxic substance and a waste material which often is not always consistent, a mixture of perhaps unknown quantities of a large number of different types of chemicals all mixed together. And, this causes us a great deal of problem in attempting to arrive at an appropriate definition. So, we are not talking about toxic substances that is pure chemicals in their original form, but we are talking about waste materials, often a conglomeration of a lot of things.

Mr. Sanjour?

MR. SANJOUR: I have a question from the audience, which I don't completely understand, and that is, can you give an example of a not hazardous waste? Let me rephrase the question in a way that has a little bit more meaning to me, and that is, can you give an example of non-hazardous waste in a sense that you would consider it non-hazardous, but you would fear some regulatory act would consider it a hazard. Could you get down to the specifics of those kinds of materials?

MR. BOLTZ: We generate a lot of dust from air pollution control equipment and sometimes this dust cannot be recycled within the steel plant for a number of reasons. Sometimes it contains a lot of zinc. Now, if you put zinc bearing materials into a steel making furnace, or more specifically would go back into a blast furnace, the zinc is going to cause you all kinds of problems, and, so, for technical reasons we are not always able to recycle. And, storing it in a segregated storage area, for, hopefully future reclaim, there is a bit of economics involved in here.

As a single plant you may not generate enough to install a process to upgrade that dust or separate out the zinc, but perhaps a regional treatment facility could.

But, anyway, that is a kind of waste material that would be put in a segregated storage area. It could lead to a little bit. If exposed to rain water, we have done leachate analyses on it, there is zinc present in the leachate, but any kind of leachate test that you perform, such as the one that I described, that the Pennsylvania Department of Environmental Resources uses, what you get is a filtrate and you analyze it for miligrams per liter of whatever constituent you are looking for and you get an answer and then what do you do with that number? I don't know what you do with the number. I don't think the DER has given sufficient guidelines on how to interpret those kinds of numbers.

But, there are wastes, dust being an example, that we consider at this point to be non-hazardous, but on vigorous kind of evaluation, they do contain some hazardous constituents.

MR. LEHMAN: Thank you, Mr. Boltz. I don't believe we have any other questions. Thank you very much. We have next on our program, actually we are moving into what we had originally planned to cover this afternoon and I hope that some of the individuals are present. I would like to call upon Diane T. Graves from the Sierra Club. Is Miss Graves here? Perhaps she is going to come this afternoon. Well, we'll come back and cover these later. Is Mr. Cushman here from the Plymouth State College? Is Mr. Early here? No, presumably they are coming in a little later. Is Mr. Mahen here?

MR. MAHEN: Mr. Gathman is going to speak for us today.

MR. LEHMAN: All right, then, we have a representative from Scientific, Inc. Would you please identify yourself and your location?

MR. GATHMAN: Just let me get organized, I expected 1:30 this afternoon.

MR. LEHMAN: Yes, I understand we are jumping ahead here a little bit. Just to alert the next speaker, while the gentleman from Scientific is getting organized, Mr. Nalvin would be next, if he is here.

MR. GATHMAN: My name is Al Gathman, I hope everybody can hear me because maybe I won't be making the statements that are real profound but I'll try to give you some opinions of an old timer.

The company that I am working with, Scientific, is an oldtimer in this business of recovery and use of raw materials that are considered as wastes by a lot of people. We are sort of pioneers, we feel in this business. And, as a company, we have been devoted to all phases of resource recovery and our initial efforts were to utilize off -- I shouldn't say off tests -- but by-products screened out of chemical companies and we sold products that their own salesman refused to put their hands on and made money out of it. So, we feel that we started way back 30 years ago in recycling materials that would have been dumped into gasoline or into the streams and the rivers.

This operation kind of grew like Topsy for many reasons, one economics, there were just so many of these nice little side streams that we could lay our hands on to make money out of so we got into the solid and liquid by-products as waste products that had to be disposed of. And, under the present definitions of hazardous and non-hazardous wastes, we could amuse you by relating some of our experiences, but I will just mention one. We were paid by a company to remove a product from sold it to Plant B for a profit. As an example of what goes on in big companies, where the left hand doesn't know what the right hand is doing. Macy's doesn't tell Gimbel's what's going on sale tomorrow.

I would like now to get into the meat of what I feel is pretty important in this waste business and we firmly believe, as you would expect from our operation, that a chemical landfill is an acceptable disposal method, providing it meets two requirements. These sound easy to do but they are expensive to do and they are not being done by all of our competitors. First, it must be well engineered and second, it must be under the supervision of technically trained personnel. This means that not all sanitary landfills are suitable for chemical landfills.

The manager of a typical sanitary landfill, and we've got a couple of those too in our working force, is a hard working individual whose main worries are: fires, the weather, traffic jams on the lift, cover material, dust and fumes that annoy the neighbors, and we have many neighbors who take delight in getting us into trouble. I know one who had complained about obnoxious fumes and she called the Board of Health and the local Board of Health called our plant manager and he gets over there, and, 2 o'clock in the morning and they can't smell anything, so they decide they will go to this neighbor's house and find out what is going on. When they got over there all the lights were out and nobody answered the doorbell. So they all went home. But, these are the kinds of things that we are faced with in a landfill, a typical landfill too.

If you take this hard working and worrying individual and add on the acceptance of hazardous waste, you have a situation that may be completely out of control. And, we know, from the grapevine, that this is happening in locations in the state that will be apprehended.

Now, working on the notices here, we didn't try to cover all sixteen items here, but I did write down my thoughts on the definition of a hazardous waste. I think they are wastes of sufficient quantity that poses a substantial danger, immediately or over time, to human, plant or animal life and which, therefore, must be handled or disposed of with special precautions.

Now, this we think we do in our landfill because of the A&B restrictions that I said a chemical landfill should have. As in the correction of any deficiency, the over-compensation of our sins of pollution has led us down a road that has everyone frightened of the dire consequences of our past mistakes.

We had questions here before I got up,

what's going to happen if something shows up in the water twenty years from now. I don't think most of us will be worrying about that. But, these are the things that I think are over-compensating for our mistakes.

We hope with proper education of the public the chemical landfill will be acceptable, and this depends on the operators, performance of the operators.

One of the alternatives that has been mentioned here today to landfilling is incineration, which should be held to a minimum because of air pollution or the possibility of concentrating toxic metals in the ash in bigger quantities that then could pose a problem. The landfill itself acts as an incinerator, in that it slowly oxidizes the same components that the incinerator does rapidly, and if metals are present they will be diluted in a large volume of the landfill.

At this point we would like to offer an idea that to aid in disposal efforts, exception to some of these new stringent laws should be available to us. For example, a combustible aromatic tar which cannot, because of compatibility, be blended into a low sulfur petroleum fuel and burned, we feel may be an exception to something like this, where it could be granted, to allow the burned and electrical generator somewheres, maybe in Atlantic City where prevailing winds is offshore and the SOx generated would go out to sea and nobody would know anything about it. But there should be some exceptions. I know I have heard that there was a lot of coke down in Delaware that was high in sulfur and because of the problems involved in trying to get permission to burn it in this country, a good deal of it went to our friends in Red China who burned it too. So, I think we ought to think of these kind of laws.

Now, to come back to the chemical waste disposal area, which we believe should be monitored or supervised by competent professional chemical men, be he an engineer or a chemist. The hazardous waste landfill is a complete challenge in itself. The toxic, the flammable, the obnoxious odors or the perfumes are all sooner or later offered up for disposal. The chemical supervisor will quickly recognize whether or not a waste is hazardous.

All wastes should be classified by the producer or the generator, the word is being used, and we think, especially the ones that are not usual, can be classified as hazardous in the future, the generator should be really alerted to the fact that it is his responsibility to tell us, who are disposing of it, the proper techniques. Maybe we should spend a little research on finding out how to get rid of some of these products.

When we do get the bill of lading, which is one of the requirements that we demand, the bill of lading, many times couched in technical language to the point where it takes a good technical man, not just a beginner out of school maybe, who hasn't had the wide experience of the older people, to make sure that it is right.

We get products in sometimes that are not labeled properly and we have to check them. But the information must be available in advance of any delivery, as one of our requirements. This is to allow for site preparation and any precautionary plans to insure the proper handling when the shipment arrives. One of the primary objectives of this planning is to be certain that the landfill operators, these are the men on the bulldozers and compactors, are instructed on the disposal technique to be used with the arrival of the shipment. These instructions must be implemented to safeguard the operators. And, this in our operation is our primary objective, to be sure that these products coming in are not being helter skelter dropped in any direction and having people really getting hurt.

Our accident experience on the landfill is about equal to the averages listed in the recently issued bulletin by the EPA titled "Injury Reporting and Information Systems for Solid Waste Management." We had a fatality and I think one of the earlier speakers, maybe

Mr. Simon made the comment that made it look like a landfill or a chemical landfill was something different than any other manufacturing operation, and it isn't really. We are doing things that the manufacturing people do too. I know Mr. Palmer from DuPont spoke about their experiences. But, I would say I have seen eight or ten people here in the group that are actually working at making hazardous wastes and also disposing of them, on their own property. So, I think we ought to look at a landfill as a manufacturing operation or an industrial operation rather than an eyesore in somebody's backyard, that everybody would like to see stopped and therefore anything that happens, they point a finger at it and say, he wouldn't have been killed if it wasn't on a landfill. People will get careless no matter where they are.

I would just like to leave that idea with you. We right now are stressing safety with our people to try to bring our averages down below the average. We are not satisfied with the data that we have, nor with what the EPA has published as being satisfactory. We think that improvements can be made, and we can see that even between our own landfill, some of them are a little bit more careful and they do a little better job and are preventing accidents than the other, and we are in the midst of an educational program to stress this with our landfill operators, we are spending money and time and effort to do it.

One of the big problems, as I said before, is education of the public. On clean-up days, the citizen who is cleaning up his cellar comes across a can, he says, I think it might be turpentine or it might be lacicin or it might be something, oh the heck with it, I'll throw it in the garbage and this winds up in a compactor and the compactor doesn't break it and a bulldozer runs over it and breaks it and flashes on the man or it might even set a fire going. So, we think the public should be educated that their responsibilities are here too.

And then we come up with the fellows who are in the garbage disposal business, they go around from house to house picking up municipal trash and every now and then someone talks them into hiding a drum or two of what might be obnoxious, but usually isn't. I know we picked up two drums of concentrated hydrochloric acid about two weeks ago and they were in one of our landfills down at the South end of the State, they didn't remember who brought it in, all they knew is here all of a sudden is two drums laying out in front of one of the tractors and if they had broken it, who knows who could have been seriously injured. These are the kind of things that we stress with the landfill operators, to be on the alert at all times.

MR. LEHMAN: Excuse me, Mr. Gathman, we are running short on time.

MR. GATHMAN: I thought I was going to be short, I'm sorry.

The second and equally important aspect to be certain that the environment will be protected. I would like to point out that there are no cut and dried instructions to give the people, you have to take each hazard as it comes in and handle it as it is. And, I know I have seen a copy of the proposed list of materials that cannot be landfilled without permission. Now, some of those products can be converted to less hazardous materials. For instance, cyanides can be converted to the ferri-cyanides that are blue pigments that we paint our houses with, things like this that can be done.

In conclusion, let us say we are dedicated to our objectives of minimum pollution under the system of free enterprise as the EPA is under the Federal authority, which is to dispose of industrial waste in an acceptable environmental manner at a reasonable cost. We think chemically designed landfills under technical supervision does this.

MR. LEHMAN: Thank you, Mr. Gathman. Do we have some questions? Yes, Mr. Lindsey?

MR. LINDSEY: Mr. Gathman, you mentioned that a suitable chemical landfill must be properly engineered, I believe on the first page.

MR. GATHMAN: Right.

MR. LINDSEY: Can you give us some thoughts on what characteristics such a landfill design should have and what engineering precaution should be taken in your opinion?

MR. GATHAMN: Well, we hired engineers to do this, we have engineers, in fact, who have designed a combination of dikes. We are on a clay bed that is impervious. They measured the clay to be sure that it was impervious. We've got a leachate collection system in a corner of that piece of land that we are going to use for this purpose. Does this answer your question?

MR. LINDSEY: Yes. I have one more. In your opinion, should hazardous and toxic materials be disposed of together with municipal trash and refuse in the same facility?

MR. GATHMAN: Yes. We have found over the years that a good engineer, as they say a heat sink, if you want to, a good place to dispose of hazardous, if you want to classify 20% sulfuric acid water, aqueous water waste as hazardous in trash, because there is enough zinc oxide, for instance, in white paper to do a pretty good job on neutralizing it.

MR. LEHMAN: Mr. Newton?

MR. NEWTON: Mr. Gathman, first a statement, if I may, may I confirm for the record's sake that yourreference to the state DEP proposing a list means the New Jersey Department of Environmental Protection?

MR. GATHMAN: Right.

MR. NEWTON: You lay great stress in your statement that on training the operators adequately, may we have your views please on how one might assure that landfill operators do receive adequate training and instruction?

MR. GATHMAN: Well, I guess being exposed for forty years to training adequately, you might say, with a small company called EXXON, I guess it kind of rubs into me, or is born or bred into the skin. So, I think it is the responsibility of the management or the operator, of the landfill, to institute safe practices and to stress them. I know I have talked to a couple of the landfill supervisors and have even thought of employing an EXXON subterfuge, if you want to call it that, of awarding gifts for safe working days. Big companies will have contests, for instance, everybody whose name begins with an A and ends with down to E, if they don't have any off the job accidents (lost time), they are awarded somthing. I talked about this with our operators too, as a method of impressing them, that we are serious.

And, another thing, probably more important to them, is that our safety meetings are all on overtime, so they know we are serious when we are willing to pay them time and a half to sit and listen to us. And, I think this in itself guarantees the safety.

MR. LEHMAN: All right, do we have any other questions from the audience? Mr. Sanjour?

MR. SANJOUR: Could you comment on whether you feel there is any need for Federal legislation in the hazardous waste area and if so, how would that affect your business?

MR. GATHMAN: Well, I have mixed feelings, being an ordinary citizen, that whenver anything gets into the Federal hands, it kind of gets bigger and bigger, it never gets smaller and smaller, and the money gets spent and many times in my particular level of civilization, if youwant to use the word, doesn't even see where his money is going. So, I think our people in New Jersey are doing a good job on this. And, I think they probably would be capable of continuing to do it.

Now, I am not mentioning the fact that some of them have decided that we can't take out of state trash, I don't believe that is a good piece of legislation, if you want to call it that. I think that should be changed.

MR. LEHMAN: All right, thank you. I think we have one last question and we should move on. Mr. DeBonis?

MR. DeBONIS: Just a brief question. You referred to recovering hazardous wastes in the beginning of your presentation. I was just wondering if you could give us some sort of an estimate of the types or quantities of wastes that you actually look to recover as opposed to, let's say, placing into the chemical landfill?

MR. GATHMAN: Well, it is all economics. If there is an alcohol water mixture that comes into a landfill, to be disposed of. If it is below a certain concentration and it costs more to regenerate that alcohol than it is to buy new products, it is pretty obvious what's going to happen.

MR. LEHMAN: All right, thank you very much Mr. Gathman. One the of the speakers we had originally scheduled for this morning has now arrived, so I would like to call upon, if I may, Mr. Blakeman Early from the Environmental Action in Washington, D.C. Mr. Early please And following him will be Mr. Nalven.

MR. EARLY: Good morning. My name is Blakeman Early, I'm with Environmental Action, a non-profit national citizen's environmental lobbying organization located in Washington, D.C.

I am pleased to be here to present Environmental Action's views on the management of hazardous wastes, a topic which has received relatively little public attention in the past. However, if the subject receives no more than discussion, more public attention will be necessarily drawn to the increasing number of damages and injuries which occurs as a result of both past and present improper hazardous waste management practices.

Although my testimony today will focus primarily on the more obvious damages associated with the improper hazardous waste disposal, such things as loss of drinking water supplies, destruction of underground water aquifers, animal and human poisoning.

Environmental Action is committed to improving hazardous waste management from a broader long range perspective. We are all becoming more aware of the growing threat being posed by cancer in this country due to publicity surrounding such reports as the National Cancer Institute estimate that between 70 and 90% of all cancer is environmentally induced and the National Center for Health Statistics finding that the rate of cancer deaths rose to 5.2% in 1975, a level 4.2% higher than the annual growth experienced during the past 30 years.

It is readily apparent that if we could prevent human contact with carcinogens in the environment, we can have a vast effect on the rate of cancer growth in this country.

Environmental Action believes that improved management of hazardous wastes will not only have the short term benefits of preventing the more apparent damages mentioned later in my testimony but will also close one avenue, indeed many avenues by which carcinogens are released into the environment.

There is no data available linking improper waste management practices to cancer. This is due in part to the long latency period during which cancer develops. Experts consider a minimum of 15 years to be necessary for most cancers to develop and some take up to 40 years.

Similarly, little data exists linking chronic poisoning to improper hazardous waste disposal. This lack of data is also due to the relative lack of attention to hazardous waste management drawn in the past.

It is obvious, however, that the same type of practices which result in leaching, spilling and emitting of substances to the air, to which humans have immediate toxic reactions, also provide a pathway by which humans come into contact with carcinogenic substances as well as low level toxics which can cause chronic poisoning.

Clearly, the upgrading of hazardous waste management practices is a more intelligent, effective and in the long run economic approach to protecting the public from cancer and chronic poisoning. In the treatment of our drinking water, restriction of our fishing areas, and other measures which only deal with hazardous pollutants after they have paraded into the environment.

I would like to turn now to a discussion of the damages which often result from the improper management of hazardous waste. In most cases I am referring to damages resulting from improper storage or disposal of hazardous waste rather than improper transport, though enough damage has been caused by the latter activity to raise significant concern.

The EPA's Hazardous Waste ManagementDivision of the Office of Solid Waste Management is to be complimented for its current damage assessment studies, which is the first concerted effort to assess the magnitude of damages resulting from the improper hazardous waste management.

The EPA has identified six major routes of environmental transport through which the improper land disposal of hazardous wastes can result in damage. 1) ground contamination via leachate, 2) surface water contamination via run off, 3) air pollution via open burning, evaporation, sublimation and wind erosion, 4) poisoning via direct contact, 5) poisoning via the food chain and 6) injury due to fire and explosion.

Rather than repeat the incidents of each type of damage which EPA has previously cited and which I hope will be introduced for the record, I would like to supplement these examples with other incidents.

First, in the area of ground and surface water contamination, water damages are by far the more frequent type of reported damage, because lagooning is the most prevalent method of disposing of hazardous industrial waste. And reported water damage often becomes manifest via fish kills and obnoxious drinking water.

In most cases humans can protect themselves from drinking water that is so contaminated as to cause immediate poisoning through the use of sight and smell. Therefore, few documented incidents of injury are directly traceable to drinking water polluted by hazardous wastes. These same faculties we have are not useful in protecting against chronic poisoning and the consumption of carcinogens.

The following are typical examples of the problems caused by inadequate lagooning of hazardous wastes. The State of Pennsylvania was faced with a $400,000 clean up cost when the River Chemical Company ordered to upgrade its industrial waste storage lagoons, containing 3½ million gallons of toxic wastes, abandoned its facilities near Doylestown, Pa.

The American International Refining Corporation left Pennsylvania with another extensive clean-up job when it went bankrupt and abandoned an industrial waste storage tank and lagoons which were in need of repair. Previously a lagoon rupture had killed an estimated 4.5 million fish in the Allegheny River.

In New Jersey, the town of Newfield had to abandon its municipal drinking water well when it was contaminated by chromium leachate emanating from a nearby waste lagoon.

In Long Island, New York, a liquid waste disposal base and used for the containment of plating wastes by the Liberty Aircraft Company, corroded nearby private wells and has tainted a large portion of the underlying aquifer which is a supply source for New York City.

A recent report to the Maryland General Assembly, by the Maryland State Department of Natural Resources, Maryland is no stranger to the hazards of improper waste lagooning. In Hollywood, Maryland, a leaching lagoon containing phenolic wastes from a wood treating company, have contaminated both ground and surface waters in areas up to two miles from the plant.

In Hewlick, Maryland, sewerage oxidation ponds containing a large proportion of industrial pickling brines have rendered six private wells unfit for drinking purposes.

Water damages have been sustained in nearly every state from illegal and indiscriminate dumping. Here in New Jersey approximately 150 wells were condemned and rendered useless for decades, when over 4,000 drums of petrochemical wastes were dumped at an abandoned chicken farm in Dover Township. The cost of extending public water supply alone will be approximately $250,000 and other costs, such as providing interim drinking water, loss of water rights, and health damage will escalate that total cost.

Most of the above incidents are preventable when industries are required to maintain lagoons adequately and treat or incarcerate wastes which may threaten the integrity of the lagoon liner.

Currently, however, many states do not have the authority to inspect and monitor lagoon facilities located at a plant which is not in the business of waste disposal. The examples above, which are duplicated many times over throughout the country, demonstrate a need for such authority.

In the area of air pollution, Maryland's Department of Natural Resources is a source of a report of an air pollution damage incident. In this incident six persons were injured when 2,000 gallons of liquid sodium were dumped in the Norris Farm landfill emitting obnoxious gases.

Another example. Environmental Action has learned that a preliminary study conducted for EPA's Office of Research and Monitoring, which is yet to be released, found samples of air in the community near the Kin-Buc Landfill to contain vinyl chloride, a carcinogen, in amounts alarmingly close to the Occupational Safety & Health Administration's occupational limits. The Kin-Buc landfills accepts polyvinyl chloride processing sludges for disposal from which it is believed the vinyl chloride gases escaped.

Poisoning via direct contact. One of the classic cases of how not to dispose of hazardous wastes was widely reported last Spring. This case involved the poisoning of more than 60 horses and 6 humans as a result of their contact with TCDD, which was a contaminant in some waste industrial oil used as a dust retardant in three stables in Central And Eastern Missouri. It took nearly three years to trace the cause of the damage. This case clearly indicates the necessity for keeping track of hazardous wastes from the point of generation to the point of final disposal.

Finally, fire and explosion. This type of incident is less common and more often affects only disposal site operators as illustrated by an incident already reported in EPA's Hazardous Waste Disposal Damage report dated June 1975.

In August of 1974, a landfill in Everett, Washington was the scene of a particularly fierce blaze and attendant explosions when aluminum and magnesium wastes were disposed in combination with concentrated phosphorus. Fortunately, no workers were injured.

As observed in the Maryland Department of Natural Resources Report, these incidents represented only the tip of the iceberg. They were obtained from newspapers, magazines and other public sources. Furthermore, the magnitude of the problem will increase as air pollution, water pollution and ocean dumping requirements come into full effect over the next decade, and the volume of pollution control residuals increases an estimated 100% between 1971 and 1983 according to EPA sources.

Those residuals which are not hazardous

will nevertheless be competing for the land disposal space which will be competing with hazardous residuals for land disposal space.

Only a handful of states have adequate hazardous waste mangement authorities today. Unless all states have effective controls, we shall continue to see articles such as that which appeared in the November 23 issue of the Newark Star Ledger. This article described New Jersey as the recipient of hazardous industrial wastes from as far away as Ohio and Virginia, because of the low cost and limited enforcement of state regulations.

Much of the latter problem is believed to be attributable to the lack of money and manpower provided to the state public utilities commission and the Department of Environmental Protection.

Without uniformity and control over hazardous waste management nationwide, the states with the weakest authorities and/or enforcement, will be the recipients of a disproportionately high amount of the nation's hazardous wastes.

Environmental Action submits that the improper management of hazardous wastes is a problem which is greater in scope than the states are willing and equipped to handle. We endorse the basic provisions in Senate Bill 2150, which provide Federal standards for hazardous waste management. However, we feel the bill should also provide Federal standards for the transport of hazardous wastes.

Environmental Action also supports the concept of Federal fiscal support to all states that adequately implement such Federal standards.

I'm gratified by the support of this legislation, which has been demonstrated here today.

We call upon the Congress to act on this legislation and other comprehensive solid waste management legislation as quickly as possible. It is unfortunate that the administration has not found itself able to endorse this legislation.

Thank you.

MR. LEHMAN: Thank you, Mr. Early. Mr. Early requested that a certain document be introduced into the record and I would like to do that at this time. It is this particular document, Volume I of the Hazardous Waste Disposal Management Report dated June, 1975. So I will introduce that into the record.

This publication (SW-151), the first in a series of reports to document incidents of improper land disposal of hazardous wastes, was prepared by the Office of Solid Waste Management Programs

## HAZARDOUS WASTE DISPOSAL DAMAGE REPORTS

On June 30, 1973, the U.S. Environmental Protection Agency (EPA) submitted a report to the U.S. Congress on the subject of hazardous waste disposal as had been required by the Solid Waste Disposal Act Amendment of 1970.[1] That report concluded that the prevailing methods of land disposal of hazardous wastes are largely inadequate and cited numerous case studies pertaining to improper hazardous waste management. Since the 1973 Report to Congress, EPA has continued to study hazardous waste disposal. A portion of these studies has consisted of more detailed investigations of improper land disposal practices to determine their impact on public health and on the environment. Case studies have been compiled within the framework of these investigations.

The problems associated with improper land disposal of hazardous wastes--unlike the problems of air and water pollution--have not been widely recognized by the public, although the damages may be as severe and difficult to remedy. In addition, the hazardous waste disposal problem continues to become even more significant, as the progressive implementation of air and water pollution control programs, ocean dumping bans, and cancellation of pesticide registrations results in increased tonnage of land-disposed wastes, with adverse impact on public health and the environment. The problem is manifested in groundwater contamination via leachate, surface water contamination via runoff, air pollution via open burning, evaporation, sublimation and wind erosion, poisonings via direct contact and through the food chain, and fires and explosions at land disposal sites.

The objective of publishing these damage reports is to bring about national awareness of the problem, which is essential to its solution. These reports will be published from time to time as resources permit. No systematic effort has been made to concentrate on any one parameter of interest, be it geographical, industrial, type of disposal site, or type of damage. Similarly, it is not the purpose of this series of reports to single out any particular person, firm, or industry. Cases are investigated as information becomes available. The only criteria used in the selection of incidents for these reports are:

- severity of damage
- availability of supporting information
- availability of EPA personnel for investigation

The data base for these damage reports varies widely. In some instances, official public records will be available for documentation; however, in most cases the reports will have to be based on inspection by EPA personnel, interviews with parties involved or having first-hand knowledge of specific incidents, technical investigations by consulting firms, newspaper accounts, etc.

The authority for the publication of such reports derives from Sec. 204 (a)(1) and (b)(1) of the Solid Waste Disposal Act of 1965 (P.L. 89-272)--as amended by P.L. 91-512, P.L. 93-14, and P.L. 93-611.

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HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT

March 7, 1975

Arsenic Poisoning in Minnesota

1. Personal Damage - Eleven persons developed arsenic poisoning. Two required hospitalization and treatment.

2. Environmental Damage - Contamination of the soil and groundwater

3. Economic Damage - Discontinued usage of contaminated well. Installation of public water supply cost approximately \$3,000. Removal and safe disposal of contaminated soil is estimated at \$25,000.

4. Cause of Problem - Subsurface migration of arsenic compound.

5. Type and Quantity of Hazardous Waste Involved - Grasshopper bait, consisting of arsenic trioxide, bran, sawdust, and molasses. Total quantity disposed estimated at less than 50 pounds.

6. Source of Waste - Local farmers

7. Date of Incident - Burial of grasshopper bait estimated between 1934 and 1936. First case of illness reported in May 1972, with other cases following during the next 10 weeks.

8. Location - EPA Region V, Minnesota, Perham

9. Status - Problem of how to deal with contaminated soil still requires resolution. Samples from 12 nearby wells are being analyzed at six-month intervals by the State Health Department.

10. Remedial Action Taken - The well has been capped. Cost considerations have prevented permanent correction of the situation at this time.

11. Legal Action Taken - None

12. Remarks - In May 1972, a local building contractor occupied a new office and warehouse structure at the outskirts of Perham, a town of 1900 residents in western Minnesota. At that time, a well was drilled to supply drinking water for about 13 people who worked on the premises.

Early in May, five employees became ill with gastrointestinal symptoms. Following this, and continuing throughout the next 10 weeks, other employees also became ill. Arsenic poisoning was determined to be the cause, which affected a total of 11 out of 13 persons exposed to the water. Two required hospitalization and treatment. One of the victims lost the use of his legs for about six months due to severe neuropathy. The medical aspects of this groundwater contamination incident have been well documented by Dr. E. J. Feinglass.[2]

Chemical analysis of samples taken from the affected well established arsenic concentrations of up to 21,000 ppb. (The U.S. Public Health Service drinking water standard for arsenic is 50 ppb.) As Dr. Feinglass pointed out in his article, the particularly serious consequences of chronic arsenic poisoning were probably avoided in this instance because of the extremely high concentration of arsenic in the drinking water. The acute course of the illness allowed early recognition of the problem.

The source of the well water contamination has been traced back to the mid-1930's, at which time grasshoppers had constituted a serious problem to farmers in the area. Some old-timers recall that excess grasshopper bait had been buried at the former County Fair-grounds, in a corner which was used as the village dump in those days. That area is now directly adjacent to the new facilities of the building contractor whose well became contaminated.

The exact area of disposal was located approximately 20 feet from the well. The well is 31 feet deep and the arsenic trioxide was buried at a depth of about 7 feet. Analysis of soil samples established a maximum arsenic concentration of 40% at the spot where a white crystalline material was found. The Minnesota Department of Agriculture has estimated that less than 50 pounds of grasshopper bait was disposed in the trench about 40 years ago.

Several options have been proposed for solving the problem. These include the following: (a) removal of approximately 2,000 cubic yards of contaminated soil to sealed vaults; (b) chemical fixation of the soil; and (c) covering the area with asphalt to retard further leaching of arsenic into the groundwater. The estimated costs of these solutions range from $25,000 to $2,500. Due to budgetary considerations, the problem has not yet been resolved. There are current plans to install a monitoring well in the immediate vicinity in the direction of the estimated groundwater flow.

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT

March 7, 1975

Industrial Waste Disposal on Farmland in Illinois

1. Personal Damage - None

2. Environmental Damage - Contamination of the soil, surface- and ground-waters with toxic materials; destruction of wildlife, stream-dwelling organisms, and local vegetation

3. Economic Damage - In excess of $250,000 has been spent to date by one property owner for clean-up and monitoring operations; at least three cattle were killed by cyanide poisoning.

4. Cause of Problem - Dumping and burying of hazardous industrial wastes on land

5. Type and Quantity of Hazardous Waste - At least 1,511 containers (mostly 55-gal. and 30-gal. drums) of industrial wastes containing cyanides, heavy metals, and miscellaneous other materials

6. Sources of Waste - Mostly metal finishing operations

7. Date of Incident - Three dead cattle discovered on May 20, 1974; however, the dumping had been going on for an unknown number of years until about 1972

8. Location - EPA Region V, Illinois, near Byron, on the Johnson Property and the former Dirks Farm, which was purchased by the Commonwealth Edison Company in 1973

9. Status - The dumping and burying ceased around 1972, but the disposal site has sustained long-range environmental damage, which is particularly evident during periods of heavy rainfall. An unknown quantity of deteriorating drums of chemical wastes are estimated to be still buried at the Johnson Property.

10. Remedial Action Taken - Commonwealth Edison's contractor, the Conservation Chemical Company, removed a total of 1,511 containers from the former Dirks Farm for controlled disposal. Of this quantity, 576 fifty-five gal. drums and 425 thirty-gal. drums contained spent cyanides, which were incinerated. Earthen dams and trenches were constructed to confine the toxic runoff, which was treated with calcium hypochlorite to destroy the cyanide. A surface- and ground-water monitoring

program was initiated. No known remedial action has been taken at the adjacent Johnson Property.

11. Legal Action Taken - In December 1974, the State Attorney General Office, at the request of the Illinois EPA, filed a complaint against Byron Salvage Company and its listed owners, Mr. and Mrs. W.E. Johnson. The complaint alleges that the company allowed contaminants to be placed on land so as to create a water pollution hazard; polluted Woodland Creek with discharges of cyanide, cadmium, copper, iron, lead, manganese, nickel, silver and zinc; conducted a refuse disposal operation without a permit; contaminated underground water with phenol, cyanide and cadmium; and did not have a state wastewater discharge permit.

12. Remarks - In May 1974, three dead cattle were discovered on Commonwealth Edison Company's recently acquired property (formerly known as the Dirks Farm), and pathological examination established that the cattle had died of cyanide poisoning. Further investigation revealed that the approximately 5-acre area, which is part of a large property set aside for a nuclear power plant, had been for several years a repository of large quantities of toxic industrial wastes.

According to information furnished by the Illinois EPA, Mr. Johnson, owner of the Byron Salvage Company, initially hauled industrial wastes to his own property for dumping and burial. Later, Mr. Johnson allegedly negotiated with Mr. Dirks, owner of the neighboring farm property, for permission to dump more industrial wastes there. In 1974, when Commonwealth Edison Company learned of the potential problems associated with its acquired property, it hired the consulting firm of Dames and Moore to study the nature and magnitude of the environmental damage and to recommend a proper clean-up procedure. Dames and Moore prepared a comprehensive study which documents the substantial damage to wildlife (birds, downstream aquatic community, stream bottom-dwelling organisms, frogs, etc.) and local vegetation (trees, shrubs, etc.). Also, the study points out the severity of the contamination of nearby soils, vegetation, and surface- and ground-waters by toxic materials. The following tabulation will serve to illustrate the contamination of the surface-water runoff which ultimately enters the Rock River, situated 1 1/2 miles east of the site:

| Contaminant | Maximum Concentration Detected in Runoff (parts per billion | U.S. Public Health Service Drinking Water Standards (parts per billion) |
|---|---|---|
| Arsenic | 60 | 50 |
| Cadmium | 340 | 10 |
| Chromium | 17,200 | 50 (W.H.O. standard) |
| Cyanide | 365,000 | 200 |
| Phenols | 8 | 1 (recommended) |

Ongoing surface- and ground-water monitoring efforts by Commonwealth Edison testify to the long-range nature of the problem posed by toxic pollutants that had drained into the soil. Also, it is too early to predict what time period will be required before farm crops can be safely harvested on the affected property. As far as the Johnson Property is concerned, an unknown quantity of chemical wastes is estimated to be buried there, awaiting the outcome of current legal proceedings.

There are two recent significant developments surrounding this case study:

1. In February 1975, Mr. Johnson brought to the attention of local public health officials several additional sites within one mile of his property where other parties allegedly dumped liquid industrial wastes on land. These sites are currently being investigated.

2. As of March 1975, owners of at least forty-six private wells within a three-mile radius of the Johnson Property have been warned by the Illinois Department of Public Health that their drinking water is unsafe due to unacceptable levels of lead and mercury. One of the wells was found to have an unsafe concentration of cadmium and many contained cyanide; however, the cyanide concentrations were within U.S. Public Health Service drinking water standards. Investigations by State authorities are in progress to determine the source(s) of these contaminants.

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT

March 7, 1975

Fatality at a New Jersey Industrial Landfill

1. Personal Damage - Bulldozer operator killed in explosion at landfill

2. Environmental Damage - None which resulted from incident

3. Economic Damage - Bulldozer destroyed; approx. $91,000 damage

4. Cause of Problem - Explosion while burying and compacting drums of unidentified industrial waste chemicals

5. Type and Quantity of Hazardous Waste Involved - From one to five 55-gallon drums of unidentified chemicals

6. Source of Waste - Unknown industrial origin

7. Date of Incident - October 11, 1974

8. Location - EPA Region II, New Jersey, Edison Township, Kin-Buc Landfill

9. Status - Landfill remains active. The case was investigated by the Occupational Safety and Health Administration (OSHA) and New Jersey State authorities.

10. Remedial Action Taken - Management has agreed to make every effort to keep out unknown chemical wastes.

11. Legal Action Taken - The OSHA issued six citations (covering thirty-six items) for violation of the Occupational Safety and Health Act of 1970. A formal settlement of contested items was reached between OSHA and the management on March 4, 1975.

12. Remarks - The Kin-Buc Landfill, located on 30 acres adjacent to the Raritan River, has received both municipal and industrial wastes for about twelve years. It is owned by Kin-Buc, Inc., a subsidiary of Scientific, Inc., of Scotch Plains, N.J.

According to Mr. James Stroin, Vice President of Scientific, the landfill receives approximately 200 truckloads of waste per day, 25% of which is industrial waste. This includes wastes from such industrial categories as organic and inorganic chemicals, pharmaceuticals, paints, plastics, and others.

The wastes are delivered to the site in tank trucks and in containers. Bulk liquids are poured out of the tank trucks on top of the previously deposited waste, while those in containers are buried and then compacted with bulldozers. Mr. Stroin explained that two tests are conducted as a means of identifying the wastes. The first, a test for flammability, is conducted by igniting a sample in a glass beaker. The second is pH testing by indicator paper.

The acceptance of unidentified chemical wastes at landfills has been deemed an unsafe practice by the State of New Jersey and is specifically prohibited in recently promulgated solid waste disposal regulations. However, these regulations had been suspended by court order at the date of the explosion; they have since been reinstated.

According to the OSHA investigation, eleven 55-gallon drums of unknown chemicals had been stored at the site for about six weeks prior to the explosion. On October 11, 1974, one of the managers of the Chemical Waste Division of Scientific, Inc., told an employee to remove these drums for burial. Mr. Donald Amatel, one of the two bulldozer operators working there at the time, had covered five drums of the unidentified industrial waste chemicals and had begun the compacting operation when an explosion occurred. According to the OSHA investigation, a large flame enveloped the bulldozer. Mr. Amatel jumped out of his cab and another explosion followed, which caused burns covering approximately 85% of his body and destroyed the bulldozer beyond recovery. Mr. Amatel died the following day. He had been active in his line of work for about fifteen years.

When interviewed by an EPA official, Mr. Stroin attributed the fatal outcome of the accident to the faulty judgment of the bulldozer operator. He indicated that Mr. Amatel should have stayed in the cab and backed out with the equipment to avoid injury. Witnesses, however, stated that this would not have been possible. In response to questions about possible environmental problems with the landfill, Mr. Stroin conceded that there were occasional problems with contaminants being drained from the landfill after periods of heavy rainfall.

For the first ten months of 1974, six other obviously chemical waste disposal-related occupational injuries were recorded in the Kin-Buc logs, the maintaining of which is required under the Williams-Steiger Occupational Safety and Health Act of 1970 (excluded from this requirement are minor injuries requiring only first aid treatment). The recorded injuries affected two bulldozer operators, a laborer, and two drivers. These injuries, as obtained from the OSHA files, are as follows:

1. Eye irritation sustained while bulldozer operator was pushing drum which split, squirting liquid into eyes.
2. Smoke inhalation which caused respiratory and stomach conditions while operator was fighting a fire on a bulldozer.
3. Conjunctivitis of eyes caused by fumes from waste products. Safety glasses were being worn at the time of injury.
4. Burned foot when driver stepped out of truck into a hole containing 250°F acid waste.
5. Chemical burns to hands and other parts of body as a result of pushing a drum with bulldozer. The drum split open and liquid squirted out.
6. Sustained burn of the cornea when dumping acid from a tank truck.

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REFERENCES


1. U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Disposal of hazardous wastes; report to Congress. Environmental Protection Publication SW-115 Washington, U.S. Government Printing Office, 1974. 110 p.

2. Feinglass, E.J. Arsenic Intoxication from well water in the United States. The New England Journal of Medicine, Vol. 288, No. 16, pp. 828-830 (April 19, 1973).


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As before, if any of the audience has questions for Mr. Early would you please raise your hand and write out your question. Do we have any questions from the panel? Mr. Sanjour?

MR. SANJOUR: Could you comment, Mr. Early, on how you feel about the adequacy of state regulation of hazardous waste, particularly in New Jersey, in light of the previous speaker's comments?

MR. EARLY: I didn't hear all of the previous speaker's comments. By and large, to my knowledge, only three states have comprehensive solid waste management legislation per se, although others utilize more basic legislation, such as water pollution and air pollution and solid waste management laws.

Clearly, each state has to have a very comprehensive type of authority, one that is clearly spelled out in the legislation. New Jersey has some regulations which I understand are pending, which might provide adequate authority, but the article in the Newark Star Ledger made it very clear that even in a situation where New Jersey wants to act, they have a limited number of inspectors and it is very difficult for them to carry out the kind of enforcement they would like to.

I find those states with which I am familiar have by and large inadequate legislation.

MR. LEHMAN: Do we have other questions ? We have a question here. Mr. DeBonis?

MR. DeBONIS: Yes, there is a question relating to a statement you made that 70% of all cancer is environmentally caused and the question is whether or not this includes smoking as a cause, and what percentage due to smoking?

MR. EARLY: I believe that those figures do include smoking, but I'm not certain, these figures come from the National Cancer Institute, and I'm not positive, I wouldn't know the percentage.

MR. LEHMAN: Mr. Kovalick?

MR. KOVALICK: You indicated a support or an endorsement for Senate Bill 2150, does that bill include, that bill as I understand it talks about Federal guidelines and Federal standards,but state implementation, is that also part of your endorsement? That the states carry out provisions of that bill, if they are capable and willing?

MR. EARLY: I would endorse a scheme that would be analogous with the water act, in that the Federal government would have the authority to initiate a permanent program for the management of hazardous wastes, and they could authorize that the states implement that program, if they found the state program to have sufficient authorities.

MR. LEHMAN: Any other questions? Thank you, Mr. Early. I would like at this time, please to call on Mr. Malvin from the New Jersey Manufacturers Association. Is he here? Not here. Mr. Gallay then, are you here? Yes. Mr. Gallay from the SBB Ltd., Germany, Mr. Gallay.

MR. GALLAY: Good morning and thank you very much to give to my company the opportunity to inform the American industry about our environmental protection activity in Europe.

As the gentleman said, I represent the company, SBB, which is a Dutch/German company and is a company who invented and developed and practiced for the first time the incineration at sea of chemical wastes. And, our operations cover firstly and almost exclusively the incineration of chlorinated hydrocarbon wastes.

I'd better state right from the start the philosophy of the company. We think that the only right thing to do with the wastes is to transform it chemically into a useful product. We think, however, that we will be in business for about 30-40 years because we do not believe that a significant or at least major part of the chemical waste, the hydrocarbon waste, will be transformed chemically in an acceptable technical way, and an acceptable economic way.

Therefore, we believe, as I said, that -- to put it another way, we do not believe that before thirty, forty years the industry will have available the catalyst to make the chemical transformation in a satisfactory and acceptable way.

Now, the whole operation started when SBB, which was originally a German company, constructing, engineering, designing equipment for chemical and petroleum industries and especially combustion furnaces, they were building one of the largest chemical companies in Europe, in Germany actually, building a furnace and in the discussion with this company we found out that the disposal of the majority of their wastes was made in a more or less satisfactory way. But, they had one problem that they could not master, and this was the disposal of chlorinated hydrocarbon, they had tried everything.

For years they have operated land incinerators, waste recovery of HCO with carbon, of material with natural carbon hydroxide and they just couldn't make it.

By that time the German or the European restrictions on dumping the discarded material from HCL neutralization was such that they were at a loss, they didn't know what to do. And then, the man who started the company, the German engineer, suggested that as the problem is to avoid the toxicity of chlorinated hydrocarbons or organic compounds, on the life in the sea, they should burn this product at sea and to transform this organic compound into inorganic products which are non-toxic. Therefore, through the complete combustion, $CO_2$, water and HCl. Everybody knows what happens with $H_2O$ and $CO_2$, the hydrochloric acid condenses in the water and integrates by this association in the sea water.

Now, the first ship that has been built was the ship called Mathias I a small ship with a loading capacity of 530 tons and was such a success that in fact it unveiled a fantastic problem. The problem was worsened by the fact that the environmental authorities in Europe, whenever an industry came to say, well look, we believe now that we have an alternative, we have this amount of waste, the authorities said, well, you never said that before. And they started putting penalties.

I think we were instrumental to convince these European authorities to stop such a procedure because this was making sure that what we call black practices of disposing the waste will be continued.

The second ship was built in 1972, and most of you have heard of Vulcanus, our competitor, that was built and put into operation after our second ship. The Vulcanus has something like 4,000 tons, therefore larger than our first two ships. Now, because it was so large we realized that we have to go now in quite another dimension about the whole business. And, for that we decided that before doing so we had to answer some questions and the first question was, how much chlorinated hydrocarbon waste is in the whole world, and from the whole possible information that we obtained, this amounts between 500,000 tons and one million tons a year.

Now, the next question was, how complete is the incineration in the furnace of our ship. The next one was, what exactly is the chemical effect of the combustion gases coming from the ship furnace on the sea And, the last one was, what is the biological effect of these gases.

Now, I have no time to give the details. I am prepared to answer all the questions in the interval after the meeting, but the first question was answered after tests had been carried out in the presence of highly specialized people, in the presence of the Dutch government and the result was that the incineration combustion efficiency is higher than 99.9%, which to our knowledge and to the knowledge of all the sources, official or private, is comparably higher than what is achieved on the land incineration.

The other question was, what was the chemical effect on the sea. A Professor Gratsoff, from the University of Kilamarine Institute has determined and found in fact that it is insignificant. A very interesting point is that we were burning in the North Sea, we still do in the North Sea, the pH of the North Sea is 8.2 which is too high, close to the pollution, industrial pollution. Therefore, practically any amount of HCl poured in the North Sea has a favorable effect. But that was startling but true. The only thing is that the amount of HCl that comes out of incineration, carried on our ship, is insignificant to have any practical effect on the huge amount of water.

The next one is, how toxic are the chlorinated organic compounds to marine life, and for that and the last question we have assigned the Institute Sorbonne which is a most suitable biological institute for marine biology in France. Sorbonne took samples from the sea and contaminated this sample with chlorinated hydrocarbon, the ones which you usually receive from industry. And they determined by dilutions of 1,000 to 10,000, all the category of fish, all category of animals, died, all of them within less than ten hours. And, I trust and I hope that everybody here will shudder thinking what this means when 500,000 tons to 1 million tons of chlorinated hydrocarbon, which are disposed every year, all over the world, in an imoroper way.

The next question was, what is the biological effect of the gases of our combustion on the sea. And, what they have done, they took a sample about 60 liters and they took the gases directly from the furnaces and let bubble up the gases in the sample, 34 hours, and then they put the same animals that they used in the first experiment in this water, and I have the report, official report, which is available to everybody in the world that is concerned with the environment, that there was after 70 days exposure no mortality or any physical disturbance was shown. And this was the basis that we took for expansion of our business.

What we did, we have a new ship, remember I said the first ship was 530 tons, the second ship was 1300 tons, the third has 4,000 tons, the new ship is going to be ready by January-February 1976 and it is 20,000 tons.

Now, you may ask why? Somebody said that business is not going very well. Unfortunately for the world, our business does fantastically well. We have two ships and we have not been able to keep up with the demand in 1975. We have had companies, I won't say the country, that for two years they have told us they have nothing and then in February they called us and begged us to come because the police have clamped down on their operations. We had to remove 14,000 tons at once.

We have one competitor -- oh, we have many competitors in the system, but what happened is that many industries have tried to cling to their old system, this and this and that, and many of them with incineration on land.

I never heard about incineration on land that functions properly. I heard about plants that were said to function properly. And this is, maybe I haven't seen anything, but in two years I have been in the United States I haven't seen yet a plant that operates properly. And this comes now on us with a terrific demand to come to the rescue. We are going to come if we clear all the procedures with EPA by March, April, May for loading the first chlorinated hydrocarbon liquids. And here I come to the point.

The three existing incineration ships are able to incinerate only liquid chlorinated hydrocarbons. Our new ship is going to have the capability to incinerate also solid or semi-solid. We can also, on the two ships that we have, we can incinerate chlorinated hydrocarbons containing water. And, I heard here, many of the wastes can be treated to reduce water and so on. I wish it was so.

We have among five companies, three in the States and two in Europe, over 600,000 tons of watery waste that contains 95 to 96% water. We can burn it but who is going to pay it. 600,000 tons that cannot be reduced to something like 20 to 30% water.

We have burned about 250,000 tons of chlorinated hydrocarbon liquid in six years of operation. Now, don't believe that this has so much in Europe, I do not know exactly, although I think I stopped understanding what happend in the states, but it will be interesting for you to know that the Rhine has analyzed in 1975 with the Dutch Government with 200,000 samples and has been found in April of this year to have more severe pollution in Holland than in 1974 and the chlorinated hydrocarbons contained is double in 1975 than in 1974. I hope you are in better shape.

We think that we have opened a gate for new directions. I would like to make a small suggestion. Particularly because I saw an article today in the paper talking about EPA switching to prevention and I worked 17 hard years for an American company and I learned that it is one quality in the American approach, to go step by step. I would suggest this time go half step by half step. For the prevention you can all of you come in from the industry, I have been a long time, 20 years in the chemical industry, what you have to do first toward the new company's sake and the national economy's sake, start prevention by segregating your different wastes. We are approached by many, many companies who say, can you help us? Yes, we can help everybody, but it would be much cheaper if you would segregate right from the start the wastes that can be disposed in a cheap way or a relatively cheaper way than to mix it, as I say, with 600,000 tons of water.

I have no more time but if you have any questions, I'll be glad to answer them.

MR. LEHMAN: Thank you, Mr. Gallay. It looks like we have a number of questions here. I would like to ask just one at the beginning. Mr. Gallay, could you comment on the cost of incineration at sea?

MR. GALLAY: Yes, sir. The cost, of course is important.our basic line was to be competitive first of all with incineration on land. For my information, we are cheaper than incineration on land in the States, the same level in Europe. For the liquid chlorinated hydrocarbons our prices go down from $60 to $40 depending on the volume. For the solid waste or semi-solid, we have not yet burned semi-solid or solid. We are going to do it after we finish all our investigation of conditions of the liquid in our new ship. That means by June, July we start with the solid and we are going to start with drums. You know everywhere the problems with drums with waste and the price for this is going to be probably between $60 and $100, but we said to all our potential customers, we want to first of all have a certain volume, a significant volume of this material sold before we crystalize our records.

Now, for the cost point, there is one important thing. In order to keep the cost as low as possible, we are going to sail from Europe with European wastes to the Americas, North and South and to sail from American continents with the wastes from this part of the world to Europe, in order to kill as much as possible the dead time for such an expensive vessel. And to reflect in our prices, the lower cost.

MR. LEHMAN: Thank you, we have many other questions. Mr. Lindsey?

MR. LINDSEY: Yes, I have a number of questions here from the floor that are very similar. May I ask it in this way. You mentioned that you know of no land incineration facility that operates satisfactorily. May I ask the question, why should a shipboard facility operate in a more satisfactory manner than a land facility?

MR. GALLAY: All right, gentlemen, the land incineration has to do something with the HCl. Now, it can either recover HCl or it can scrub it. The problem is that you have to bring the gases that are going to be at something like 1300 C which is 2500 F. back to the temperature where the water is still liquid, which is below 100 C. And, I haven't heard yet of a plant that hasn't got corrosion problems to the point -- well, anyway I haven't heard of any. So, therefore, this is the problem of the land incineration.

Our ships, I'm sorry, I have some slides but I couldn't show them, the new ship has a furnace which is built in such a way in order to insure complete combustion that has an opening that can be inserted in this room up to the first column. It has 48 feet diameter. Now, you can imagine what a technical problem would be to cover this circle in order to bring the gases somewhere where you could either scrub the gases or to recover the HCl.

Therefore, the difference in difficulty is, the difference in the technique is that the land incineration cannot let the HCl go in the air because of the damage it makes to the environment and therefore has to recover the HCl prescribed, whereas we let the HCl gases out in the sea where it can integrate in an inorganic way.

MR. LINDSEY: Along the same lines, I would like to extend that a little bit, can you elaborate any further on how far HCl emissions from the ship are likely to travel? In other words, might they travel to where the land is?

MR. GALLAY: The largest distance that we have seen is when everything is calm on the sea, and this was about 500 meters, 550 yards. When you have wind or when it is a very humid atmosphere the HCl condenses very quickly, in small droplets and goes down in the sea.

MR. LINDSEY: One more part of this also from the audience. How long can the sea continue to absorb the off gases before there is an adverse effect?

MR. GALLAY: The sea?

MR. LINDSEY: Yes.

MR. GALLAY: Well, you have here, as I said, if the combustion is complete, you have water, CO2 and HCl. Water makes CO2, you will agree there is no problem. HCl, when you consider the amount of HCl that can come out of a combustion, and which is spread on the surface of the sea, you will see it as insignificant. Maybe I can give you something that you feel, what I want to say. When we started, there were these two ships, the Dutch government had to give us an area in the North Sea because the ships were too small to keep the high sea. And the area that they gave us is the area with the least traffic. We may have heard of the problems about the traffic in the channel in the North Sea.

Now, we have operated six years in this area which is the area of the fisherman -- which is the fishermen area from the Coast of Holland next to the Hague. Six years. And, I can tell you also that the fishermen come with their boats at night to fish because their catches are better, not because of the HCl, but because of the light which attracts fishes. But it is one proof that in six years we did not have any unfavorable effect.

MR. LEHMAN: Mr. DeBonis?

MR. DeBONIS: There is a question from the audience here, it says, what is the possibility of using HCl for vessel fuel?

MR. GALLAY: I think we should take it from the record.

MR. LEHMAN: Another question?

MR. KOVALICK: From the floor. What provisions have been made for accidental spillage of these highly toxic wastes into marine waters during transfer and handling operations especially considering the large amounts handled?

MR. GALLAY: Yes, sir. I do not know to what extent you are familiar with IMCO. IMCO is the International Maritime Coordination Organization, of which all the European governments are members and the United States is an observer, and as I understand they have plans in two or three years from Coast Guard to join. IMCO gives regulations for all chemical transport, or transport of all chemical material on all waters. You can prepare yourself gentlemen, but two or five years from now to have to have only vessels with double bottom and double walls to transport these chemical materials.

Our ships are all satisfying the import specifications which are made just in order to avoid spillage in case of an accident.

Now, the past three, though its dimension should have a double wall, distance one from the other one, 1 meter 40. By chance when we bought the tanker that we transformed into an incineration ship, had along the two sides tanks with 5 meter distance from one wall to another one, and it came out for us to be cheaper to leave these walls than to put a double wall. Therefore, we are about three times better than what the specification requires.

The second thing is that the ship according to the German specifications, which are observed now by IMCO as well, is constructed in such a way that if it is cut in two by another ship, both halves have to stay floating. I couldn't tell you what happens if it is cut in three.

MR. LEHMAN: We have another question, Mr. Newton?

MR. NEWTON: A question from the floor. How do your operations affect international law of the sea treaties?

MR. GALLAY: There are no international law of the sea treaties. That's a question. We have been hammering to everyone from the states to Europe that the environmental authorities should start thinking about this situation. There are no international laws for the high sea.

I must say for you, gentlemen, I wish in Europe we had such a good year as we found in the States. What happens is in Oslo in 1972, was a conference trying to legislate what happens at high sea and they realized that that's impossible unless they are going to quarrel about 24 years and then if there is one small African Republic to say no, it will be worthless. And for once they managed in 24 hours to find a brilliant solution. They bypassed the problem and said, all right, we cannot legislate the high seas, but what we can say is that the ships who do not do what we require are not going to enter our ports. And, if you are a ship owner and you want to make business, but you cannot go in Finland, Sweden, in Norway, in Germany and Holland and Belgium and France and Britain and Ireland, in Spain, In Italy, then you'd better close shop.

The United States, I said, is not a member yet of this organization, but is a member of the Ocean

Dumping Convention. We work together with the other thing, which in fact, although, I repeat, there is no international legislation to regulate the sea operations, but it is very effective for controlling what the ships are going to do.

MR. LEHMAN: Thank you, Mr. Gallay. Evidently we have a few late questions which we may ask you in writing to respond to. There was one question that was really addressed to EPA, and I want to comment on that. The question reads, there was a demonstration burn of chlorinated hydrocarbon on a ship in the Gulf of Mexico a couple of years ago, was it successful? And, does the EPA approve of this method of disposal?

This is a very complex question in the sense that you've got to recognize that the Hazardous Waste Management Division of the EPA is not the group that issues the ocean dumping permits. This is done through the Marine Protection Branch in the Office of Water Programs of EPA. And also there is an Ocean Disposal Branch or at least a section in each of EPA's regional offices.

So, whoever asked this question, I would suggest that they get in touch with the EPA regional office or the headquarters office and get their view on the success or non-success of that type of operation.

It is my understanding that the EPA's position is that it depends. In other words, it is a waste by waste judgment. In other words there is no carte blanche for the whole situation.

Ladies and gentlemen, in view of the fact that we had a large number of questions of our last speaker, and we are very close if not past the time we announced for our lunch, I'm going to adjourn the meeting now for a lunch break. We will reconvene one hour from now, which is roughly 1:17 or 1:20, and we still have a large number of people to speak, so we want to start again on time.

(Whereupon a luncheon recess was taken.)

A F T E R N O O N   S E S S I O N

MR. LEHMAN: May we please come to order. We have, I believe, Mr. Nalvin from the New Jersey Manufacturers Association, is with us now. I would like to call him as our first speaker this afternoon and following him, Diane Graves of the Sierra Club, just to give you a little advance warning. Mr. Nalven, please.

MR. NALVEN: Representatives of the Hazardous Waste Management Division, Environmental Protection Agency, my name is David Nalven. I appear today as chairman of the Solid Waste Subcommittee, New Jersey Manufacturers Association.

The safe disposal of hazardous solid wastes presents a problem of major concern to both the people of the state of New Jersey and its corporate citizens as well. We face this situation largely because the state contains a high concentration of industries which generate significant amounts of hazardous wastes.

Our small geographical size and advanced environmental control situation have served to limit our disposal options. While we recognize the necessity for stringent controls on the disposal of hazardous wastes, we have already seen how public support for environmental controls can be weakened when there is a high unemployment rate.

The only satisfactory answer may be to seek solutions on a nationwide basis.

New Jersey Manufacturers Association has been able to work closely with the New Jersey Department of Environmental Protection and the members of its staff responsible for developing a sound solid waste management program. We are pleased that together we have made some measurable progress in the development of the state's program. We can see, however, that a complete solution cannot be structured within the state's borders alone.

We, therefore welcome this opportunity to address this panel for the purpose of recommending the development of uniform national standards and the further involvement of the Federal government in the development of a national program to "dispose of the undisposable."

Our experience in attempting to wrestle with the problems of hazardous waste management and disposal has revealed some significant issues that deserve your careful consideration.

To date, no definition of the term "hazardous waste" has been found to be completely acceptable to all concerned parties. Perhaps the most perplexing part of the problem is the necessity of basing the definition, or including therein, some reference to levels of concentrations. Since a so-called hazardous waste can generally represent a hazard to the environment at even low levels of concentration, it becomes desirable to provide specific limits - or at the very least, guidelines - to be used. In addition, certain hazardous wastes can be put into a condition which makes them unavailable to the environment. The definition, therefore, should be based on the likelihood of a release of significant concentrations of hazardous components to the environment, whether in leachate, incinerator off-gas, or other discharge modes.

Our Committee feels that clear delineation of responsibilities between generators, haulers-collectors and disposer should be established. There has been an unfortunate tendency to multiply liability at each step of the procedure. In New Jersey, for example, the generator continues to be liable for actions taken by either or both of the licensed hauler-collector and the ultimate disposer. This creates the potential for unwarranted prosecution.

We propose the following:

1) The generator should be responsible for contracting with a licensed hauler and treater/disposer, properly characterizing the waste, and maintaining disposal records.

2) The transporter should be responsible for obtaining a hauling license and maintaining records of origin, destination, and characteristics of materials hauled.

3) The treater/disposer should be responsible for maintaining records of wastes received including the identities, the transporter and generator, and obtaining a license for operation.

Operational standards for hazardous waste disposal sites should not be based on the philosophy of controlling both the internal procedures and what is released or made available to the environment. We favor, instead, control based on the latter, with stringent controls on record keeping so that abandonment of a disposal site does not leave problems for successors to deal with.

Our general view is that where possible, private industry should be permitted to treat and dispose of "hazardous" wastes. Industry should operate its facilities and equipment within the constraints of regulations promulgated to protect the environment. Regulations should be developed, however, designating a reasonable timetable for the phase-out of environmentally unacceptable waste disposal practices. Industry would then have the opportunity to provide the alternate disposal services or process modifications to comply.

The Association's solid waste subcommittee has already recommended to the New Jersey Department of Environmental Protection that regional sites should be encouraged for certain extra-hazardous wastes. This concept should also apply at the Federal level for certain other wastes; namely, those that might be difficult or impossible to dispose of within state boundaries due to small quantitites yet high hazard potential which render them uneconomic for localized disposal. Some examples are radio-active materials, certain explosives, most etiological agents, war gases, some heavy metals, and other materials of an especially toxic and hazardous nature such as dioxin or PCB's.

It may be that past and present methods of disposing of, for example, war gases, should be reviewed before a determination is made as to whether private industry or the Federal government should handle these exotic wastes.

We would like to repeat our point, that hazardous waste disposal is of special concern in our small state. Solutions that do not recognize the national nature of the problem will inevitably end up as discriminatory to New Jersey industry. Solving the problem must be accomplished without putting an additional burden on New Jersey residents and their industries.

We thank you for this opportunity to express our views.

MR. LEHMAN: Thank you, Mr. Nalven. Will you accept questions, Mr. Nalven?

MR. NALVEN: Yes, certainly.

MR. LEHMAN: Mr. Kovalick, do you have a question?

MR. KOVALICK: Yes, I have a couple while we are waiting for some from the audience. First of all, for clarification, does your Association represent the category of industry we would call generators or also treaters and disposers of waste or both?

MR. NALVEN: We are not restrictive. The committee on which I'm a member, the Environmental Quality Committee and the Subcommittee on Solid Waste, is a subcomittee thereof, we have only generators.

MR. KOVALICK: I see. The second question.

MR. NALVEN: I would like to add that some of our generators have on-site disposal facilities of their own.

MR KOVALICK: You mentioned, if I could find my place, the statement, well I recall a statement that Mr. Palmer from DuPont made this morning and he uses the words performance standards referring to the kinds of standards and guidelines that he believes to be most desirable. That is, standards or guidelines governing what comes out of the site. Do I interpret your endorsement to be the same here?

MR. NALVEN: We do favor what is released into the environment.

MR. KOVALICK: As opposed to regulations?

MR. NALVEN: To what goes into a facility.

MR. KOVALICK: Or a process?

MR. NALVEN: Yes. What may come out of it or what indeed comes out of it.

MR. NEWTON: Mr. Nalven, I note the statement in your testimony that in New Jersey the generator continues to be liable for actions taken by either or both of the licensed hauler/collector and the ultimate disposer. We would be interested in the statute, regulation or case law under which you base that statement?

MR. NALVEN: We would be very happy to supply that to you. I don't have it right here with me, but if somebody here could give me the address to get it to, I would be more than happy to send it to you.

MR. NEWTON: Fine, I would appreciate that. The address, of course, is in our Federal Register notice.

MR. NALVEN: In the Federal Register notice?

MR. NEWTON: Yes, do you have that?

MR. NALVEN: Yes.

MR. LEHMAN: Any further questions?

MR. KOVALICK: On page 4 you noted the Association has recommended that regional sites should be encouraged by the State of New Jersey for certain extra-hazardous wastes, and this concept should also apply at the Federal level. Could you elaborate on what you meant by encouraged?

MR. NALVEN: We feel that the State or the Federal government, as the case may be, should assume the leadership in this area of how such a regional site should be set up. We have discussed this at great length with the state, our discussions are continuing. It isn't an easy problem for the state, we certainly don't feel it is an easy problem for you, as a Federal government, but we do feel that there are certain wastes which must be handled, which an individual company and some very large companies cannot handle by themselves, which even a private waste disposer may not be able to handle, and perhaps a larger geographical area, a larger population area or a larger industrial population area must be included.

MR. LEHMAN: I have a question, Mr. Nalven, when you say regional facility, do you refer to a region within a state or a larger region that might contain more than one state?

MR. NALVEN: Of necessity, first of all, we're talking, when I talk about our discussions with the State of New Jersey, we are certainly talking about within New Jersey, because that's the only area that they have to operate. But we also feel that it is very likely that when we say regional, now to you, we may mean several states or maybe a large portion of the country. We do not even see that it would rule out the possibility of one site for the whole 48 states.

MR. LEHMAN: I see. Do we have any other questions? I guess not. Thank you very much, Mr. Nalven. Our next scheduled speaker is Diana Graves of the Sierra Club, is she here? Momentarily. Our next speaker on our agenda is Mr. Clarence Moore of the National Barrel & Drum Association. Is Mr. Moore here. Mr. Moore please.

MR. MOORE: Thank you, Mr. Lehman. If the thickness of the copies distress any of you, most of it is attachments.

My name is Clarence Moore. I am the Environmental & Legislative Consultant for the National Association of Barrels and Drums. And, this statement is submitted on behalf of the National Barrel and Drum Association, a trade association with headqaurters in Washington, D.C., representing some 175 steel drum reconditioning companies throughout the United States, responsible for reconditioning and returning to commercial reuse approximately 73 million drums annually. That represents about 85% by volume of the steel drum reconditioning done in this country.

The purpose of this statement is to propose recovery from the Nation's solid waste disposal problem of an estimated one million tons of steel annually. Additionally, our proposal would result in the elimination of an imminent environmental and public health hazard, associated with the current pesticide container disposal practice, as well as other highly toxic substances.

A further objective of this proposal is the removal of the prohibitions and restrictions on the use and reuse of toxic containers subject to certain limitations which result in the loss of valuable natural resources and the wasteful use of energy, as well as contributing to the problems of hazardous waste disposal.

This proposed solid waste management via resource recovery concept is predicated upon the utilization of existing technology within a viable industrial group, which has its roots firmly implanted in resource recovery, through the repetitive reuse of packaging materials.

In recent years pesticides have become a very important and vital part of agricultural technology.

The use of these substances has resulted in greatly increased productivity per acre of both food and fiber.

The Council on Environmental Quality in its annual report stated that domestic use of pesticides, et al, is in excess of 800 million pounds annually and the amount used continues to grow each year. An example of this growth pattern in pesticide usage can be seen in the increase between 1966 and 1971. In 1966 the estimated usage was 681 million pounds, by 1971 up to 833 million pounds, an increase of 22%.

This continued increase in pesticide use has produced public concern regarding the toxic aspect and the persistence of these chemicals in the environment and this public concern has resulted in both Federal and state regulations governing the use of the substances.

But one major aspect of pesticide usage that remains to be dealt with, i.e., the impact of pesticide container disposal on the solid waste management problem. For as pesticide usage has increased, so have the number of containers which must be disposed of.

Now, one of the critical problems associated with empty containers is that they are not completely emptied and small quantities of active ingredients remain in the containers. Various rinse and drain plans have been instituted to minimize hazards associated with exposure and contact with empty containers, but these plans have had only very limited success. The majority of empty containers are still disposed of in an improper and hazardous manner. This represents a significant nationwide disposal problem for emptiers of pesticide containers.

It is not uncommon for farmers and applicators to discard the containers in the most available area, where, in addition to causing the pollution by leakage, rust, etc., they become readily available for misuse and handling by persons not aware of the dangers associated with the residues.

To date there is little or no incentive to return these containers to the supplier or for salvage, and only limited areas of the country have provided facilities for the disposal or storage of empty pesticide containers, although studies to date have indicated that farmers recognize the problem of empty pesticide container disposal and would be willing to cooperate in a solution aimed at solving these disposal problems.

An example of the magnitude of the problems associated with empty pesticide container disposal is the 417 page workshop report of the Federal Working Group on Pest Management.

Incident reports involving the environment, human health and animal losses as a result of improper management of empty pesticide containers can be found in various reports, the most recent of which is the Toxicology of Pesticides.

Now, one suggested solution to the pesticide container disposal problem is by disposal in landfill areas. Yet this catchall solution ignores the issues concerning the safety of employees and equipment; additionally it contributes to the depletion of a valuable natural resource, steel. And, it also increases associated energy costs, according to CEQ reports, which estimated that each 1 million tons of steel lost to landfills cost the equivalent of 1.5 million barrels of oil.

The pesticide container disposal problem is only the tip of an iceberg just forming, as daily more and more substances are declared to represent threats to human life and the environment and potentially millions of additional containers will compound the solid waste management problem. And as with pesticide containers the majority of these containers still contain residues of the original materials. In a few selected areas of the country these containers are being collected and placed in public or privately operated landfills, which is clearly neither an adequate nor totally safe resolution of the problem.

The use of landfills to dispose of pesticide as well as other toxic substance containers raises many serious questions, which might best be summarized by the comments of Dirk R. Brunner, of the EPA Solid Waste Research Laboratory, at the 1972 conference on pesticide containers (the report is one of the appendices) and the last paragraph reads as follows: This is Mr. Brunner.

"So we've got these problems with pesticide containers, and how to get rid of them in a landfill. If it is truly a sanitary landfill, the ground water and surface water contamination problems are minimal. But there aren't too many sanitary landfills around. The problem then revolves around what happens to the employees who are disposing of these containers as well as other hazardous wastes at the landfill site."

In writing the Solid Waste Disposal Act, the findings of the Congress as stated in section 202 of the Act, were in part that inefficient and improper methods of disposal of solid wastes result in scenic blights, creates serious hazards to public health, have an adverse effect on land values, create public nuisances and further, that the failure or inability to salvage and reuse such materials economically results in the unnecessary waste and depletion of our natural resources.

One stated objective of the act was to conduct investigations to determine means to recover materials and energy from solid waste. It is our aim to deal with that aspect of solid waste disposal associated with pesticide containers.

The numerous problems associated in this field have been thoroughly documented in the literature. The problems which have received the greater attention have been centered around those incidents involving injuries and the occasional loss of human life, fish kills, and ground water contamination.

Now, our proposal is predicated upon the utilization of the existing steel drum reconditioning plants within the Continental United States for the reconditioning of pesticide and other highly toxic containers, which previously held more than 15 gallons. The members of this industrial community who would be able to participate in this plan are geographically well distributed, with economically viable facilities, including proper burning facilities, and a list of the members of the National Barrel & Drum Association who have proper burning facilities, more than 50, is available upon request.

An important element in the proper disposal of these empty toxic containers is decontamination by the emptier. This has been recognized by the manufacturers of these pesticides. The National Agricultural Chemicals Association of Washington, D.C. has recently published an updated booklet entitled "Disposing of Pesticide Containers", which recommends a rinse and drain procedure, prior to shipment to a drum reconditioner. The containers would then be burned out in a drum incineration furnace and reconditioned via standard reconditioning methodologies by companies with adequate facilities. Those containers found to be unacceptable for reconditioning after burning could then be shipped to a scrap dealer for recovery of the steel.

Now, a mini-model of this plan was submitted by Dr. Joseph Hooper, President of W & H Industries Inc., to the California Department of Agriculture and has been operational in the State of California for approximately one year. A copy of that Code is attached as Appendix B.

On February 14, 1974, a comparative study of the energy requirements of steel drum manufacturing and reconditioning was prepared by Prussing and Prussing of Urbana, Illinois, and this is attached to my statement as Appendix C. Data utilized in developing the pesticide container recovery plan in Tables 1 through 5 are modified with the same computer program, attached as Appendix D to my statement.

To highlight the energy savings of the proposed system of reuse of toxic containers, we quote from the Abstract on the second page of the Prussing report, which says:

"Single use drums require twice as much energy per fill as heavier drums which can be reconditioned. This is because the greatest energy requirement in the steel drum system is for the manufacture of steel. It takes roughly ten times as much energy to manufacture a drum as to recondition a drum.

A shift from the current mix of reusable and single-use drums to an all 18 gauge drum system, with an average of eight reconditionings per drum (9 fills) would create energy savings of 17,043 billion BTU per year, which is 23% of the total energy requirements of the present system and enough energy to provide electric power for one month to a city the size of San Francisco."

Currently, the agricultural chemicals industry annually utilizes an estimated six million steel containers with a capacity greater than 15 gallons. This accounts for an annual depletion of steel in excess of 1 million tons and up to this time, very little emphasis has been placed on the reuse of these containers or the recovery of the scrap steel. Authoritative estimates place 3%, only 3%, as the figure representing the combined reuse and recovery portion. If the total number of containers recovered for reuse or resource value were to be increased to 40%, the energy savings would be 2,826 trillion BTU's annually.

Ancillary to the energy and resource recovery aspects, but not less important is the public health and environmental aspect for which no economic value can be clearly defined but which must be clearly shown as a portion of the solid waste disposal problems associated with these containers.

Gentlemen, I thank you for the chance to present this statement.

## Excerpts From Comments Of Mr. Dirk R. Brunner U.S. Environmental Protection Agency, Cinncinnati, Ohio At The 1972 Conference on Pesticide Containers

"Presently there are two basic methods for disposing of solid waste, and I am including pesticide containers as solid waste: incineration and sanitary landfilling. I'll limit my subsequent comments to sanitary landfilling because I am not competent to critically evaluate incineration of pesticides and their containers.

Sanitary landfilling is a bit more than the dump that probably serves your hometown. In fact, the 1968 national survey indicated 6 percent of the nation's solid waste disposed on the land was by sanitary landfilling. This figure was based on very rough criteria, even excluding an investigation of ground water impairment. The number of acceptable disposal sites would be lower if more stringent criteria were used. This severe shortage of suitable solid waste disposal sites indicates there are few acceptable sites for disposal of pesticides and pesticide containers.

California, a leader in landfill technology, can be used as an example of the shortage of acceptable sites. There are presently only 11 Class 1 disposal sites that accept all types of pesticides and containers. For the less hazardous pesticides, the more prevalent Class 2 disposal sites can be used. EPA's position stated in a brief paragraph in Sanitary Landfill Design and Operation published this year, allows the disposal of empty pesticide containers at all sanitary landfills. If we look at the California guidelines for pesticide container disposal, empty containers can only be disposed if they are rinsed. More work is definitely needed in this area before the establishment of sound guidelines.

What are some of the problems that the landfill operator has? Basically, they revolve around the health and safety of the employees. What type of employees do we have? We have poorly educated people who are working on the collection route and at the disposal site itself. The specific jobs performed by disposal site employees are equipment operators and spotters. The equipment operator, located several feet above the solid waste, spreads and compacts the solid waste (including pesticide containers and other hazardous wastes) 8 hours a day. In other words, these people endure long-term exposure to a variety of hazardous materials.

The Spotter is responsible for directing collection vehicles to the appropriate areas for waste deposition and subsequent spreading and compacting. Typically, the spotter stands in or adjacent to the waste through most of the day. He consequently is exposed to the dusts, aerosols, splashings, and occasional explosions associated with the waste deposition.

These two employees at the landfill site are the ones who are exposed the most to pesticides in the solid waste disposal field. They are the potential victims of the pesticide problem and the hazards associated with it: the irritants, the breathing of toxic chemicals, and so forth.

How can we approach these people and solve their problem? We can provide a public education program, directed through their trade organizations. We can do it at the federal level in programs. We have, in the past, directed training programs at the public administrator, the engineer, and the public. We are now directing our training efforts to all the operating people, the ones who are intimately involved. Basically, we've got the same problem the trucking industry has, or any one of the transportation industries that are only partly affected by the pesticide program. That is, many of the employees are not aware of the problems and they do not know how to handle the pesticides. They don't really know how dangerous they can be or whether or not all of them are dangerous.

This is the type of information that I feel should be labeled on the container when it's brought to the landfill. We must remember that people are at the disposal site. We have to consider the durability of that container all the way through the system, and specifically the label. Without notifying these people about how to dispose of a pesticide and the problems associated with it, we are exposing them to potential accidents and explosions. There have been explosions due to the carrier liquid in the pesticide; when this occurs at a sanitary landfill, both life and equipment are endangered. The bulldozer is a minimum of $50,000 investment for the landfill operator; you can't put a dollar value on the operator's life or health.

We can also have inhalation of dusts. There was one example following a warehouse fire. Several thousand pounds of damaged packages containing pesticide dust were to be disposed of. The containers were brought to a landfill site; a dozer was run around to cover them over with soil. The whole time the dozer operator was working, he was breathing in the pesticide dust. How did this affect him? We don't know. There was no investigation of this particular incident in terms of health and welfare of the dozer operator.

So we've got these problems with pesticide containers, and how to get rid of them in a landfill. If it is truly a sanitary landfill, the ground water and surface water contamination problems are minimal. But there aren't too many sanitary landfills around. The problem then revolves around what happens to the employees who are disposing of these containers as well as other hazardous wastes at the landfill site.

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Dirk R. Brunner is Project Manager of the Land Disposal Project, Solid Waste Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio. He graduated from Clarkson College, Potsdam, New York, with a major in civil engineering, and did graduate work at the University of Maine in sanitary engineering. He joined the U.S. Public Health Service, Solid Waste Program in 1968, and this work became part of EPA's responsibility in 1970.

RECOMMENDED PROCEDURE AND PRACTICES FOR THE

RECONDITIONING OF USED PESTICIDE CONTAINERS

Pursuant to Article 10, Section 3143, of the California Administrative Code, the following are the criteria for the reconditioning of used pesticide containers with a capacity of 28 gallons or more.

These reconditioning procedures apply to all such pesticide containers except those which have contained organic mercury, lead, cadmium, or arsenic.

These procedures are structured to minimize potential adverse public health, worker health and/or environmental impact which could arise as a result of the following:

Transportation of Emptied Containers.

Storage of Emptied Containers.

Reconditioning of Emptied Containers.

Employee Exposure to Pesticides.

Pesticide Residue Disposal.

Container Reuse.

TRANSPORTATION OF EMPTIED CONTAINERS

A specific truck shall be designated for collection of emptied pesticide containers.

The truck body shall have a steel bed and covered top to protect drums from the sun and open (ribbed) sides for ventilation.

After each use, the truck shall be decontaminated in the pesticide storage area by washing with a solution composed of not less than 10% sodium hydroxide and 2-1/2% sodium gluconate followed by a water rinse.

All pesticide containers collected must have bungs in place when loaded and transported, and shall be adequately secured to prevent loss from the vehicle while in transit.

STORAGE OF EMPTIED CONTAINERS

A specific storage area exclusively for pesticide containers shall be provided with a climb-proof fence and locked gates. In addition, this area shall be located so as to minimize exposure of any employee who is not involved in handling used pesticide containers.

The area shall be posted with warning signs on each side and on the gate in English and any other language necessary, substantially as follows:

DANGER
POISON STORAGE AREA

All Unauthorized Persons Keep Out
Keep Door Locked When Not In Use

This sign must be of such size that it is readable at a distance of 25 feet.

The storage area shall be protected from flooding by off-site waters. In addition, the grading shall run to a central collection sump for collection of vehicle decontamination process waters, other wastes accumulated in the storage area, and on-site drainage.

All containers stored in this area shall have bungs in place.

Adequate soap, clean towels, and not less than 20 gallons of water shall be maintained in the storage area for emergency washing in the event of skin contact with a pesticide residual.

RECONDITIONING OF EMPTIED CONTAINERS

In all cases, the flushers, and/or strippers shall be used exclusively for pesticide containers. The commingling of the pesticide containers with other containers in the same cleaning process shall be prohibited.

Reconditioned pesticide containers shall not be mixed with other containers and shall not be reused as food, feed, beverage, drug, or cosmetic containers.

Containers to be reconditioned shall have only the head of said container removed. In no case shall the end bearing the DOT embossment be removed. The container and its removed cover shall be placed in a drum burn out furnace operating at a minimum of 1400° F with a dwell time of five (5) seconds. In addition, the fumes from the furnace must pass through an after burner operating at a minimum of 1650° F. From here the container shall be reconditioned by standard accepted reconditioning processes.

EMPLOYEE EXPOSURE

For each employee being assigned to work with used pesticide containers, the employer shall arrange with a physician to have a base line cholinesterase determination. Further monitoring of each employee shall be determined by the physician.

No employee shall be permitted to work with contaminated containers unless he is utilizing all applicable protective clothing and equipment.

No employee under 18 years of age shall be permitted to work with or handle pesticide containers before reconditioning.

The employer shall provide adequate instruction and training of supervisors and employees so they understand the safety procedures required for the handling of these containers.

No employee should work alone handling containers except when supervision is provided at intervals not exceeding 2 hours. Between the hours of 6:00 p.m. and 6:00 a.m., at least two employees are required to work together when handling such containers.

No smoking or eating shall be permitted in any area where such containers are processed or stored, nor shall food or tobacco be permitted to be stored in these areas.

Employees shall be instructed to remove their protective clothing and equipment at the end of each day. No employee shall be permitted to take home protective clothing or equipment worn while working with such containers. Clean outer clothing such as coveralls shall be worn daily.

When illness is apparent, or when exposure has occurred that may be expected to lead to an illness, the employee shall be taken immediately to an appropriate medical facility for treatment.

RESIDUE DISPOSAL

All caustic wash solutions and container product residuals shall be disposed of by off-site disposal in a land fill authorized to accept hazardous and/or extremely hazardous wastes in accord with the regulations of the State Department of Health in Title 22, Division 4, California Administrative Code.

CONTAINER REUSE

Reconditioned pesticide containers shall not be sold for, or be used as, food, feed, beverage, drug, or cosmetic containers.

# THE ENERGY REQUIREMENTS OF STEEL DRUM MANUFACTURING AND RECONDITIONING

by

Laurel Lunt Prussing

and

John E. Prussing

Urbana, Illinois February 14,1974

**ABSTRACT**

This study estimates and compares the energy requirements of reusable and single-use steel drums. Single-use drums require twice as much energy per fill as heavier drums which can be reconditioned. This is because the greatest energy requirement in the steel drum system is for the manufacture of steel. It takes roughly ten times as much energy to manufacture a drum as to recondition a drum.

A shift from the current mix of reusable and single-use drums to an all 18 gage drum system with an average of eight reconditionings per drum (9 fills) would create energy savings of 17,043 billion BTU per year, which is 23% of the total energy requirement of the present system and enough energy to provide electric power for one month to a city the size of San Francisco.

Further energy savings could be realized if the number of reconditionings of reusable drums could be increased.

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# ABOUT THE AUTHORS

## LAUREL LUNT PRUSSING

Mrs. Prussing is an economist with research and practical experience in the economics and politics of recycling. Her academic background includes A.B.,Wellesley College, A.M.,Boston University, and graduate study at the University of California, San Diego. She is presently a Ph.D. candidate in the Department of Economics at the University of Illinois at Urbana-Champaign. As an elected official of Champaign County, Illinois, she is charged with the responsibility of finding solutions to county solid waste problems. She was formerly an Urban and Regional Economist with Arthur D. Little, Inc., Cambridge, Massachusetts and an Economist at the Center for Advanced Computation, University of Illinois.

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## INTRODUCTION

This study was commissioned by the National Barrel and Drum Association to determine the energy requirements of reconditioning steel drums versus discarding or recycling drums by scrapping and remelting. The steel drum reconditioning industry has long promoted its product as a more economical alternative to single-use or limited reuse drums. However, as in other types of packaging, there has been a trend toward throw-away steel drums.

In 1973 fuel shortages caused Americans to realize that nature's riches are not infinite. The United States may be returning to an earlier ethic of resource conservation. It is appropriate to examine the role of the steel drum reconditioner in such conservation.

The method used in this report is based on Bruce Hannon's classic study of the energy requirements of reusable versus recyclable beverage containers.[1] Professor Hannon has been of invaluable help in this analysis of the steel drum industry.

## ESTIMATES OF THE ENERGY REQUIREMENTS FOR STEEL DRUMS

Energy use can be studied at many levels, for most industries are interrelated. This report is based on a model which abstracts

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1 Bruce Hannon, "System Energy and Recycling: A Study of the Beverage Industry", Document No. 23, Center for Advanced Computation, University of Illinois at Urbana-Champaign, January 5, 1972, revised March 17, 1973.

from that maze of interrelationships and selects the most significant energy requirements of the steel drum system.

This study traces the energy needs of steel drums from raw materials procurement through steel making, drum manufacturing and reconditioning and all transportation links between these activities. The flow chart on page 3 shows the steel drum system and the processes for which energy use was estimated. Activities enclosed by broken lines on the chart were not included in the energy estimates. The energy requirements of fillers and industrial users, for example, dwarf the portion that might properly be allocated to the use of steel drums within the industry.

Although there are other industries besides steel from which drum manufacturers purchase inputs (e.g., paints) sheet steel comprises 95% by weight of all such inputs. Similarly an insignificant fraction is omitted by not including chemical and paint purchases by reconditioners.

Table I on page 4 gives the energy required at each stage of the flow chart for three types of steel drums, the durable 18 gage drum, the lighter weight 20/18 gage drum and the single-use 22 gage drum.* Although the 18 gage drum is heavier and requires more steel and more transport energy at each stage, its ability to withstand many reconditionings eventually reduces its total energy requirements considerably below the 20/18 gage reusable drum and the 22 gage single-use drum.

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*Note: the finished weights of these drums are 46 lb., 38 lb. and 28 lb., respectively. Each requires an additional 25% of steel from the steel mill to allow for fabrication scrap.

FLOWCHART

STEEL DRUM RECONDITIONING SYSTEM

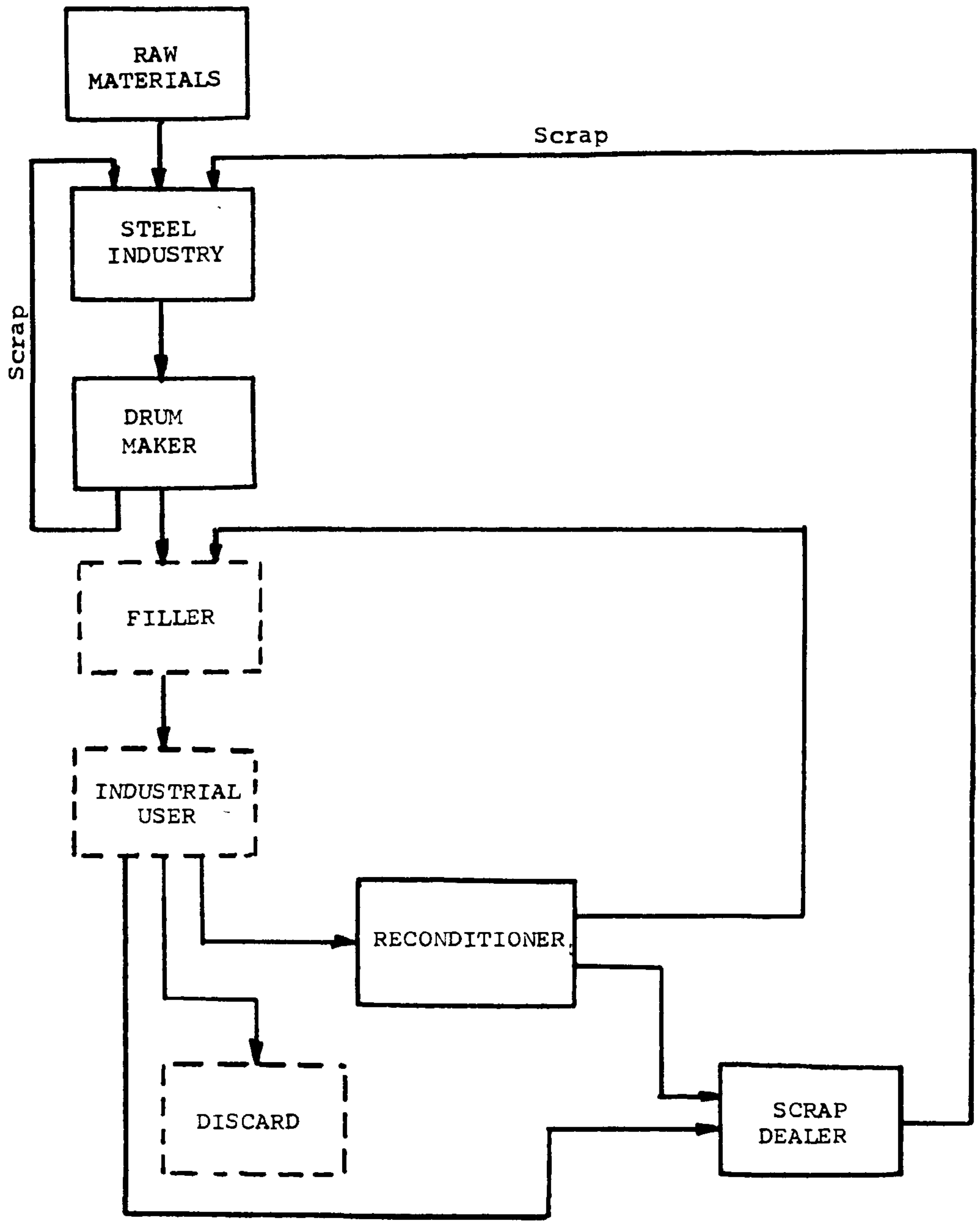

TABLE I

ESTIMATED ENERGY REQUIREMENTS FOR THE MANUFACTURE, TRANSPORT, AND RECONDITIONING OF STEEL DRUMS

| Process | Energy Requirement (1,000 BTU/drum) | | |
|---|---|---|---|
| | 18 gage drum (46 lb.) | 20/18 gage drum (38 lb.) | 22 gage (28 lb.) |
| Mining of ores[1] | 100.1 | 82.7 | 60.9 |
| Transport of ore[2] | 27.0 | 22.3 | 16.5 |
| Manufacture of steel[3] | 1,322.5 | 1,092.5 | 805.0 |
| Transport of steel to drum manufacturer[4] | 10.9 | 9.0 | 6.7 |
| Manufacture of drums[5] | 113.0 | 113.0 | 113.0 |
| Transport of scrap from drum manufacturer to steel industry[6] | 2.7 | 2.3 | 1.7 |
| Transport to filler[7] | 7.2 | 6.0 | 4.4 |
| Transport of filled drums to industry[8] | 108.7 | 107.0 | 104.8 |
| Transport of used drums:[9] | | | |
| a) to reconditioner | 2.0 | 1.7 | ---- |
| b) to scrap dealer | 1.4 | 1.2 | 0.9 |
| c) for discard | 1.4 | 1.2 | 0.9 |
| Reconditioning of drums[10] | 147.6 | 147.6 | ---- |
| Transport of reconditioned drums to filler[11] | 2.5 | 2.1 | ---- |
| Scrap yard[12] | 0.9 | 0.9 | 0.6 |
| Transport of scrap to steel industry[13] | 5.9 | 4.9 | 3.6 |

Notes on following page

Notes for Table I (complete list of references on p.12)

1. Hannon, Table 3: 1,740 BTU/lb. of finished steel

2. *Ibid.*, 470 BTU/lb. of finished steel

3. *Ibid.*, 23,000 BTU/lb. of finished steel

4. *Ibid.*, 190 BTU/lb. of finished steel to transport steel to drum manufacturers an average of 392 miles. Includes weighted average of rail and truck transport at 640 BTU per ton-mile and 2,400 BTU per ton-mile respectively (Hannon, p. 12)

5. Census of Manufactures, MC67(S)-4, Table 4, "purchased electricity" converted to thermal energy at 1 kwh= 11,620 BTU; "kilowatt hour eqivalents of purchased fuel" converted to thermal energy at 1 kwh=3,412 BTU (Hannon, p. 12). Allocation of fuel requirements for steel drums in SIC 3491, "Metal Barrels, Drums and Pails" computed from the value of steel drums as a percent of the value of the industry's total output in 1967 (reference 3). This share--65%--is virtually identical to the physical measure of drum output versus total output in terms of the surface area of the steel processed.

6. 25% of the transport energy used from steel industry to drum industry

7. Average distances and mode of transport from reference 4

8. Share of drum output to each filler from reference 5, distance and transport mode from reference 4

9. Reconditioner receipts: 85% local by truck 10 miles; 14% by truck 100 miles; 1% by rail 250 miles. Energy of local truck shipments: 4 miles per gallon diesel fuel; 138,000 BTU per gallon. Energy to scrap dealer and discard: 10 miles by truck; 4 miles per gallon diesel fuel; 240 drums per truck. Energy reduced for lighter drums by weight.

10. Reconditioning energy: natural gas (1 therm= $10^5$ BTU), purchased electricity as in note 5 above

11. Reconditioned drums shipped an estimated 25% further than reconditioner drum receipts

12. Gasoline consumption of scrap dealer less energy for 10 mile haul from local sources (note 9 above)

13. Based on average shipping distance of a midwest scrap dealer: 400 miles by rail

The manufacture of a steel drum begins with the mining and transport of ores to the steel industry. Sheet steel from the mill is then shipped to the drum manufacturer. The steel required to make a drum includes an extra 25% allowance for each pound of finished drum to account for scrap incurred in the drum manufacturing process. This scrap is returned as an input to the steel industry.

Steel requirements and transportation energy are estimated in proportion to the weight of each of the three types of drums. Drum manufacturing energy, however, was estimated as equal for all three, since surface area rather than weight seemed a more reasonable measure of the energy used in the fabricating of drums from sheet steel.

The transport energy required to ship drums to fillers was estimated from a weighted average of the proportion of drums shipped by rail and by truck. Slightly more than half of new drums are shipped by truck and the rest are shipped by rail. Rail shipment takes about one fourth as much energy per ton-mile as truck shipment (640 BTU per ton-mile, versus 2,400 BTU per ton-mile according to Hannon's estimates).

The energy required to ship filled drums to industrial users was computed as a weighted average based on the type of filler (chemicals, SIC 281; paints, SIC 2851; and petroleum products, SIC 291), the average distance to customers from each filler by rail and by truck, and the proportion of each filler's output shipped by rail and by truck.

Once drums are emptied by industrial users they can be reconditioned, scrapped, or discarded. (In this model we have included in "discard" drums which may find a useful purpose such as highway markers or even stoves and shower stalls in Alaska; in short, drums which are no longer used to ship the output of fillers.) The energy required to ship used drums to any of these alternatives is relatively small.

Information on the energy used to recondition drums was supplied by a reconditioner who prefers to remain anonymous. Reconditioning energy was assumed to be the same for both types of reusable drums since the energy is needed to clean and repair drum surfaces.

The energy requirements to ship reconditioned drums to fillers and to compress drums for scrap and to ship the scrap to steel mills are negligible compared with other requirements of the drum system.

Table II on page 8 sums the appropriate energies from Table I and indicates the savings made possible by reconditioning a drum rather than manufacturing a new one. For the 18 gage drum reconditioning energy is one tenth as much as manufacturing energy.

Table III on page 9 indicates the total amount of energy which would be required for each type of drum to provide 100 million fills, the estimated annual number of fills of steel drums in the United States. The energy ratios at the bottom of the table show that an all single-use drum system would

TABLE II

ENERGY REQUIREMENTS:

MANUFACTURE AND DELIVERY OF NEW DRUM TO FILLER;

RECONDITIONING AND DELIVERY OF USED DRUM TO FILLER

(1,000 BTU/drum)

| | 18 gage | 20/18 gage | 22 gage |
|---|---|---|---|
| New drum[1] | 1583 | 1328 | 1008 |
| Reconditioned drum[2] | 152 | 151 | ---- |

1 Table I down to and including transport to filler

2 Table I, transport to reconditioner, reconditioning energy, and transport to filler

TABLE III

COMPARISON OF THE CUMULATIVE ENERGY REQUIRED

FOR 100 MILLION FILLS OF

REUSABLE AND SINGLE-USE STEEL DRUMS

| Reusable | | Single-use |
|---|---|---|
| 18 gage | 20/18 gage | 22 gage |
| 56,489 bil. BTU | 77,735 bil. BTU | 111,400 bil. BTU |
| (9 fills per drum; 8 reconditionings) | (4 fills per drum; 3 reconditionings) | (new drum for each fill) |

ENERGY RATIO

$$\frac{\text{20/18 gage drum}}{\text{18 gage drum}} = 1.4 \qquad \frac{\text{22 gage drum}}{\text{18 gage drum}} = 2.0$$

require twice as much energy as an all 18 gage system. A complete 20/18 gage system would require 40% more energy than an all 18 gage system.

Table III is based on a systems analysis in which all flows of material on the flow chart have been estimated. The equation and an explanation of the variables upon which Table III is based are given in the Technical Appendix.

Table III is based on the reconditioning industry's conservative estimates of eight reconditionings per 18 gage drum (9 fills) and three reconditionings per 20/18 gage drum (4 fills). Lighter weight drums which can be reconditioned have an initial advantage over heavier drums until the number of reconditionings of the heavier drum exceeds that for the lighter drum. (Single-use drums are at a disadvantage after the first reconditioning of an 18 gage drum.) Lighter weight drums are less durable and generally cannot be reconditioned more than three times. The 18 gage drums, however, could be reconditioned up to 16 times with little problem. Any increase in the number of reconditionings will lower the energy requirements of the steel drum system.

CONCLUSION

The estimated energy requirements of the current mix of reusable and single-use steel drums in the United States is 73,532 billion BTU per year. If the system were converted to all 18 gage drums with an average of eight reconditionings (9 fills per drum) an estimated 17,043 billion BTU per year could be saved. This is enough to provide the equivalent in electrical energy for a city the size of San Francisco for one month.[2]

If the return rate of 18 gage drums were increased so that the average number of reconditionings was raised to 15 ( 16 fills per drum) then the United States could save an estimated 29,707 billion BTU per year, the equivalent of 238 million gallons of gasoline, by converting to an all 18 gage drum system. This would raise the ratio of energy requirements of the 22 gage single-use drum to energy required for the 18 gage (16 use) drum to 2.5.[3]

Clearly efforts to increase the use of 18 gage drums and the rate of return of such drums (by such means as deposits) would conserve energy. Conversely, a trend to use more light weight drums or to reduce the return rate of drums would further burden American energy resources.

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2 See Hannon, op. cit., p. 23.

3 If no losses occurred in the 18 gage system (no discards and no drum failures) the ratio would reach a maximum of 4.2. This is because as the number of reconditionings increases, the average energy approaches the reconditioning energy, since the energy required to manufacture the drum becomes a smaller and smaller fraction of the cumulative energy used. Mathematically, in equation A-4 of the Technical Appendix the average energy for the 18 gage drum approaches a lower limit of $265.5 \times 10^3$ BTU per fill as the number of fills becomes infinite. The average energy for the 22 gage drum is $1113.5 \times 10^3$ BTU per fill.

References

1. Hannon, Bruce, "System Energy and Recycling: A Study of the Beverage Industry", Center for Advanced Computation, University of Illinois, CAC Document No. 23, revised March 17, 1973.

2. U.S. Bureau of the Census, Census of Manufactures, 1967, Special Series: Fuel and Electric Energy Consumed, MC67(S)-4, U.S. Government Printing Office, Washington, D.C., 1971.

3. U.S. Department of Commerce, "U.S. Industrial Outlook, 1974, Metal Shipping Drums and Pails".

4. U.S. Bureau of the Census, Census of Transportation, 1967, Vol. III, Commodity Transportation Survey, Part 3, Commodity Groups, U.S. Government Printing Office, Washington, D.C., 1970.

5. U.S. Department of Commerce, "Current Industrial Reports: Steel Shipping Drums and Pails, Summary for 1967", M34K(67)-13.

## APPENDIX A

### Technical Appendix

The system analysis of the steel drum reconditioning system is based on the flowchart of the system. On the next page the flowchart is shown with the energy variables of the system labelled. These variables denote the amount of energy required by a process, such as $E_{DR}$ (the amount of energy required to make a drum) or the amount of energy required for transportation, such as $E_{ST,DR}$ ( the energy required to transport the steel for a drum from the steel industry to the drum maker). On the page following the flowchart a symbol list is given which defines each of the symbols appearing on the flowchart.

The total energy required to mine raw materials, make a new drum, fill it and deliver it to the industrial user is called $E^*$ , and is equal to:

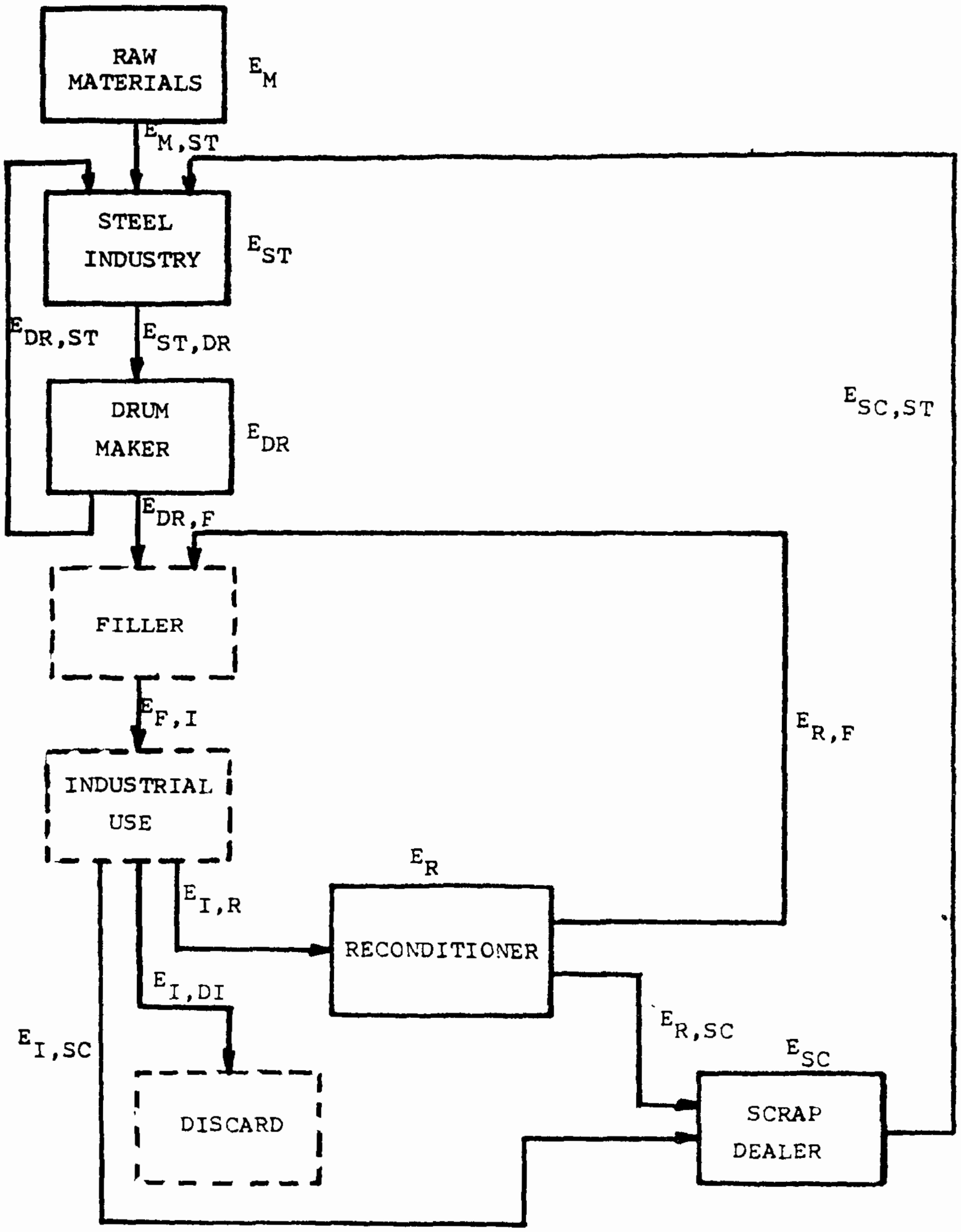
$$E^* = E_M + E_{M,ST} + E_{ST} + E_{ST,DR} + E_{DR,ST} + E_{DR} + E_{DR,F} + E_{F,I} \quad (A-1)$$

Next, an equation is derived, based on the flowchart, which describes the total energy requirement for the complete reconditioning system. The total energy

FLOWCHART



STEEL DRUM RECONDITIONING SYSTEM



LIST OF SYMBOLS FOR FLOWCHART

Energy Requirements

$E_M$ = Mining of ores

$E_{M,ST}$ = Transport of ore

$E_{ST}$ = Manufacture of steel

$E_{ST,DR}$ = Transport of steel to drum manufacturer

$E_{DR}$ = Manufacture of drums

$E_{DR,ST}$ = Transport of scrap from drum manufacturer to steel industry

$E_{DR,F}$ = Transport to filler

$E_{F,I}$ = Transport of filled drums to industry

$E_{I,R}$ = Transport of used drums to reconditioner

$E_{I,DI}$ = Transport of used drums to discard

$E_{I,SC}$ = Transport of used drums to scrap dealer

$E_R$ = Reconditioning of drums

$E_{R,F}$ = Transport of reconditioned drums to filler

$E_{R,SC}$ = Transport of reconditioned drums to scrap dealer (equal to $E_{I,SC}$)

$E_{SC}$ = Scrap yard

$E_{SC,ST}$ = Transport of scrap to steel industry requirement, E, is expressed in terms of N, the number of reconditionings of a drum. By changing the value of N in the equation, one can calculate the energy requirement for any number of reconditionings.

The general equation for the energy requirement for N reconditionings (N + 1 fills) is:

$$E = E^* + N \Big\{ f_1 (E_{I,SC} + E_{SC} + E_{SC,ST}) + f_2 E_{I,DI} + f_3 \Big[ E_{I,R} + E_R + f_4 (E_{R,F} + E_{F,I}) + f_5 (E_{R,SC} + E_{SC} + E_{SC,ST}) \Big] + (1 - f_3 f_4) E^* \Big\} \tag{A-2}$$

where

$f_1$ = fraction of drums from industrial user to scrap

$f_2$ = " " " " " " " discard

$f_3$ = " " " " " " " reconditioner

( Note that these fractions must sum to one: $f_1 + f_2 + f_3 = 1$)

$f_4$ = fraction of drums from reconditioner to filler

$f_5$ = " " " " " " scrap

( $f_4 + f_5 = 1$)

Numerical values for these fractions are given on the following page. The values for the energy variables are given in Table I of the report.

Numerical values for the fractions $f_i$:

| | 18 GAGE | 20/18 GAGE |
|---|---|---|
| $f_3$ | 1.03 N/(N+1) | 1.05 N/(N+1) |
| $f_4$ | 0.97 | 0.95 |
| $f_5$ | 0.03 | 0.05 |

Note: $f_3$ is determined from $f_3 f_4$, which is the return rate for the reconditioning loop, equal to $1 - 1/(N+1) = N/(N+1)$.

While expressions for the fractions $f_1$ and $f_2$ ( the fractions of the drums from the industrial user which go to scrap and discard) can be determined, the terms in Eqn. (A-2) in which they appear have very small coefficients. These negligibly small terms are ignored in obtaining the simplified equations which appear later in the appendix.

Assuming $f_1$ and $f_2$ are equal, expressions for them are: $f_1 = f_2 = \frac{1 - 0.03N}{2(N+1)}$ for the 18 gage drum, and $f_1 = f_2 = \frac{1 - 0.05N}{2(N+1)}$ for the 20/18 gage drum.

Once the total energy requirement E for a given number of reconditionings N is calculated for a given weight drum, the average energy requirement per fill can be calculated by dividing E by the number of fills, N+1. This average energy per fill, $E_{av}$ , is the number which decreases as the number of reconditionings of a drum increases. The total energy used, E, increases each reconditioning, but less than for new drums.

$$E_{av} = E / (N+1) \quad = \text{average energy per drum per fill.} \qquad \text{(A-3)}$$

The magnitudes of the energy variables in the energy equation are given in Table I as follows: (in 1000 BTU's per drum)

| | 18 gage | 20/18 gage | 22 gage |
|---|---|---|---|
| $E^*$ | 1692.1 | 1434.8 | 1113.5 |
| $E_{I,SC} + E_{SC} + E_{SC,ST}$ | 8.2 | 7.0 | 5.1 |
| $E_{I,DI}$ | 1.4 | 1.2 | 0.9 |
| $E_{I,R} + E_R$ | 149.6 | 149.3 | ----- |
| $E_{R,F} + E_{F,I}$ | 111.2 | 109.1 | 105.3 |
| $E_{R,SC} + E_{SC} + E_{SC,ST}$ | 8.2 | 7.0 | 4.2 |

SIMPLIFIED EQUATIONS for the cumulative energy per drum (E) for an arbitrary number of reconditionings (N):

Equation (A-2), after substitution of the values of the energy variables, can be simplified. Some of the terms in the equation are negligibly small and can be ignored. The simplified equations are as follows:

<u>18 GAGE DRUM</u>

$$E = \left[1692.1\ (2N+1) + 265.5\ N^2\right] / (N+1) \qquad (A\text{-}4)$$

<u>20/18 GAGE DRUM</u> (maximum of 3 reconditionings)

$$\text{for } N \leq 3: \quad E = \left[1434.8\ (2N+1) + 266.0\ N^2\right] / (N+1) \qquad (A\text{-}5)$$

$$3 < N \leq 7: \quad E = E(3) + E(N-4)$$

$$7 < N \leq 11: \quad E = E(7) + E(N-8)$$

etc......

<u>22 GAGE DRUM</u> Since $f_3 = 0$, Eqn. (A-2) reduces to

$$E = (N+1)\ E^* \qquad (A\text{-}6)$$

(Thus for this weight drum the average energy per drum per fill is just $E^*$ )

## COMPUTER PROGRAM

A small computer program was written to calculate the cumulative and average energy requirements per drum for the reconditioning system. A listing of the program appears below.

```
      DIMENSION E(50)
      NR=0
      NC=4
CC    NC IS THE MAX. NO. OF FILLS FOR 20/18 DRUM......
      KMOD=0
      DO 100 K=1,16
      NF=NR+1
      NZ=NF+NR
      NSQ=NR*NR
      E18=(1692.1*NZ+265.5*NSQ)/NF
      E22=1113.5*NF
      AV18=E18/NF
      IF(NF.GT.NC) GO TO 10
      E2018=(1434.8*NZ+266.*NSQ)/NF
      AV20=E2018/NF
      E(NF)=E2018
      GO TO 99
   10 IF(MOD(NF,NC).EQ.1) KMOD=KMOD+1
      E2018=E(KMOD*NC)+E(NF-KMOD*NC)
      E(NF)=E2018
      AV20=E2018/NF
   99 WRITE(6,98) NF,NR,E22,E2018,E18,AV20,AV18
   98 FORMAT(1X,2I5,5F11.1)
  100 NR=NR+1
   97 STOP
      END
```

On the following page a list of symbols and their explanation is given. The equations programmed are the simplified equations from the preceding page.

## COMPUTER PROGRAM SYMBOLS

NR = number of reconditionings

NC = maximum number of fills for the 20/18 gage drum.

NF = number of fills

E18 = Cumulative energy requirement in 1000 BTU's per drum for 18 gage drum

E2018 = Cumulative energy requirement for 20/18 gage drum

E22 = Cumulative energy requirement for 22 gage drum

AV18 = average energy per drum per fill for 18 gage drum

AV20 = average energy per drum per fill for 20/18 gage drum

TABLE A-1

OUTPUT OF COMPUTER PROGRAM

| Number of fills (N+1) | Number of reconditionings (N) | Cumulative energy 22 gage drum | Cumulative energy 20/18 gage | Cumulative energy 18 gage drum | Average energy per drum per fill (20/18 gage) | Average energy per drum per fill (18 gage) |
|---|---|---|---|---|---|---|
| 1 | 0 | 1113.5 | 1434.8 | 1692.1 | 1434.8 | 1692.1 |
| 2 | 1 | 2227.0 | 2285.2 | 2670.9 | 1142.6 | 1335.4 |
| 3 | 2 | 3340.5 | 2746.0 | 3174.2 | 915.3 | 1058.1 |
| 4 | 3 | 4454.0 | 3109.4 | 3558.5 | 777.3 | 889.6 |
| 5 | 4 | 5567.5 | 4544.2 | 3895.4 | 908.8 | 779.1 |
| 6 | 5 | 6681.0 | 5394.6 | 4208.4 | 899.1 | 701.4 |
| 7 | 6 | 7794.5 | 5855.4 | 4507.9 | 836.5 | 644.0 |
| 8 | 7 | 8908.0 | 6218.8 | 4798.9 | 777.3 | 599.9 |
| 9 | 8 | 10021.5 | 7653.6 | 5084.2 | 850.4 | 564.9 |
| 10 | 9 | 11135.0 | 8504.0 | 5365.5 | 850.4 | 536.6 |
| 11 | 10 | 12248.5 | 8964.8 | 5644.0 | 815.0 | 513.1 |
| 12 | 11 | 13362.0 | 9328.2 | 5920.3 | 777.3 | 493.4 |
| 13 | 12 | 14475.5 | 10763.0 | 6195.0 | 827.9 | 476.5 |
| 14 | 13 | 15589.0 | 11613.4 | 6468.3 | 829.5 | 462.0 |

Note: The average energy per drum per fill for the 22 gage drum is 1113.5 regardless of the value of N.

ALL NUMBERS SHOWN ARE IN UNITS OF 1000 BTU's per drum.

Modification of Prussing Energy Study

WHES, SIC Group 5085 inRe: Pesticide containers over 15 gallon capacity

Modified flowcharts for direct flow without loss offset

Reconditioning Flow

EI-r to ER to ER-f to EF-i and repeat

| CODE: | | BTU/drums |
|---|---|---|
| EI-r | Transport of used drums to reconditioner | 1,850 |
| ER-f | Transport of reconditioned drums to filler | 2,300 |
| ER | Reconditioning of drums | 147,600 |
| EF-i | Transport of filled drums to industry | 106,830 |
| EC-r | Cumulative Energy in reconditioning flow | 254,830 |

Formula:

EI-r + ER + ER-f + EF-i = EC-r

STOP

End

New Drum Manufacturing Flow

E-e to E-mST to E-st to EST-dr to E-dr to EDR-f to EF-i

| CODE: | | BTU/drum |
|---|---|---|
| E-e | Mining of ores | 82,700 |
| E-mST | Transport of ores | 22,300 |
| E-st | Manufacture of Steel | 1,092,500 |
| EST-dr | Transport of steel to drum manufacturer | 9,000 |
| E-dr | Manufacture of drums | 113,000 |
| EDR-f | Transport to filler | 6,000 |
| EF-i | Transport of filled drums to industry | 106,000 |

ECDR Cumulative Energy in New Drum Manufacturing 1,432,330

Formula:

E-m + E-mST + E-st + EST-dr + E-dr + EDR-f + EF-i = ECDR

STOP

End

Ore mining flow

E-m to E-mST

| CODE: | | BTU/drum |
|---|---|---|
| E-m | Mining of ore | 82,700 |
| E-mST | Transport of ores | 22,300 |
| EC-o | Cumulative energy to mine and transport | 105,000 |

Formula:

E-m + E-mST = EC-o

STOP

End

Proposed resource recovery flow

ECDR to E-hs to EI-r to ER-d to ER-sc to ECS-st

| CODE: | | BTU/drum |
|---|---|---|
| ECDR | New drum manufacturing to filler to industry | 1,432,330 |
| E-hs | Transport to holding site | 1,700 |
| EI-r | Transport to reconditioner | 1,850 |
| ER-d | Reconditioner decontamination | 80,000 |
| ER-sc | Transport from reconditioner to scrap dealer | 1,000 |
| ESC-st | Transport to steel industry | 5,000 |
| EC-o | Cumulative mining / transport energy | 105,000 |
| EC-rr | Cumulative energy for resource recovery | 1,416,880 |

Formula

ECDR + E-hs + EI-r + ER-d + ER-sc + ESC-st + EC-o = EC-rr

STOP

End

MR. LEHMAN: Thank you, Mr. Moore. Will you entertain some questions?

MR. MOORE: I shall be glad to.

MR. LEHMAN: Mr. Kovalick?

MR. KOVALICK: I take it it is largely economic and not technical reasons that there isn't more drum reconditioning going on in the country as a whole, versus California specifically?

MR. MOORE: If you mean in the toxic and pesticides, with reference to toxic and pesticides containers I would say so. There was a study we had that showed that of over 2,000 farmers who were interviewed by the Department of Agriculture in 1972, over 50% of them said that they would be willing to cooperate with a regional recovery spot, but it is a query how far a farmer would take his drum, I mean these are feasibility study programs that we are not capable of answering. But, I would say that in answer to your question specifically, yes, the average drum reconditioner is not capable of going to the expense of taking these containers in with a detriment, with the residue they have and meeting the economic needs, the economic price of the market for the normal reconditioned drum.

MR. KOVALICK: What would be the alternative then, if he can't, do you have a recommendation or is that Dr. Hoofer's?

MR. MOORE: No, I think Dr. Hooper addresses himself more to this technically, I address myself to it as a layman. It seems to me that the industry is there, the industry is made up of a group of responsible businessmen, they do have the facilities, they do have the incinerators but they get in thousands and thousands of drums each day from normal use and they have no way to deal with these special pesticide drums. They can't in the economic picture handle the pesticide drum, though it would seem to me there would have to be some thought given by the government and by you gentlemen to a proper way to invigorate and to use an existing industry which stands waiting your call to do anything and the two together, with imagination devise a system whereby an industry that is capable of handling it but finds a very special problem which it can't economically handle, find something to solve that situation, also to save the steel and keep these drums in use.

MR. LEHMAN: Before we go on with the questions, Mr. Moore referred to a brochure with photographs of steel drums and I think it only fair that we put that in the record to show what he referred to, so we will do that. We do have other questions. Mr. Sanjour?

MR. SANJOUR: You seem to be advocating some sort of Federal initiative. Could you be more specific as to if that is the case.

MR. MOORE: Well, there do exist these approximately 6 million drums that are filled with pesticides each year and out of this 6 million, only 3% are treated in any way so that they can enter into our normal commerce again as do other drums by the normal process of reconditioning. Yet the facilities do exist in the reconditioning plants to handle these drums under certain regulations as to the safety, the way in which they could be handled, the facilities that the company would have to have, so that these drums instead of being taken to a landfill which probably isn't adequate or left on the countryside, could become part of the normal reconditioning industry. I think it does require, I don't say Federal legislation, I think it requires Federal initiative to help devise a system by which the industry can use its facility to the fullest extent to reach this goal.

I don't think the industry, we do have, we are an industry that has an environmental committee and works hard on its own environmental problems. I don't think it is an issue that the industry by itself can solve.

MR. LEHMAN: We have another question, Mr. Lindsey?

MR. LINDSEY: Yes, a question from the floor. Do drum reconditioners have facilities to scrub noxious gases from heat treating of drums? More generally, has your organization put together any guidance on incineration of drums and how it should be carried out?

MR. MOORE: We have just begun to. We have had one meeting, we will have another meeting in January. Yes, I must put a comment on it that I'm essentially an attorney and not a technician and Mr. Hooper will address himself to this later, but yes, the industry does have the capacity through rinse and drain procedures to clean these drums so that they can be used in the normal application.

MR. LINDSEY: I think maybe you misunderstood the question. They were asking, I tnink, specifically, are there pollution control facilities on the incinerator itself?

MR. MOORE: Yes, afterburners and pollution control facilities.

MR. LEHMAN: Mr. DeBonis?

MR. DeBONIS: Yes, reference was made to your mention of 100 million tons of steel being lost to landfills, according to the CEQ report, the question is how much of that total represents steel and barrel drum containers? As opposed to, I suppose beer cans and other types of things that will come up as steel and solid waste.

MR. MOORE: It is my understanding from the information given to me that that speaks only to the steel drum, the amount that is lost to the landfill through the steel drum containers that contain more than 15 gallons, that's all I was speaking of. That figure relates to those drums that contain more than 15 gallons.

MR. DeBONIS: I think to clarify this, I think the context, now that I read it more clearly, is not that 100 million tons of steel a year go to a landfill but that for every 100 million tons, 1.5 million barrels of oil is saved, so it is just an energy equivalent.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: Another question from the floor. What is done with rinse solutions from the empty containers?

MR. MOORE: I'm not sure about this. I know that they are all disposed of according to legal procedures within the areas in which that company operates. And we have, our industry has always had an enormous solid waste problem because even in a non-toxic or non-pesticide area the first user frequently leaves as much as a gallon of some substance in the drum and the average drum reconditioner has been faced year in and year out with a solid waste disposal program that he's had to meet successfully to meet his local standards. And, the question of the toxic materials is simply an added version that he has to handle locally.

MR. LINDSEY: It would be helpful to us, I think, if you could perhaps later on enlighten us on how that is accomplished.

MR. MOORE: I'm sure the Association would like to do it.

MR. LINDSEY: We would appreciate it.

MR. MOORE: They would be very happy to play a real role in developing any rules or regulations that we can work up.

MR. NEWTON: There is one more question from the floor as to whether or not you consider a pesticide container different from any other type of drum that contains chemicals?

MR. MOORE: Yes, I think there are, I'm sure there are Federal regulations that presently pesticide containers cannot be reused except under very limited circumstances and have to be discarded, so they are accorded special treatment. The industry accords them special treatment. Ninety seven% of them don't even reach the reconditioning industry, so it is only 3% of them out of the 6 million, only 180,000 that ever really tangentially reach my industry, which really could handle 100% of it.

MR. LEHMAN: Thank you very much, Mr. Moore. Our next speaker, I believe she is here now, is Diane Graves, Sierra Club, Princeton, New Jersey. Miss Graves, please.

MISS GRAVES: Thank you for the opportunity to comment on the scope and nature of the hazardous and toxic management problem. My name is Diane Graves and I'm Conservation Chairman for the New Jersey Chapter of the Sierra Club. Today I'm speaking for the national Sierra Club as well as the Chapter.

The policy of the Sierra Club is that the release of any environmentally hazardous substance into the environment should be prohibited unless the immediate environmental and safety benefits clearly outweigh the long-term environmental damages.

It is urgent that EPA focus on problems caused by hazardous and toxic substances at the earliest possible stage. Chemicals must be tested for health effects prior to marketing. Once a chemical is marketed, the investment in money, time and jobs is enormous. Thus it becomes far more difficult to prohibit or even to regulate the chemical's use.

There needs to be stringent regulations during the development, production and the use of these substances. There need to be regulations for storage and transport. Disposal of the product and its wastes must be regulated with the greatest care. Though some manufacturers act responsibly and see that their wastes are disposed of properly, most do not. We know that liquid chemical wastes are dumped in fields and woodlands in New Jersey. One chemical company's waste was dumped at a farm, the waste found its way into 180 household wells that had to be sealed and city water brought in at homeowners expense.

In February, 1975, the National Cancer Institute estimated that from 60% to 90% of all human cancers are caused by environmental factors. In July, 1975, the NCI released maps showing New Jersey has recorded one of the highest rates of cancer-related deaths in the nation. In early November, 1975, the National Center for Health Statistics reported that the cancer death rate for Americans so far this year increased 5.2% over the same period of last year.

Canaries used to be taken into mines. When the canaries sickened and died, miners were alert to danger and left the mine. We've been given warnings for a long time and we have done little more than give the problem our attention. The cancer statistics indicate that we are the canaries. We must not delay any longer.

An example of how ignoring the need to clean up continuous serious hazards is the PCB experience. Polychlorinated biphenyls (PCB's) provide a typical and continuing tale of environmental misfortune and irresponsibility. The industrial history of PCB's has been well documented. PCB's were first manufactured in 1929. By 1933, 23 of the 24 men working in the first U.S. PCB manufacturing plant suffered from chloracne. Further, PCB's were carried home on workers clothing causing frequent chloracne among wives and children.

PCB's seriously affect liver function, as well.

By the mid-1940's it was well established from workers' experiences that PCB's were toxic and needed to be controlled. The warning was ignored for 20 years until it was recognized as an environmental hazard. The general public first learned about the problem in 1970. Had industry heeded the 1943 warning to avoid human exposure to PCB's, we could have avoided the 1972 estimated 1,500 to 2,000 tons of PCB's per year "lost" to the air, 4,000 to 5,000 tons per year to fresh and coastal waters, and 18,000 tons per year to dumps and landfills. The continuing PCB experience gives us an urgent warning and it should prompt strong action at last.

"Environmental Determinants of Human Cancer," a paper in the Oct. 1974 Cancer Research publication states, "The economic impact of cancer is massive. The direct costs of hospitalization and medical care for cancer in 1969 exceeded $500 million. The direct and indirect costs of cancer, including loss of earnings during illness and during the balance of normal life expectancy, were estimated at a total of $15 billion for 1971....On purely economic grounds, it is clear that control or further limitation in the overall burden of environmental and occupational chemical carcinogens, with anticipated major reductions in the incidence of human cancer, is likely to achieve very significant reductions in total national costs from cancer.

These considerations are not appropriately reflected in allocation of Federal priorities and resources for prevention, in contrast with the diagnosis and treatment, of human cancer...Since World War II, there has been an exponential and largely unregulated increase in the numbers and quantities of synthetic organic chemicals manufactured and used in industrial countries. The claimed needs to use increasing numbers of new synthetic chemicals make it essential to recognize and critically evaluate carcinogenic and other human and environmental hazards with regard to the real or alleged matching benefits that they confer.

Such costing must be weighted by factors including the persistence and environmental mobility of the chemical, the size of the population exposed, and the reversibility of the adverse effect....there are clear economic, besides other, incentives to reduce the environmental and occupational burden of chemical carcinogens....Inherent in the toxiological and regulatory philosophy and practice is lip service to the concept of balancing benefit against risk; this implies benefit to the public and not to industry, and risk to public health or environmental integrity and not economic risk to industry. If the chemical in question does not serve a broad socially and economically useful purpose for the general population, why introduce it and force the public-at-large to accept potential hazards without general matching benefits?

There are approximately 6,000 new compounds used in industry processes and commercial products made each year. There is little or no testing, and no legislation to control inclusion of these in non-food and non-pesticide products before they are widely distributed and used. About 100 of the 6,000 substances are hazardous or toxic.

In considering the costs of pre-market testing and regulation to the chemical industry, the balancing factor must be the cost to society of not doing so.

Now that we know that most human cancer is caused by environmental factors, we should be able to prevent a great deal of human cancer by finding and removing chemical carcinogens from the environment. We should be more careful of exposing the human population to chemical carcinogens than we are to radiation, as chemical carcinogens are probably a greater hazard.

There is clear need for effective hazardous and toxic substances control legislation. The Sierra Club generally supports S.776 and we urge that EPA move swiftly to promulgate rules and regulations upon its passage.

Both legal and financial responsibility for hazardous and toxic waste treatment and disposal rests squarely on the producer of the product. The manufacturers must be accountable to the public through EPA. The agency should issue operating permits subject to periodical review. Filing of lists of hazardous and toxic wastes generated and the procedures for treating and disposing of it must be mandatory. There must be built in enforcement.

Whether disposal is on-site or contracted, out, the safest method must be required. EPA must have tough standards, and enforcement authorization and capability.

If hazardous waste is contracted for disposal, the manufacturer must report what was collected, the amount, how and where transported and what treatment process is required. The entire disposal process must be monitored. Waste processors must be financially responsible for the waste collected and have sufficient money to complete proper processing in case of going out of business.

Again, from the Cancer Research paper, "Responsibility for these constraints must be shared with regulatory agencies, by the legislature, by the scientific community, and by consumers and citizens, who have not yet developed adequate mechanisms for protecting their own vital rights and interests...Decisions on the use of carcinogenic chemicals in consumer products and in the workplace must be made in the open political arena on the basis of economically unconstrained and expert advice."

Thank you.

MR. LEHMAN: Thank you, Miss Graves. Will you accept questions?

MISS GRAVES: Yes.

MR. LEHMAN: Do we have any questions from the panel? We have one or two here from the floor. Mr. Kovalick.

MR. KOVALICK: From the floor. You have stated that most manufacturers do not properly treat their wastes, what is the basis for this? Have you any statistics, etc.?

MISS GRAVES: I don't have any statistics but I think it has been generally recognized, certainly in New Jersey, that it is a severe problem. There aren't facilities to deal with these wastes. I know for a fact that tank trucks have pulled into a field and dumped it, it's been found out and so forth, the wastes were untreated. This is not an uncommon experience. We are very concerned in New Jersey about the Pine Baron's Region which is in South Jersey and there is a huge aquifer under the Pine Baron's. Here again, it is known that tank trucks go down there and dump it, it is a sandy soil and nobody knows what happens to it. Whether people have been caught doing this, people are reluctant to report such things, we found, for a variety of reasons. I imagine there are some statistics on it, but I don't have them.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: Yes, question from the floor. The statement says, cancer from environmental factors have increased from 70% this morning to 90% this afternoon. Apparently they are referring to some statistics that were quoted this morning. In any case, in either event, what fraction of this is due to industrial waste disposal?

MISS GRAVES: That's probably impossible to figure out. As far as the 60 to 90% figure, that has been in a number of publications recently, including the one that I referred to in my paper. There are so many small and big and intermediate insults all the time, it is practically impossible to sort it out. We know that land-fill operators, it is obviously a hazardous occupation and in South Jersey there is the example of what happened last year when a bulldozer evidently crushed or whatever some kind of drum and it exploded and engulfed the bull-dozer in flames and the man was killed. As far as figuring out just what the percentage is from landfill versus being dumped indiscriminately, I don't have the statistics on it.

MR. LEHMAN: Another question?

MR. LINDSEY: From the floor. What would you suggest that Federal EPA do or the state of New Jersey do to implement control of disposal?

MISS GRAVES: I think it has to come from the Federal government initially. New Jersey does have some proposed rules for hazardous and toxic wastes and regulations, they are proposed. In the meantime, there are no regulations for these substances.

MR. LEHMAN: I have a question. Your statement indicated that the waste processors must be financially responsible for the waste collected and have sufficient money to complete proper processing in case of going out of business. Did you have any specific thoughts as to how that might be done?

MISS GRAVES: Not specific, I know that this is a concern from people within the industry, that's where that came from. They want to be sure, if it is a responsible industry and they have contracted out to somebody to haul the stuff somewhere that it is handled carefully and it doesn't get there and they find it is a dicey operation and somebody is going out of business and not properly taking care of it.

MR. LEHMAN: Do we have any other questions? No. Thank you very much, Miss Graves.

Our next speaker is scheduled to be Mr. Cushman from Plymouth State College, is he here? No. All right, we'll move on then. Mr. Clarence H. Roy representing the American Electroplaters Society. Is Mr. Roy here?

MR. ROY: Ladies and gentlemen, I do not have a prepared statement. I would simply like to make a few comments that are relative to the problems of hazardous wastes as they pertain to the metal finishing industry.

Many of the earlier speakers this morning were advocating self-serving and stringent legislation. I feel that the legislation should be objective and relative to improving or protecting the environmental quality rather than reacting or over-reacting in an emotional atmosphere.

Specifically with respect to the electroplaters, we are concerned with the toxic materials that are contained in the sludge which is produced as a consequence of treating the environmental problems involving water pollution and air pollution.

Presently landfilling is essential to the industrial water pollution control program and cannot be abruptly discontinued.

In Connecticut we endured an experience about two years ago wherein these residues were banned from all municipal landfill sites, sanitary landfill sites. At the end of the year the problem was monumental. Some of the larger industries, quite literally, had warehouses of sludge. The larger industries were using lime to neutralize their acidic residue and as a consequence had a very voluminous and bulky residue.

At the end of the year, the authorities were changed around and eventually landfilling was begun in Connecticut. However, it was done under the supervision of the Water Compliance Unit of the Department of Environmental Protection and certain landfills, those which had a detrimental impact either due to leachate or poor site selection, were not included in the metallurgical waste dumping that was allowed in the state.

I'm on the Governor's committee in Connecticut and we dealt with a problem that was brought up this morning, which I call hindsight technology, with respect to toxicity. I think everyone is afraid of another Thalidomyde episode and perhaps rightly so, and the matter of retrieval of solid waste from a sanitary landfill is a very difficult problem and it should be studied and addressed in greater detail. We came up with a couple of observations on how these kinds of things may be accomplished. One was to fill the landfill in a vector or a vein in order that if in hindsight we find that these materials that have been buried are detrimental to the environment that they can be retrieved by a backhoe or clam shell technique, rather than have them disperse helter skelter through the landfill.

The other alternative that was considered, it was not particularly acceptable, was the so-called peanut butter technique, wherein these wastes would be spread upon the top of the landfill and overfilled with a single layer of fill or soil, so that if at a later date they were found to be toxic, they could be removed with a bulldozer. Of course, you would also have to have legislation that would prohibit overfilling this last top layer. So this would prohibit using that landfill site perpetually thereafter once it had been covered with a top fill of toxic material.

Some of the speakers this morning were addressing themselves to the potentialities of recycling. This is increasing in many areas, including the reuse of so-called metallurgical sludges, those that contain metals of some value, are obviously targets for reclaiming or recycling. But, needless to say, economics will determine this outcome, and some of the metals will probably never economically justify recovery, within, like the gentleman this morning was saying, 40 years before this technology and the economics will catch up with the problem.

We have done some small amount of work with determining leachate burden, but I feel that it would be beneficial to know how significant the leachate burden, particularly with respect to metals and more importantly heavy metals, how relevant and how serious are these leachates from dumps that are in existence today, particularly those that are well run.

So that in the formulation of your laws you will have some criteria that are based on say well operated landfill sites.

I would suggest further that the matter of filling landfills or operational formats based upon the data and experience that we gathered from studying proper landfilling techniques with respect to metal bearing materials, would undoubtedly produce better landfills than we have today.

We have in the Electroplaters Society a number of small electroplaters who will almost forever have this metal sludge burden on a scale such that it will always present an exorbitant cost relative to the size of the corporation and it will be difficult for these people to follow an elegant sludge disposition program such as the one outlined this morning that Chemfix or some such technique as that. And this may well recommend itself to other people's comments concerning regional disposition sites for specific toxic materials, in this case particularly metallurgical sludges and wastes, and I think at this point that would constitute the completion of my comments.

MR. LEHMAN: All right, thank you, Mr. Roy. will you accept questions?

MR. ROY: Yes.

MR. LEHMAN: Mr. Sanjour?

MR. SANJOUR: Does the technology exist to treat electroplating waste waters without generating large amounts of sludge that have to be land disposed?

MR. ROY: The answer to that would be yes and no. Specifically I think you are thinking or things like reverse osmosis, ion exchange, those techniques wherein the metals can be reclaimed rather than discharged to a waste stream, wherein they would then be subject to precipitative technology which would produce the sludge. Here again you include the Gordian knot type of situation where if the economics justify the reclamation, then reclamation is the way to proceed. Unfortunately, with the smaller companies the consumption figures are not sufficient to justify the investment in the reclamation technology, but rather to go through the, what might be termed today the best practical control technology, which would be precipitative technology, which would be the sludge generating mechanism.

MR. LEHMAN: Mr. Kovalick?

MR. KOVALICK: Mr. Roy, if I heard your comments correctly, you indicated that because it is an economic burden for a small electroplater to dispose of his sludges in an elegant way, I think you used the term, therefore you thought that regional facilities were a good idea, if I can paraphrase. And, I guess I don't understand why that is a lower cost option unless that service is free, which has some implications. I would like you to talk about that. Either he is going to pay to do it himself, which you say is a burden, or he is going to pay someone else to do it, unless you are implying that someone like a government is going to operate that facility. I didn't connect all that logic together.

MR. ROY: I understand, these were just sort of a group or comments, they might not have been quite as well organized as if I had this talk prepared. But, I wanted to touch on the point that the technology is available and perhaps in a communal sense, say the person has a very small amount of copper bearing sludge, which we know is toxic to some fish, if in turn it became solubilized which is one of the questions that I was trying to pose in the landfill problem, is that, does the metal leach out, does the hydroxide redissolve and does it dissolve very rapidly.

Now, let's suppose the small plater has this residue copper in this case. This is a valuable metal, but the volume he is generating, it is hardly worth the effort, do you understand? So, I was thinking if these small contributors could in some way get their material consolidated, so that the recipient could, in this case reclaim the metal at a profit, we might have the Jack Spratt Affair, as it were, where one man's meat would be another man's poison and vice versa. In this case, the copper is certainly easier to get out of the sludge than it is to get out of the ground. And his problem is mainly in the dimensions, if he has, say, one drum of this material, he certainly is not going to go into the reclamation business, whereas if he could have his drum contributed along with others, there might be sufficient volume to justify this.

And, there are some companies springing up around the country that are working this way, to reclaim some metals. Unfortunately, the economics have to be there. It has to be a metal that is worthwhile eclaiming and worthwhile transporting some reasonable distance to a central reclamation center.

MR. LEHMAN: Do we have any other questions? No questions. All right, thank you very much, Mr. Roy.

At this time I would like to move into what was to be our next group of speakers, I hope some of them are here. I would like to call on Capt. Hugh McCabe from the New York City Fire Department or his alternate. Mr. McCabe.

MR. McCABE: My name is Hugh M. McCabe, I'm Captain, Division of Fire Prevention, New York City Fire Department. I thank the committee for this opportunity to present our comments in relation to solid waste disposal.

If we can discard waste paper, cardboard, wood shavings and the like, in New York City, there is little fire or emergency experience with hazardous waste generated from industrial processes. There is, however, a need for information and direction and regulation relative to hazardous waste disposal management.

The generation of hazardous waste, either flammable, explosive toxics, corrosive or radioactive introduces many problems. Human life and property can be endangered and fire and explosions may occur if disposal operations are not properly planned and executed.

Disposal should be conducted in a controlled manner that prevents hazards to the public's safety. Safe disposal depends on knowledge of the waste material characteristics and the various methods of safe packaging, transportation and disposal.

The New York Fire Department, and I am sure many other fire departments throughout the country experience a few problems involving hazardous wastes. Our experience generally lies within the area of chemicals. These experiences involve laboratories seeking assistance with disposal of old or unused chemicals. We have vacated premises wherein chemicals have been abandoned and left; amateurs, hobbyists, etc., also seek our assistance in the disposal of hazardous material.

In most cases, the quantities are small. If the generator is in possession of the material, the services of a chemical waste disposal company is recommended. However, there are a limited number of such companies in the City of New York.

If the material is not in the possession of the generator, it becomes our problem for disposal. Problems arise relative to such things as bombs, other explosives and various chemicals. In relation to bombs and/or explosives, the New York City Police Department Bomb Squad and the Blasting Inspecting Unit of the New York

Fire Department arrange for the safeguarding of the material of removal, transportation and final destruction in a safe location.

We are involved sometimes with soil contaminated with volatile inflammable liquids resulting from leaks from tanks which also present disposal problems. There are oil spills on land and water. All these problems are field problems and our emergency force must cope with each depending upon the waste material and the surrounding life and/or property involved.

Personal training, experience, expertise and reliance on information contained in chemical dictionaries, hazardous materials dictionaries, and standards and texts of such agencies as the National Fire Protection Association, Compressed Gas Association and some Federal and private publications, provide the hope for safe resolvement of each problem presented.

We have been fortunate in that the incidents have been infrequent and quantities of the material have been small, characteristics have been known and safe disposal has been accomplished.

As indicated in the notice announcing this hearing, Federal, state and local regulations dealing with the treatment and disposal of hazardous waste are spotty or non-existent. We are pleased that the problem has been recognized at the national level and will look forward to a hopefully realistically, reasonable and economically feasible legislation or regulations, and to this end, offer within our capabilities, any information and assistance that may prove of value to the committee.

This concludes our presentation and again we thank you for the opportunity to be heard at this meeting.

MR. LEHMAN: Thank you, Captain McCabe. Do you have any questions? Will you accept questions?

CAPT. McCABE: Certainly.

MR. LEHMAN: Are there any questions? Mr. Kovalick?

MR. KOVALICK: I think just for the record it would be interesting if you could tell us a couple of the contaminated soils or other problems that you have had?

CAPT. McCABE: In relation to soils, we have gasoline tanks, other type tanks buried below ground -- gasoline stations, paint manufacturing plants and the like. From time to time these are tested, but in the interim period because of corrosion or whatever, they develop leaks. The next thing we hear, there is a complaint and an emergency call for gasoline fumes in the subway, gasoline fumes in the cellars or the houses or whatever. It is our reaction then to take necessary action to safeguard lives and property. In this respect we would evacuate if necessary. We would evacuate the properties and so forth.

Now, we then run tests on these particular installations. If they withstand the pressure test, we know that an installation is okay, we go beyond, we start trying to find out where the leak originates. When we do locate the culprit, so to speak, we order all products removed, tanks purged of its flammable vapors and that no commodity be put back into that system and used again.

Now, what is happened now to this soil, the gasoline or product that has gotten into the soil, we are stuck now with a problem of a soil problem, contaminated with explosive vapors perhaps. So what we do in many cases, we will have an excavation of that soil, the excavation is made, the soil will be removed from the surrounding tank and excavated and this will be taken care of by an Environmental Protection Agency, they will come in and excavate it and they will take that soil.

Now, we have the soil on our hands saturated with a combustible, flammable liquid, it must be disposed of. It is generally taken out to a landflat and allowed to evaporate. This is a way to do it, it is done at times, but it is a problem. It may be better for us to have an agency like a waste disposal company come in, take that particular material away, mix it with a fuel oil and put it into a high temperature incinerator to dispose of it. And these are the type of situations we run into.

We run into a laboratory, a laboratory will move out, we'll have a new occupant take over those premises and he'll run in and he'll wind up finding six or eight boxes of ether or sodium or whatever. That becomes our burden now, and we make arrangements with distributors, we know who they are, we'll have them delivered back to the distributor or have them picked up. And, that's generally the way we handle it. We handle it as a situation develops.

MR. KOVALICK: And all of those are done at the taxpayers expense then, not by the --

CAPT. McCABE: In the interest of public safety, at the taxpayers expense, unless the generator is known and has possession, then it is his responsibility to take a waste disposal company and remove it and dispose of it.

MR. LEHMAN: Any other questions? I guess not. Thank you very much, Capt. McCabe. Our next speaker is Mr. Robert Canace of Maplewood, New Jersey. Is Mr. Canace here? No. He was scheduled a little later on in the afternoon, perhaps he will come later. Our next speaker scheduled then is Mr. Ed Shuster of the Chemtrol Corporation, is Mr. Shuster here? Here again, these gentlemen are scheduled for a later time period. All right, next, Mr. Jack Miller, Pollution Abatement Services.

MR. MILLER: My name is Jack Miller and I am Vice President and General Manager of Pollution Abatement Services of Oswego, Inc., located in Oswego, New York. Since 1971 we have been in the business of destroying liquid industrial wastes primarily by high temperature incineration. Our general market area is the Northeast, including New England, New Jersey and Pennsylvania.

Our business is quite specialized in that the material we receive cannot be recycled or reused and as such, is at the very end of the environmental clean-up ladder. In terms of total impact on the environment, the waste we process have taken a back seat to such problems as waste water treatment plants, internal combustion engine exhausts, etc. It is gratifying to see the attention the EPA is giving to this problem now and we are pleased to have an opportunity to make comments.

We would first like to comment on the incineration process. As everyone knows, matter can neither be created nor destroyed; only its form can be changed. Consequently, we believe that high temperature incineration is one of the best methods possible for the proper treatment of many hazardous wastes. Under proper conditions, burning breaks down hydrocarbons into harmless gases which can be omitted to the atmosphere and contained metals are oxidized at high temperatures to their most stable, inert state. There are very few processes that are as universal and positive as incineration. We destroy literally hundreds of different materials with one process.

It is no secret that the great majority of hazardous wastes have been either landfilled or dumped in the waterways. It is furthermore no secret that this practice continues, even in cases where the laws are explicit and enforceable. The reason these procedures continue is two-fold, 1) that it is considerably less expensive to dispose of these wastes in such a manner and 2) in many cases the proven technology for proper disposal is lacking.

In response to the question, "What can governmental agencies do for us?" we would like to make three basic recommendations:

1. Enforce existing landfill and dumping regulations.

2. Make governmental loans or outright

grants available to the industry to implement current technology.

3. Become deeply involved in the advancement of new technologies and the development of those already on the drawing board.

Our industry, that is the industry of disposing of hazardous wastes in a manner compatible to the environment, is new and as such, faces unique problems. We believe there is a real need for such services because quite obviously, individual generators of wastes are not in a position to make significant investments in equipment, manpower or technology.

A centralized collection agency and disposal service can consolidate technical help, equipment and expertise in an economical fashion. However, as a private company in the hazardous waste disposal business, we are faced with the three problems mentioned above that must be solved if the industry is to survive. The existing laws with regard to disposal must be enforced.

Since our inception, we have had to compete with waste disposal operations that do no more than pick up and dump wastes indiscriminately. As long as this practice continues, pricing will make the advancement of our industry almost impossible. Make no mistake, the cost of disposal is what governs how and where wastes will be handled.

This has a direct bearing on the second point, and that is the difficulty of obtaining investment capital at a reasonable cost. As long as the industry must compete with illegal dispoal methods, a reasonable return on investment capital will be an impossibility.

We have not, as an industry, been able to realize a fair return on our investment, let alone make expansions or do additional research on various types of treatments. It would seem with the millions of dollars being spent on environmental programs, that some monies could be allotted for lowinterest loans to overcome this problem.

Although certain vehicles for borrowing or grants do exist, we find no money is available because we are a privately owned, profit oriented venture. There are numerous opportunities for joint ventures where capital is available, but until such time as a reasonable return on investment can be shown, #3, because of lack of capital, there is no opportunity to make necessary investigations to improve on the technology.

In this respect, the EPA has acted as a dissemination source of current technology, but we feel they should go further and actually do the necessary research and development on a laboratory and pilot scale to develop this technology. The industry needs an information source which can offer advice and facts regarding specific materials and processes and proper disposal methods. Small businesses, such as this industry, simply cannot afford such sophisticated research, whereas the common good may very well justify governmental expenditures.

We would also like to comment briefly on some of the discussion topics listed in the meeting notice. First, we believe the classification of hazardous materials must be done by a central agency since a generator of a waste may, in fact, be unable to determine the extent of the hazards involved in his wastes.

As to sampling, the generator of the waste should be responsible for the contents of the waste. There is simply no way in the limits of economic feasibility for a waste disposal operation, such as ours, to accurately qualitatively analyze every waste we receive. A single 55 gallon drum of waste may have several layers of different materials in it. To try to qualitatively analyze with any degree of surety what we are dealing with, in many cases would be next to impossible. Therefore, we, as a disposal site, must rely heavily on our customers knowledge of the contents of the waste material. Once this is known, the disposal operation can set up checks to maintain control.

We also believe that the waste originator should be held responsible for ascertaining whether or not he is dealing with a legitimate and legal waste disposal operation. He should also be held responsible for the accurate description of the wastes given to the waste disposal firm. When these two things have been established we believe the responsibility should pass to the waste disposal operation.

With respect to the several questions on how specific wastes should be treated, we believe the agency should establish proper disposal and destruction methods for various groups of materials. The solutions must be practical, i.e., the magnitude of the problem must be taken into consideration with respect to the real hazards involved and weighted against the economic practicability of different methods of treatment.

With respect to the control of disposal sites, we believe they should be carefully controlled and monitored by qualified agency personnel. However, we feel that the agency should provide assistance and advice if requested, as opposed to simply enforcement. We have too often heard the statement that the enforcement body has no idea of what we can do with the material, that it cannot be buried or burned. This is not a practical approach, since in fact, material ends up being buried somewhere when the enforcement agency is not looking.

We cannot comment on the questions regarding the use of landfills since we do not have a landfill. It is our general opinion, however, that many hazardous chemicals that are landfilled will result in problems in years to come. Recent information published by the EPA illustrates cases where materials have been buried for 20 or 30 years and are now contaminating water supplies.

In summary, we firmly believe that operations such as ours will, in large part, be the solution to the hazardous waste problem, but we must first become profitable to attract capital for the necessary growth and investment in technology. Without adequate enforcement, availability of money and technology, the growth of our industry will be a slow process.

Thank you.

MR. LEHMAN: Thank you, Mr. Miller. Do we have any questions? Will you answer questions?

MR. MILLER: Yes.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: You have indicated that your facility, your specific facility is primarily in incineration, incineration oriented, is that right?

MR. MILLER: That's true.

MR. LEHMAN: Could you comment for us on the types of waste that you handle, specifically are there types of wastes which you will not handle in such a facility? And, secondly, what do you do with the ash and so forth from this facility?

MR. MILLER: Our system operates, actually an enclosed system, we handle virtually any type of organic material. You have to be careful when you answer these questions. Arsenic we do not handle, lead, mercury, those metals which the oxides are high temperature oxides, are toxic.

As far as organic material, virtually any organic will break down at high temperatures, can be handled, handle acids and bases. The particulate matter taken off the burning process is actually recirculated back to a main gallon lime lagoon in which right now it is being collected and which may be a problem in later years, as a matter of fact. There is no discharge.

MR. LEHMAN: Mr. DeBonis?

MR. DeBONIS: I have also, what is done with the incinerator ash.

MR. LEHMAN: Same question. Mr. Kovalick?

MR. KOVALICK: On page 3 of your statement, you indicate that it would be very helpful to you to have the generator identify specifically what's in the wastes being sent to you, that he should be held responsible for the accurate description of the waste." Do I interpret that as an endorsement that he may be required to do that? I mean, how do you hold someone responsible? That is, if you were in this business and you had another company in this business, and he did not require that and someone who wanted to use his firm, and the only way that he could be required to do that , I presume by some state or other regulation, is that what you intend or am I misreading it?

MR. MILLER: Well, perhaps I am stating it incorrectly. The problem goes back to the adequate sampling and the liability placed on the disposal operation. Let's say that we have normally taken a truck load of barrels a week from a customer. We know what they deal with, we know after the initial samples and initial truck-loads just what it is.

But, let's say that some clown slips a barrel of arsenic or something that could get away from us or be harmful, then we feel that we must be relieved of this responsibility.

As I stated in here, to sample every barrel for every element is an impossibility, it just can't be done. So, somehow we believe that the responsibility for this must rest upon the generator of the waste.

MR. LEHMAN: Do we have any other questions? Evidently, not, thank you very much, Mr. Miller. To move backwards to one of the scheduled speakers who has now entered the room, I would like to call next, Mr. Ed Shuster from the Chem-Trol corporation. Mr. Shuster?

MR. SHUSTER: Gentlemen, it is a privilege for me to be present today to briefly summarize certain inputs on the subject of Professional Management of Hazardous Wastes. There is absolutely no way I can discuss this subject in fifteen minutes. For example, in the supporting information are copies of addresses made by Mr. Wagner and myself which we painfully edited to 45 minutes. Discussion of nearly any unit process, or our synergistic Closed-loop System, which combines these processes into a highly sophisticated Central Processing Facility complex would require more time than is allocated for the entire meeting.

Therefore, I am submitting in writing a substantial amount of material for the record. I'll limit my comments here and will entertain questions.

We will between now and January, as stipulated in your notice, respond point by point to the discussion topics.

Our company has participated actively in the business of the Chemical Waste Committee of NSWMA, who will be submitting a comprehensive document. I am pleased to say that much of our philosophy and recommended practices have been adopted by NSWMA and are included in their document. I will avoid that redundancy at this time.

I would like to comment briefly that we strongly endorse the type of manifest system which they advocate, wherein the producer, the transporter, the processor and the disposer would all be held accountable for the management of the material.

We also advocate the type of waste advisory committee advocated by NSWMA, which would tie together the forces of the generators of wastes, the processes and disposers of wastes,the regulatory people and the public at large, in a form of a task force committee to try and draw something rational out of this whole difficult subject.

Hazardous wastes are a diverse lot. Characterization must be on the basis of properties of the waste, as well as the chemical composition of the waste and the attributes of individual components. Waste streams from the same source frequently exhibit marked compositional and property changes with relation to time. The definition of hazardous waste, therefore, should reflect that there is not a sharp delineation between hazardous and non-hazardous, but in fact it is a very broad grey area that exists.

We have demonstrated that most chemical wastes can be processed within reasonable economic constraints. In our processing, many are converted to useful marketable products, to environmentally compatible species such as $CO_2$ and water vapor or substantially converted to stable, detoxified forms with the degree of hazardous/toxic properties reduced to a level of enivonrmental acceptability commensurate with the final place of deposit of these ultimate residues. Even so, using this extensive initial processing and the type of Controlled Scientific Landfilling pioneered by Chem-Trol, provision must be made for collection and processing of any leachate formed. Today's ultimate residues in the SLF are expected to be resources of tomorrow.

Since the combined or sequential use of typically 4 to 6 processes, and sometimes as many as 10, are required to properly treat each fraction of a hazardous waste, flexibility in processing must be readily permitted. What should be regulated are the discharges to the air, water, and land, wherein the material would escape the control of man.

The generator of the waste and hence the consumer of the generator's products will bear the ultimate financial burden. Private enterprise is best equipped to conduct the business of hazardous waste management. Government should consider not only the needed regulatory program to eliminate the illicit, unethical, or shady practices that have thwarted the growth of the Professional Hazardous Waste Processing Industry; government should also consider incentive programs to encourage voluntary compliance, and eminent domain actions where needed to assure appropriate siting of processing centers and disposal sites based on technological factors. Incentive freight rates are also needed. Which is out of EPA, that's over in the Department of Transportation.

Our submitted documentation identifies the means or reducing or minimizing disposal costs through source segregation and management, rigorous analytical and quality control processes, proper identification systems, and our ability to utilize the waste resource. This approach frequently results in reduction in quantity of waste produced and permits conservation of significant quantities of natural resources and energy. Where a large enough recoverable value is present, our policy is to share this with the waste generator, further lowering his costs or resulting in his selling us the waste for its raw material value. We buy many wastes.

We feel our approach is sound, it is

viable today and it is geared toward the future. Many of Fortune's 500 companies use our services for this reason in addition to their need to meet today's codes. We process wastes from nearly every corner of America in spite of the distant transportation factor, and from locations abroad. We have substantial capacity to serve the needs of the waste generators and modular expansion capabilities at our present plant. We are also prepared to move forward with additional plants once a requisite, firm business is there to warrant the economic investment.

I believe my time is about expired, and I will again say that we will respond to the discussion topics point by point and I would be glad to either field a question or two now or later in writing, if you please.

Thank you.

NSWMA/EPA
San Francisco
Nov. 12-16, 1974

"MANAGEMENT OF CHEMICAL AND HAZARDOUS WASTE"

GENTLEMEN,

IT CERTAINLY IS A PLEASURE TO PARTICIPATE IN THE NATIONAL SOLID WASTE MANAGEMENT ASSOCIATION'S THIRD NATIONAL CONGRESS ON WASTE MANAGEMENT TECHNOLOGY AND RESOURCE RECOVERY. TODAY, I AM GOING TO GENERALLY DISCUSS THE PROPER IMPLEMENTATION TO INSURE CORRECT MANAGEMENT OF CHEMICAL AND HAZARDOUS WASTES. MY PRIMARY PURPOSES ARE:

1. TO REALLY LET YOU KNOW THE FACTS OF THE REAL WORLD IN PROPER TREATMENT OF WASTES. WHEN THE CONSULTANTS, THE DESIGN ENGINEERS, THE PROMOTION EXPERTS HAVE LEFT, AND MATERIAL STARTS FLOWING INTO YOUR PLANT, OPERATIONS ESSENTIALLY HAVE BEGUN AND THAT'S WHEN YOUR PROBLEMS START. THERE ARE NO PROBLEMS UNTIL OPERATIONS START. IN THE VARIABLE FEED WORLD OF DISPOSING OF HAZARDOUS AND CHEMICAL WASTES, PROBLEMS ARE IMMENSE, DIFFICULT AND SOMETIMES IMPOSSIBLE TO HANDLE ON A REASONABLE, ECONOMIC BASIS.

2. I WOULD LIKE TO MAKE YOU AWARE OF HOW DIFFICULT THE TREATMENT OF CHEMICALS AND HAZARDOUS WASTES REALLY IS.

3. TO MAKE YOU AWARE, UNLESS YOU KNOW THE NATURE OF THE WASTES (EXACT ANALYSIS) YOU ARE ASKED TO HANDLE A WASTE DISPOSAL PROBLEM WITHOUT BEING FULLY INFORMED AS TO THE NATURE OF THE WASTE, YOU ARE BEING EXPLOITED.

HISTORICALLY, IN 1969, IT BECAME VERY APPARENT TO OUR ENTIRE SOCIETY THAT WE HAD SUPERSATURATED OUR WATERWAYS WITH VARIOUS TYPE OF WASTE PRODUCTS. THIS LED TO A NATIONAL OUTCRY FOR ACTIONS TO IMPROVE OUR ENVIRONMENTAL CONDITION. IN TURN, THIS LED TO A DRASTIC CHANGE IN THE METHODS THAT WERE USED TO DISPOSE OF CHEMICAL AND HAZARDOUS WASTES. AT THAT TIME CHEMICAL AND HAZARDOUS WASTES WERE BEING DISPOSED OF PRIMARILY BY DILUTION WITH WATER AND THEN DUMPING INTO A WATERCOURSE, STREAM. LAKE, OCEAN, ETC. OTHER METHODS WERE ILLEGAL DUMPS, DUMPING IN FARMER'S FIELDS, DUMPING DIRECTLY INTO SEWER SYSTEMS, AND MANY, MANY OTHER NEFARIOUS WAYS. THE PUBLIC OUTCRY AND THE SUBSEQUENT FORMATION OF THE EPA, A SPECIFIC AGENCY TO DEAL WITH THE PROBLEM, CAUSED THE WASTE DISPOSAL TREATMENT TREND TO TURN GENERALLY FROM DILUTION TO LAND DISPOSAL.

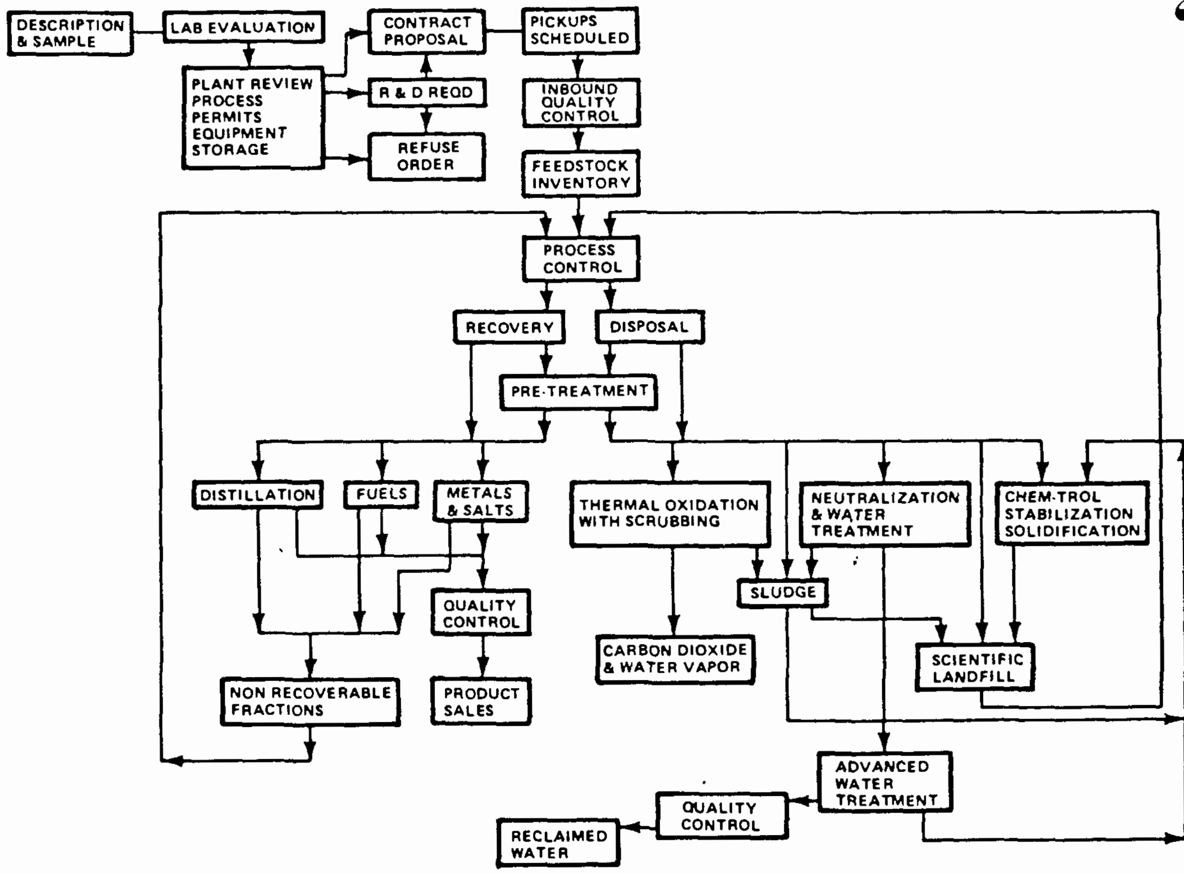
TODAY THE PROBLEM IS BECOMING VERY ACUTE. DEMAND FOR LAND DISPOSAL IS SO GREAT THAT ALL TYPES OF HAZARDOUS WASTE MATERIALS ARE DUMPED IN LANDFILLS THAT ARE NOT PREPARED TO HANDLE SUCH WASTES. THE ENVIRONMENTAL PROTECTION AGENCY, THE LOCAL AND STATE ENVIRONMENTAL AGENCIES, ARE CRACKING DOWN ON BLATANT ENVIRONMENTAL VIOLATIONS AND TEMPORARILY CAUSING MORE AND MORE WASTES TO GO TO LAND DISPOSAL. MANY CHEMICAL WASTES ARE BEING HANDLED, BY SEWER DISPOSAL WHERE THE SEWER SYSTEM HAS ONLY PRIMARY TREATMENT. AS SOON AS SEWER DISTRICTS GO TO SECONDARY AND TERTIARY TREATMENT, THIS WILL SHUT OFF AN AVENUE FOR CERTAIN TYPE OF CHEMICAL AND HAZARDOUS WASTE, AND AGAIN CAUSE A GREATER DEMAND FOR LAND DISPOSAL. PUBLIC OUTCRY AND THE FACT THAT LAND DISPOSAL WAS NOT AN ACCEPTABLE LONG-TERM SOLUTION FOR HAZARDOUS WASTES CAUSED THE FORMATION OF PROFESSIONAL TREATMENT COMPANIES. THE FIRST TWO IN THE UNITED STATES WERE INITIATED IN 1969. TODAY, THEY HAVE GROWN SUBSTANTIALLY AND ARE HANDLING APPRECIABLE QUANTITIES OF HAZARDOUS AND CHEMICAL WASTES, BUT FRANKLY, THE MAJORITY OF WASTES ARE STILL DEPOSITED ON THE LAND, MANY IN UNACCEPTABLE MANNERS.

<u>THE KEY TO PROPER IMPLEMENTATION OF A PROGRAM IS CONTROL</u>. THE BUSINESS OF PROPER TREATMENT IS ESSENTIALLY A CHEMICAL BUSINESS. WE ARE PROCESSING WASTE CHEMICALS THAT THE CHEMICAL INDUSTRY HAS BEEN UNABLE OR UNWILLING TO PROCESS. CONTROL MEANS COMPLETE KNOWLEDGE OF THE WASTE. CONTROL MEANS FULL ANALYSIS. THEREFORE, TO DETERMINE WHETHER YOU CAN HANDLE A PRODUCT AND DETERMINE AN ACCEPTABLE METHOD FOR DISPOSAL, YOU MUST HAVE A COMPLETE CHEMICAL ANALYSIS, AND LACKING THAT, YOU SHOULD HAVE ACCESS TO A LABORATORY THAT CAN GIVE YOU THAT COMPLETE INFORMATION. LANDFILLS HANDLING MATERIALS THAT ARE NOT IDENTIFIED ARE SUBJECTING THEIR EMPLOYEES AND THEIR BUSINESS TO GREAT LIABILITIES. OVER THE YEARS MANY COMPACTOR AND BULLDOZER OPERATORS HAVE BEEN KILLED OR SERIOUSLY HURT; IN COMPRESSING A DRUM IT EXPLODES OR CATCHES ON FIRE AND COMPLETELY ENGULFS THE OPERATOR BEFORE HE CAN JUMP OFF. OUR LATEST TRAGIC EVENT OCCURRED OCTOBER 1974. UNFORTUNATELY THESE INCIDENTS WILL CONTINUE UNLESS THE PROPER ANALYSIS PROCEDURE IS PRACTICED. WE CAN NO LONGER TOLERATE BEING EXPLOITED BY GENERATORS OF WASTE. NOW, WHAT MUST BE DONE IS THAT ONCE THE ANALYSIS IS RECEIVED? YOU MUST BE ABLE TO DETERMINE THE BEST METHOD FOR DISPOSING OF THAT WASTE TO MEET ALL CODES AND SAFETY REQUIREMENTS, OR PERHAPS, EXTRACTING SOME VALUE FROM IT. IF IT IS THOUGHT TO HAVE VALUE, IT SHOULD GO TO A COMPANY THAT HAS RESOURCE RECOVERY EQUIPMENT SUCH AS DISTILLATION EQUIPMENT, OIL RECOVERY SYSTEM, METAL AND SALTS RECOVERY.

IF IT DOESN'T HAVE ANY VALUE, IT SHOULD BE DESTROYED BY THERMAL OXIDATION, BY NEUTRALIZATION, CHEMICAL STABILIZATION, AND WATER TREATMENT, OR PROPERLY CONTROLLED LANDFILL; SPECIFICALLY, A SCIENTIFIC LANDFILL WHICH HAS LEACHATE CONTROL AND THE EQUIPMENT ON SITE TO PROPERLY DISPOSE OF THE LEACHATE. SCA/CHEM-TROL HAS DEVELOPED A "CLOSED-LOOP" (ATTACHED), (A SYSTEMATIC PROCEDURE TO DETERMINE WHETHER YOU CAN SAFELY AND PROFITABLY HANDLE A GIVEN WASTE) PROCESS THAT SHOWS THAT IN THE TREATMENT OF WASTE, VARIOUS FACILITIES ARE REQUIRED TO DO THE COMPLETE JOB. IN MY OPINION, RESOURCE RECOVERY IS A METHOD TO SHOW POTENTIAL SAVINGS TO THE ORIGINATOR OF WASTES AND THEREBY ENCOURAGE HIM TO PARTICIPATE IN A TOTAL PROPER WASTE DISPOSAL PROGRAM. THE CLOSED-LOOP PROCESS GIVES YOU A FLOW DIAGRAM AS TO THE PROPER IMPLEMENTATION AND HANDLING OF CHEMICAL AND HAZARDOUS WASTE. GOING THROUGH IT QUICKLY WE RECEIVE A DESCRIPTIVE SAMPLE FROM THE CUSTOMER, WE ANALYZE IT, WE DETERMINE IF WE HAVE THE PERMITS, THE EQUIPMENT, STORAGE CAPABILITIES TO HANDLE THAT PRODUCT. IF WE DO, WE SUBMIT A CONTRACT PROPOSAL. THEN WE SCHEDULE A TRIAL PICKUP AND, PERHAPS THE TRIAL WILL INVOLVE TWO OR THREE TANKWAGONS OF MATERIAL FROM THE CUSTOMER. IF WE FIND THE ORIGINATOR IS SHIPPING US WHAT HE SAYS HE IS, WE ENTER INTO A LONGER CONTRACT. IF WE DON'T, WE EITHER INITIATE A RESEARCH AND DEVELOPMENT PROGRAM TO HANDLE IT IN THE FUTURE, OR WE REFUSE THE ORDER. A PROFESSIONAL TREATMENT PLANT IS NOT THE ANSWER TO ALL THE WASTE PROBLEMS. IT CERTAINLY HAS LIMITATIONS AND TO RECOGNIZE THOSE LIMITATIONS, YOU HAVE TO HAVE THE PROPER ANALYSIS, PROPER PROFESSIONAL TEAM. NOW BACK IN THE LAB EVALUATION PORTION, WE MADE OUR DETERMINATION THEN BEFORE WE MADE THE CONTRACT PROPOSAL, WHETHER THE MATERIAL AHD ANY VALUE, AND COULD GO TO RESOURCE RECOVERY OR HAD TO BE DISPOSED OF. IF IT HAS RECOVERABLE VALUE, IT IS PROCESSED THROUGH FRACTIONAL OR FLASH DISTILLATION, FUELS RECOVERY, METALS SUCH AS COPPER, ZINC RECOVERY, AND PRODUCTS THAT CAN BE SOLD "AS IS". IN OTHER WORDS, WE ACT AS A CLEARING HOUSE FOR CERTAIN TYPE OF WASTE PRODUCTS. IF THERE IS NO VALUE, THE PRODUCT MUST EITHER BE PUT THROUGH THE THERMAL OXIDIZER AND DESTROYED BY HIGH TEMPERATURES, NEUTRALIZED, STABILIZED AND PUT INTO A LANDFILL, OR IT IS RUN THROUGH THE WATER TREATMENT SYSTEM. THIS IS THE TYPE OF CONTROL, THE TYPE OF BACKUP, THAT IS REQUIRED TO OPERATE A CENTRAL DISPOSAL FACILITY IN ACCORDANCE WITH ALL LAWS. A SMALLER CLOSED-LOOP COULD BE DEVELOPED, IN OTHER WORDS, A LOOP CONTAINING LESS FACILITIES, IF YOU CAREFULLY DEFINE YOUR LIMITATIONS SO YOU DON'T TAKE PRODUCTS IN THAT WILL CAUSE PROBLEMS.

chem-trol

CLOSED LOOP PROCESS FEATURING TOTAL CONTROL



I WOULD JUST LIKE TO DISCUSS BRIEFLY THE MATERIAL HANDLING ASPECT OF PROPER IMPLEMENTATION. AGAIN, IDENTITY OF THE PRODUCT IS ESSENTIAL SO YOU CAN DETERMINE THE CORROSION NATURE OF THE PRODUCT AND UTILIZE PROPER EQUIPMENT SO YOU DO NOT ENDANGER YOUR DRIVER OR OTHER PEOPLE ON THE HIGHWAYS. ALSO, IDENTIFICATION IS REQUIRED SO YOU DON'T MIX ON MILKRUNS. PRODUCTS THAT ARE NOT COMPATIBLE, SUCH AS CYANIDE AND ACIDS, THAT WOULD RELEASE A POISONOUS GAS, AND MANY OTHER COMBINATIONS THAT WOULD CAUSE EXPLOSIONS. MANY HAPPEN EACH YEAR WITH HAULING CONTRACTORS THAT ARE NOT INFORMED AS TO THE NATURE OF THE WASTE PRODUCT THEY ARE HANDLING. FOR YEARS THE ORIGINATORS OF THE WASTE HAVE GENERALLY TRIED TO MAINTAIN SECRECY AS FAR AS THE NATURE OF THE WASTES ARE CONCERNED, AND FOR YEARS, THEY HAVE EXPLOITED THE LANDFILL OPERATORS, AND THE POOR LITTLE HAULER, IN THE SENSE THEY HAVE SUBJECTED HIM TO TREMENDOUS DANGER POTENTIAL, BECAUSE IN MOST CASES, THEY DID NOT SUBMIT INFORMATION REGARDING THE NATURE OF THE WASTE. EVEN RECENTLY A CERTAIN GROUP OF PROFESSIONALS INSISTED THAT THEIR BUSINESSES WOULD BE IN DANGER IF THEY HAD TO REVEAL THE NATURE OF THE WASTE. <u>OUR POSITION AS PROFESSIONALS IN THIS FIELD TODAY MUST BE COMPLETE IDENTIFICATION</u>. WE ARE ESSENTIALLY TAKING THEIR ENVIRONMENTAL PROBLEM AWAY AND WE BETTER BE ABLE TO HANDLE IT IN THE PROPER FASHION OR WE CREATE MANY PROBLEMS WITH THE REGULATORY AGENCIES FOR OURSELVES.

IT IS QUITE OBVIOUS TO ALL OF US THAT THE COSTS OF PROPERLY TREATING WASTES ARE GOING TO BE APPRECIABLY HIGHER THAN PREVIOUS METHODS. PROPER IDENTIFICATION IS COSTLY. FOR EXAMPLE, A GOOD LABORATORY WILL CHARGE $35 AN HOUR FOR ANALYSIS, AND I CAN ASSURE YOU THAT ALMOST EVERY SAMPLE WILL COST A MINIMUM $35, AND MOST OFTEN ON THE AVERAGE OF $70. THE CAPITAL EQUIPMENT REQUIRED TO DO A PROPER JOB IS EXTREMELY EXPENSIVE. TO DUPLICATE WHAT WE HAVE AT MODEL CITY WILL COST OVER $10 MILLION. HIRING CHEMICAL ENGINEERS, THE CHEMISTS, THE PROFESSIONAL PEOPLE THAT WE MUST EMPLOY TO DO A PROPER JOB IS EXPENSIVE. THIS ALL ADDS UP TO MUCH HIGHER COST FOR PROPER TREATMENT. WE AS A SOCIETY, WE AS AN INDUSTRY, HAVE NO ALTERNATIVE BUT TO PROPERLY TREAT THESE WASTES AND CHARGE THE PRICES THAT ARE REQUIRED. WE MUST, HOWEVER, MAKE EVERY EFFORT TOWARD RESOURCE RECOVERY. THE WASTE RESOURCE, THAT IS PRODUCTS OF VALUE CONTAINED IN WASTE, HAS REALLY NEVER BEEN PROMOTED, AND BELIEVE ME, THERE ARE HUNDREDS OF THOUSANDS OF DOLLARS OF VALUABLE PRODUCTS BEING THROWN AWAY EACH DAY. IF WE CAN FIND ONE OR TWO PRODUCTS OF VALUE IN A CUSTOMER'S WASTE STREAM, AND THEN PUT IT IN A FORM THAT MAKES IT MARKETABLE, WE WILL APPRECIABLY REDUCE THE ORIGINATOR'S COST AND ALSO HELP OUR SHRINKING NATURAL RESOURCE PROBLEM.

IT IS ESSENTIAL, IT IS PROFITABLE, AND IT IS A WAY TO APPRECIABLY DEVELOP OUR INDUSTRY. IF WE CAN SHOW A CUSTOMER THAT THERE IS POTENTIAL FOR LOWER COSTS, AS COMPARED TO THEIR DOING IT, WE HAVE A LONG-TERM CUSTOMER BECAUSE HE IS NOT INTERESTED IN INSTALLING HIGH COST CAPITAL EQUIPMENT AND THE ENVIRONMENTAL ENFORCEMENT PROGRAM AND TECHNOLOGIES ARE MOVING AHEAD AND CHANGING SO OFTEN. (SEE ATTACHED COST-TIME GRAPH).

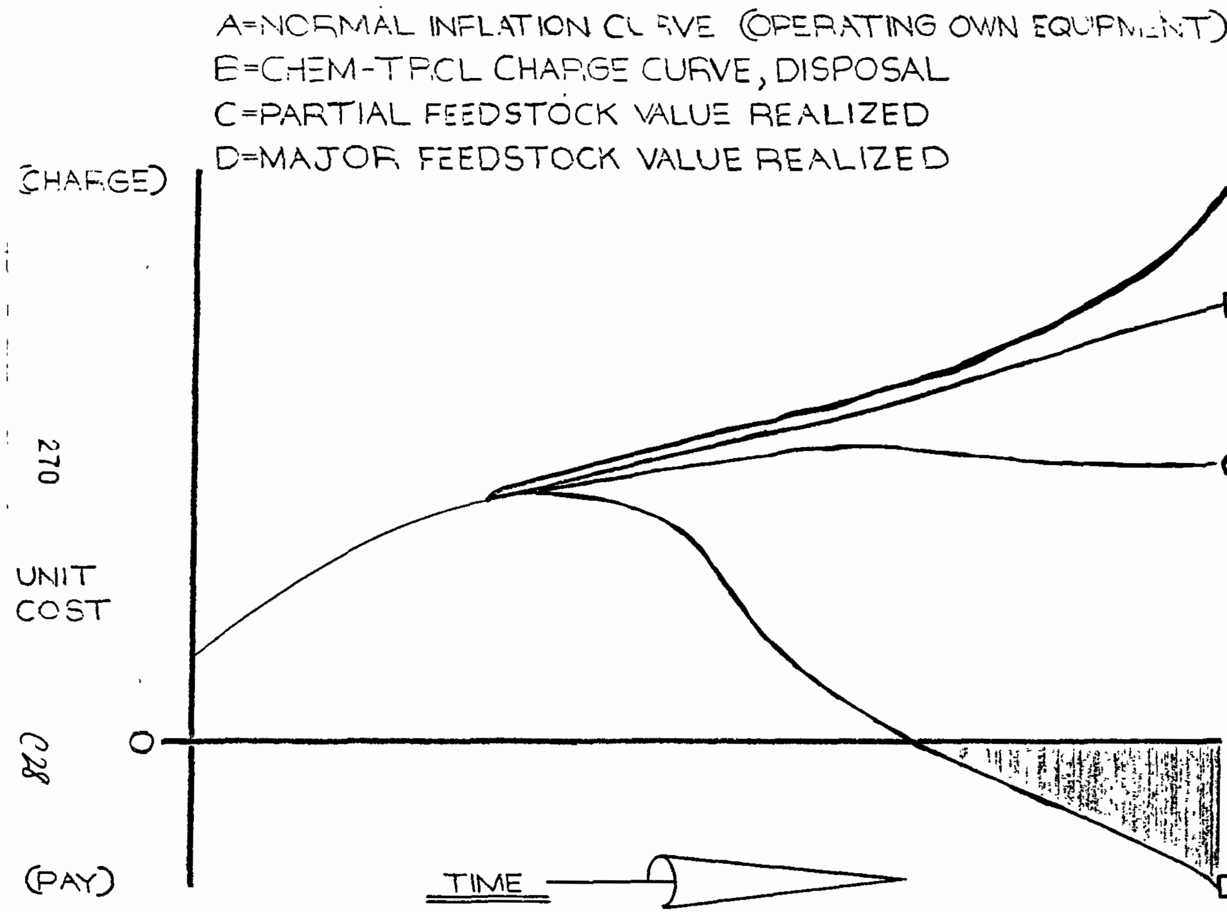
OUR INDUSTRY MUST IMPROVE IN THE SENSE OF HAVING TECHNICALLY CAPABLE PEOPLE TO RUN THE BUSINESSES FOR US. THE FACTS OF LIFE ARE: TO PROPERLY CONDUCT THE CHEMICAL AND HAZARDOUS WASTE BUSINESS, WE HAVE TO HAVE COMPETENTLY TRAINED CHEMISTS AND ENGINEERS. THERE IS NO OTHER WAY. THE SOLID WASTE INDUSTRY RECOGNIZES THIS AND IS GEARING UP TO MEET THE CHALLENGE. THE SOLID WASTE BUSINESS INDUSTRY HAS THE HAULING CAPABILITIES AND THE MATERIAL HANDLING CAPABILITY. NOW WITH THE ADDITION OF THE PROPER FACILITIES AND TECHNICALLY COMPETENT PEOPLE, THE SOLID WASTE INDUSTRY HAS ALL THE NECESSARY TOOLS TO DO AN EXCELLENT JOB AT A LOWER COST THAN INDUSTRY OR GOVERNMENT.

IN SUMMARY, PROPER IMPLEMENTATION TAKES PROPER IDENDIFICATION, COMPLETE FACILITIES, WELL-ENGINEERED HAULING CAPABILITIES, TRAINED TECHNICAL PERSONNEL, AND ENFORCEMENT BY THE REGULATORY AGENCIES. IF A CONTRACTOR NOW HAULING WASTES WANTS TO DO IT ON A LONG-TERM BASIS, HE MUST NOW RECOGNIZE HIS LIMITATIONS AND MUST CONSIDER THESE POINTS:

1. DO I HAVE THE PRODUCT COMPLETELY ANALYZED?
2. CAN I HANDLE THAT TYPE OF PRODUCT FOR DISPOSAL OR RECLAMATION.
3. WHO CAN HANDLE THE PRODUCT FOR DISPOSAL OR RECLAMATION?
4. DO I KNOW WHERE TO TAKE THESE WASTE PRODUCTS SO THAT I DO NOT CAUSE A PROBLEM FOR THE ORIGINATOR NOR FOR MY COMPANY?
5. DO I HAVE THE PROPER CONTROL TO MAINTAIN THE ECOLOGICAL AND SAFETY CODES THAT ARE REQUIRED?

GENTLEMEN, UNLESS YOU CAN ANSWER THESE QUESTIONS AND BE PROPERLY ORGANIZED TO HANDLE THE WASTE PRODUCTS WITHOUT CAUSING ENVIRONMENTAL OR SAFETY PROBLEMS, YOU ARE IN A SHORT-TERM BUSINESS. IF YOU WISH TO BE LONG-TERM, YOU MUST TAKE IMMEDIATE STEPS TO GEAR-UP TO PROPERLY MANAGE THE DISPOSAL OF CHEMICAL AND HAZARDOUS WASTES.

LOUIS E. WAGNER, PRESIDENT
CHEM-TROL (LIQUID WASTE DIVISION)
SCA SERVICES, INC.


A=NORMAL INFLATION CURVE (OPERATING OWN EQUIPMENT)
B=CHEM-TROL CHARGE CURVE, DISPOSAL
C=PARTIAL FEEDSTOCK VALUE REALIZED
D=MAJOR FEEDSTOCK VALUE REALIZED
(CHARGE)
UNIT
COST
0
(PAY)
TIME
A
B
C
D

SEMINAR ON MANAGING HAZARDOUS MATERIALS AND WASTES
Nashville, Tennessee
April 4, 1975

Address by: Edward R. Shuster, Division Manager, Technical Services & Market Development - CHEM-TROL POLLUTION SERVICES, INC.

It certainly is a pleasure for me to be here today at this Hazardous Waste Seminar. Rounding out discussions of handling, transporting and disposing of these materials, is an exciting alternative to disposal, "The Value That Can Be Derived From Waste Products". As we all have seen, the prices of chemicals, metals, fuels and just about everything else, have sky-rocketed over the past year and; even though there is hope that our current administration is going to take the necessary corrective steps, prices will continue to rise. As a result, it seems the goal of cleaning our environment, re-using raw materials as many times as possible, and treating waste as a valuable raw material, must now be considered necessity. Pollution control has become an accepted requisite, not simply a whim, of an affluent society. Cleaner air and water are not so much luxuries as conditions necessary to insure health, safety, and the quality of life. Cleaning up and recycling are not only the answer to disposal and pollution control problems, they are also part of conserving our diminishing natural resources. This is a broad base, scientific, public and political concern. But those of us enmeshed in the positive side of pollution control, its opportunities for new technology and enterprise, find it too easy to forget that the main thrust of the environmental movement upon industry heretofore has been a rather negative one. In fact, most of the problems and frustrations of the environmental management business can be traced to its basic negative impact. Heretofore, environmental management was a source of a cost, not of a profit, to most industries. Today, cleaning up can be considered not only a challenge, but an opportunity to reduce costs appreciably and, perhaps even establish a value for waste products. Environmental management's responsibility has become much broader. Those responsiblities now include returning dollars (profit) to the corporation, because now there are substantial opportunities in the environmental management sector to do exactly that. Environmental management today presents several cost saving opportunities. Do you as private enterprise really have a choice but to look for value in your waste product? Do you have an option? Not really. You have these choices. Simply pay waste disposal costs, or set up a realistic program to define, analyze your waste products in a very professional manner and determine the best game plan toward cost savings. What is the magnitude of industrial wastes generated in the United States today? The wastes that I speak of include paper, metals, rubber, chemicals, industrial liquids, waste oils, hazardous wastes, etc. Waste metals have been recognized as a major growing industry in the United States. Millions of tons of these wastes are now being recycled. A few very short years ago, scrap steel and iron were selling for anywhere between $18 and $22 a ton. This past year, scrap steel shot up to as high as $200 a ton giving new impetus to this type of enterprise. You have a parallel situation in the paper and cardboard industry. The lubricating oil reclaiming plants that have dwindled in number from 144 in 1965 to about 34 operating plants in 1974, have now found a new life in much higher prices for their reclaimed products. In the area of industrial liquid chemical wastes and hazardous wastes, the E.P.A. has indicated that there are at least 10 million tons generated in the U.S. per year. In many circles, it is felt that this figure is more like 100 million tons per year. The magnitude is great. We are wasting and have wasted valuable raw materials that could be utilized in many segments of our industrial community. The magnitude of industrial and municipal wastes has been huge and it will continue to grow in our affluent society at a level of 5% to 10% annually. It seems very clear that by discarding these waste products, we are also not recognizing millions and perhaps even billions of dollars of revenue each year. Many plant managers often say, "Well, there is no way that waste disposal in this plant is going to be anything but an operating cost". That attitude is totally obsolete. That situation is best exemplified by this case study.

A major Western New York company had the entire waste disposal needs of their plant handled on a disposal cost basis. Each year, they put out a contract to dispose of their wastes for one year, and each year, for at least five years, the same refuse hauler was awarded the job. During that five year period, he quoted fixed rates on containers, pick-ups, etc., but it mounted at an increasing rate from a minimum of $100,000. up to approximately $180,000. the last year. The company suffered several business setbacks, called in efficiency experts to evaluate every conceivable way to save money. After months of study on the waste, the efficiency expert recommended that because there are so many products of value being thrown away each year, it would be interesting to request a quote this year for the highest bid for these waste products rather than a disposal cost. You can imagine what happened. The same refuse hauler that hauled away this waste at a high disposal cost previously, now submitted the highest bid to purchase these products of value. He knew that even paying the company $30,000 a year for their waste products and hauling them away, he still would make appreciable profits. There are many other examples. One company was disposing of a liquid waste amine product for 10 years at the annual cost of $10,000 a year. A central disposal facility working with the product found a home for it, found a direct sale, because oftentimes one company's waste is another company's raw material, and subsequently started paying for the waste product. Savings to the originator of the waste - over $10,000. per year. There are many other examples. Waste chlorinated solvents such as trichlor, perchloroethylene, methyl chloroform and methylene chloride are frequently recoverable products with established values to reclaimers of $.03 to $.05 per pound, based on recoverable yield, and fluorinated, chlorinated solvents are even worth more. Oxygenated solvents such as waste acetone, methyl isobutyl ketone, methyl ethyl ketone, and others, now are sold based on recoverable yield. Two years ago, it would cost you a minimum of $.15 to $20 per gallon for an incineration disposal charge. There constantly are new uses developed as the virgin raw material market shrinks. New markets are being found for recycled products each day. Recycled products are now being looked to in many areas as primary supplies, and certainly are now described as very valuable commodities, and in short supply, because the waste resource has not really been fully promoted or exploited by the people that have created it. We speak of the waste resource, we mean those products of value that are now considered waste that can have a value as a raw material or as an energy source, and have been discarded rather than suggested and reclaimed. I would urge all of you to start considering the waste resources in your respective companies. I am just going to list a few suggestions regarding the steps that you should take now toward recognizing the value in waste products, as summarized in Table 1.

A. Know your processes.

B. Know your raw material and supply intake.

C. Know your output.

D. Know your waste products. Chemical wastes should be throughly analyzed.

E. Set up a company-wide program to segregate your waste products. A major problem in industry, and in general, has been co-mingling of many waste products that separately have high value, but mixed together makes it economically impossible to recognize the value because of the high cost and difficulty of separation. Therefore, it is extremely important to classify your waste streams and segregate to recognize value. Only mix when you are absolutely positive that there can be no value associated with that waste stream.

F. Initiate a collection program, and for large volume wastes, start designing for containerization. Many companies, especially with various types of liquid wastes, have fallen into the habit of putting their wastes in 55 gallon steel drums, and smaller. The result is you are not only throwing away your waste now, but you are throwing away a valuable steel drum. Study today's economics and you will find you may be pleasantly surprised that containerization would save you appreciable dollars today, and will also make more feasible the possibility of collecting dollars for your waste products. Establish a firm program of waste handling rules, to which your employees must adhere. Clear identification of waste products is extremely important in each program and it can only be accomplished by your employees. These people must be fully trained and made to understand that identification of waste products and consistent quality waste products are extremely important in a program to develop value in your wastes.

G. Initiate a program to identify waste disposal costs as a cost of doing business. Heretofore, waste disposal was just so simple and so easy, it was not considered expensive, it was never considered a significant cost of doing business. Today you must include it as a cost of doing business as a separate cost control center, so you can determine your effectiveness in this area. If you do not start a program to recognize the value, I can assure you that your cost for positive disposal will continue to increase at a very high rate. Proper disposal techniques cost appreciably more than simple landfill or uncontrolled techniques. The regulatory agencies are going to require legal compliance through the proper disposal of waste products, although costly.

H. Emphasize to all employees the control required to produce consistent quality waste products. This is not in conflict with efficiency or quality control, and in accordance with good management and production techniques. If you are producing a quality product, you should be producing a consistent quality waste product.

I. Initiate a waste inventory and make it the responsibility of competent supervisors to keep that inventory sheet up-to-date. Waste has always been a measure of efficiency. Supervisors in many cases reported lower quantities to show their efficiency. They were not disputed because the costs were so low, no one paid attention to it. It was like an exaggeration in reverse. Quantity reported from middle management to a higher level was reduced somewhat and reduced each step up the line until top management received the word that there was no waste.

J. Know your wastes thoroughly and completely. Have a competent waste management firm assist your own efforts.

In today's tight money situation many say that there is no way we can spend the capital dollars to start deriving values from wastes.

If that is the case with your company, you have alternatives. There are professional central disposal and recovery facilities in the Northeast section of the U.S. today. One such company is CHEM-TROL POLLUTION SERVICES, INC., located in Model City, New York, near Niagara Falls. CHEM-TROL can assist you in setting up a program to recognize the waste resource. This first involves in-plant analysis of your waste stream, determination of the quantities and then looking for values. CHEM-TROL not only establishes values, performs removal services on a professional and timely basis, but it also eliminates many of your environmental problems. CHEM-TROL can haul your wastes away and eliminate your need for capital expenditures at this time. Figure 1 illustrates the economic trends relating costs with time. Not only can CHEM-TROL provide economic incentives, but changing environmental codes make major capital investment today a serious gamble.

Chem-Trol can provide a complete service. Exactly what CHEM-TROL offers and how they can do it is best exemplified in the Closed-Loop Process Diagram, Figure 2.

How and why are values established? There are several reasons and they include:

A. A shortage of virgin raw materials.

B. Many companies are now starting to formulate utilizing recycled products.

C. Many companies have now recognized that they do not always need virgin products. Purchasing agents who experienced the shortages of last winter are doing many things, including utilization of recycled materials as a second source of supply to make sure they are never caught short again.

D. The oil crisis has made us recognize that we must take advantage of BTU's no matter what shape or form that they take. When it is impossible to recognize a chemical value from a waste, it may be possible then to recognize a BTU or energy value. Many waste solvents and waste oils, are now being processed to put them in a form where they can be burned in incineration systems, boilers, kilns, and be used as a primary source of energy. Billions of gallons are available through the waste resource. Technology is perhaps the major reason. Technology was pretty much dormant in this whole waste field for over 30 years. Now the wheels are really starting to spin. Segregation and separation techniques are improving. Uses for waste products are expanding. Who would have thought a few years ago that we would develop equipment to burn garbage and utilize it as a fuel. Who would have thought that we would develop technology to economically extract methane gas to be used as a supplement for natural gas to heat your home, from landfills. Another very important factor is that, as I mentioned before, one company's waste product is another company's raw material. A reputable central disposal facility also establishes value in this manner - acting as a clearing house for waste products. How long does it normally take to establish a value for waste products? If you set up your own program and have a definite method for the reclamation of products of value from your waste and a utilization for these products, starting today, it probably would take 2 to 3 years. If you dealt with a professional central disposal facility, because of their experience and contacts, and if your product fit into one of the broad categories that now has value, it could be as little as 3 to 6 months. On the average, it takes anywhere from 6 months to a year and a half, if a value is to be established. It also depends on the research priorities that are set, and these are pretty much set based on volume of the waste products. In other words, high volume products are given more research priorities. Now there are several advantages and disadvantages to setting up your own program rather than doing business with a professional central reclamation and disposal facility. But, at this time, the advantages of experience, marketing, and processing of waste products, and the fact that minimal capital expenditure is required,it is strongly recommended that you consider a program with a reputable service company. A company you can rely on will allow you to do what you know best, while meeting your waste service requirement and setting up a realistic program to establish values from your waste streams. Also, in establishing such an alliance, you may find the central service facility as a source for needed raw materials and products, and fuels that you need to conduct your business. We must not think of environmental management as nothing but a source of cost, but now as a potential source of a profit, as a challenging opportunity. Our raw material resources are finite. We may exhaust some supplies within the twentieth century, and many more before the twenty-second century. The U.S. is the most developed country in the world and utilizes the majority of the raw materials generated today. Underdeveloped nations are catching up. They are using our lifestyle as their personal goals for their respective countries. To do that, they themselves will use substantial quantities of raw materials. We need to set up a responsible program of re-utilization to extend our supplies and expedite our technology to find new energy sources. Promoting the waste resourse is a must for your business, it is a must for your society, and it's good for your business.

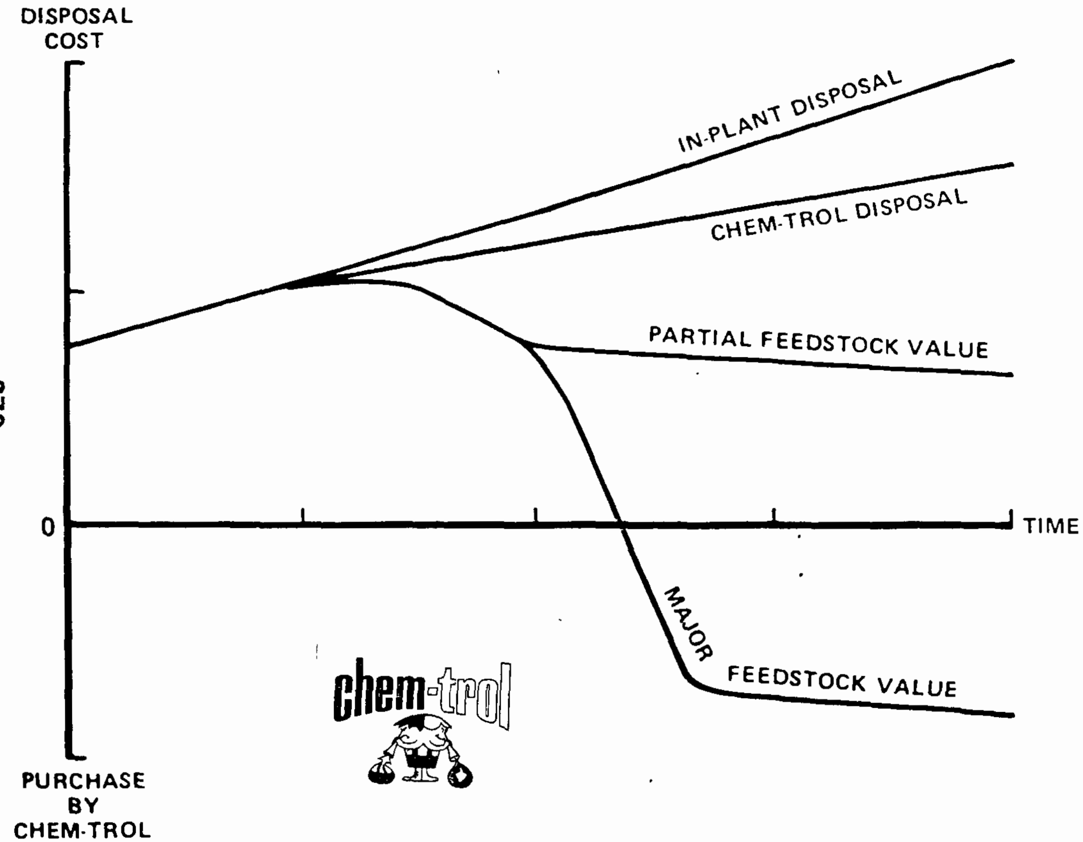

DISPOSAL
COST
IN-PLANT DISPOSAL
CHEM-TROL DISPOSAL
PARTIAL FEEDSTOCK VALUE
0
TIME
MAJOR
FEEDSTOCK VALUE
chem-trol
PURCHASE
BY
CHEM-TROL

FIGURE 1

CLOSED LOOP PROCESS FEATURING TOTAL CONTROL

chem-trol

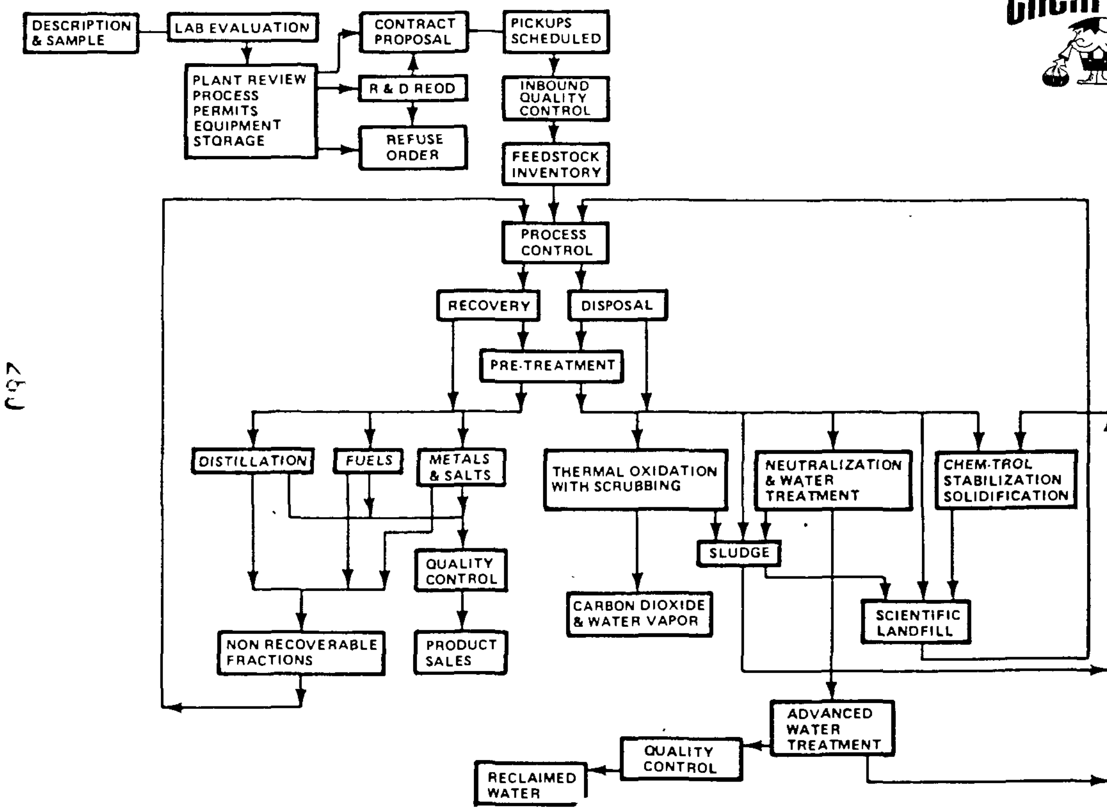



FIGURE 2

# WASTE PREPARATION CAN REDUCE COSTS

CONSIDER WASTE AS A PRODUCT

- DEFINE MANUFACTURING PROCESS
- DEFINE WASTE PRODUCT QUALITY AND QUANTITY
- KEEP PRODUCTION AND INVENTORY RECORDS
- STORE, PACKAGE, AND LABEL PROPERLY

KNOW YOUR WASTES

- CHARACTERIZE CHEMICAL & PHYSICAL PROPERTIES
- OBTAIN GOOD ANALYTICAL DATA

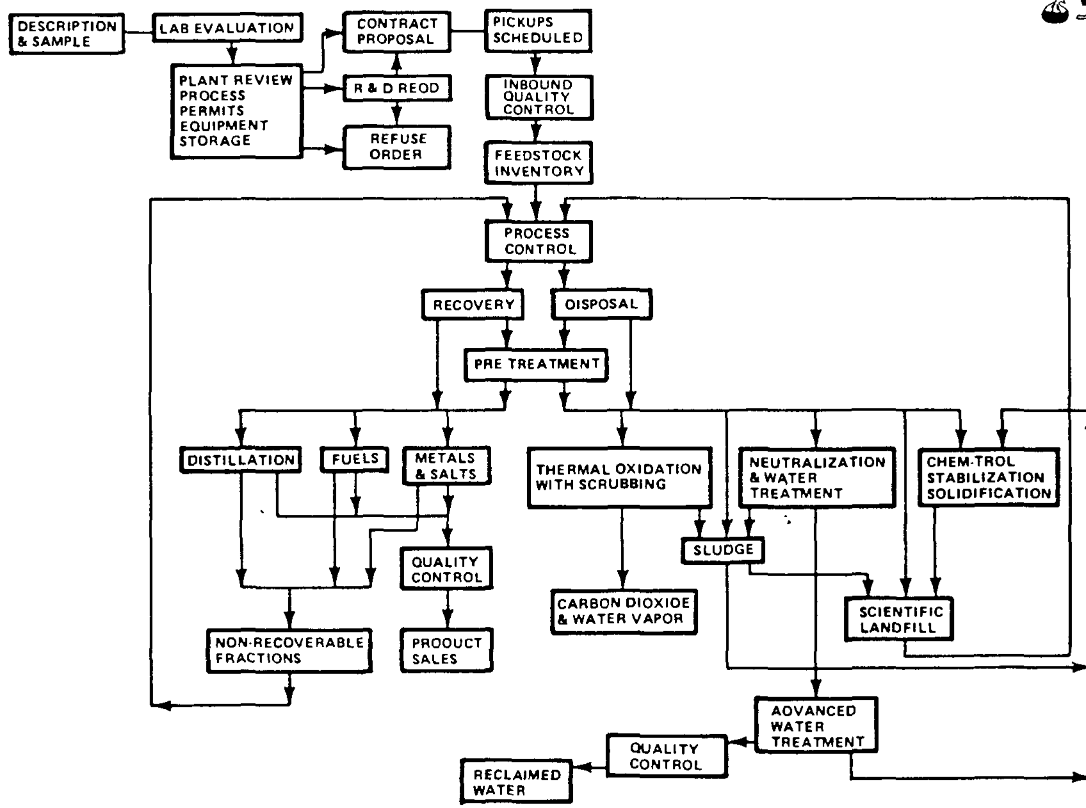
MANAGE YOUR WASTES

- AVOID COMINGLING OF WASTES
- ESTABLISH VOLUME REDUCTION PROGRAM
- AVOID DILUTION

SEEK CHEM-TROL ASSISTANCE

TABLE 1

CLOSED LOOP PROCESS FEATURING TOTAL CONTROL



SCA SERVICES INC.

# WASTE PRODUCT SURVEY

chem-trol DIVISION

PLEASE PROVIDE ALL INFORMATION REQUESTED BELOW, THEN RETURN THIS FORM TO

**CHEM–TROL POLLUTION SERVICES, INC.**
P.O. BOX 200, MODEL CITY, NEW YORK 14107 TELEPHONE 716 - 754 - 8231

| | |
|---|---|
| COMPANY | PLANT LOCATION |
| MAILING ADDRESS | [redacted] |
| DESCRIPTION OF WASTE PRODUCT | |

| | | |
|---|---|---|
| VOLUME | FREQUENCY: PER MONTH / PER YEAR / ONE TIME | PACKING: IN DRUMS / IN BULK |

## CIRCLE APPROPRIATE BLOCKS

| | |
|---|---|
| PHYSICAL STATE @ 70°F: SOLID / LIQUID / SEMISOLID | VISCOSITY @ 70°F: LOW / MEDIUM / HIGH |
| LAYERING: NONE / BILAYERED / MULTILAYERED | % LAYERING BY VOLUME AT INFINITE SETTLING: ____ % TOP, ____ % ____, ____ % ____, ____ % BOTTOM |
| SUSPENDED SOLIDS: <5% / 5-20% / >20% / WEIGHT OR VOLUME | DISSOLVED SOLIDS BY WEIGHT: <5% / 5-20% / >20% |
| SPECIFIC GRAVITY @ 60°F: < / 0.8-1.0 / 1.0-1.2 / 1.2-1.4 / 1.4-1.7 / >1.7 | FLASH POINT (OC): <80°F / 80-150°F / >150°F / NONE |
| THOUSANDS OF BTU'S / LB: <1 / 1-5 / 5-9 / 9-12 / 12-16 / 16-20 | ORGANICALLY BOUND CHLORINE (WT %): NONE / TRACE / 1-10% / 10-30% / >30% |
| ORGANICALLY BOUND SULFUR (WT %): NONE / TRACE / 0.5-5% / >5% | pH: 1-4 / 4-7 / 7 / 7-10 / 10-13 |
| TOXICITY: HIGH / MEDIUM / LOW / UNKNOWN | OTHER INFORMATION |

PLEASE IDENTIFY AND QUANTIFY ALL KNOWN COMPONENTS

| | | | | |
|---|---|---|---|---|
| VOLATILE ORGANICS | % | % | % | % |
| | % | % | % | % |
| NON VOLATILE ORGANICS | % | % | % | % |
| ACIDS OR ALKALIS | % | % | % | % |
| SALTS | % | % | % | % |
| METALLICS | % | % | % | % |
| CYANIDES - PESTICIDES - CARCINOGENS - OTHER HAZARDOUS/ TOXICS | % | % | % | % |
| | % | % | % | % |

**SERVICE DESIRED:** RECOVERY / DISPOSAL ONLY

IF RECOVERY WHAT COMPONENT(S) IS (ARE) TO BE CONSIDERED FOR RECOVERY

PL ATTACH RECLAIMED PRODUCTS SPECIFICATIONS AND ANY ADDITIONAL HAZARD AND HANDLING INFORMATION TO THIS SHEET

TO THE BEST OF MY KNOWLEDGE AND ABILITY TO DETERMINE, THIS IS A COMPLETE AND ACCURATE DESCRIPTION OF THIS WASTE MATERIAL

| | | |
|---|---|---|
| SIGNATURE | TITLE | |
| PHONE NUMBER (INCLUDE AREA CODE) | DATE | [redacted] |

~~283~~ C41

CT - 113 REV 12/73 NIAGARA BUSINESS FORMS NIAGARA FALLS, N Y

chem-trol

POLLUTION SERVICES, INC.

P O BOX 200, MODEL CITY, NEW YORK 14107 • TELEPHONE 716—754-8231

## GUIDE TO PACKAGING AND IDENTIFICATION OF WASTE PRODUCTS

Proper packaging and identification of waste products is essential to assure their intact arrival at Chem-Trol, to assure safety for all personnel handling the material and to assure compliance with governmental rules and regulations regarding material shipments. By following these guidelines you will be able to avoid or minimize delays, rejections and additional laboratory, handling and transportation charges.

A. DRUMS

Drums must comply with ICC/DOT container and marking specifications including the following:

1. Drums must have bungs in place and tightly secured. Vented bungs or bungs with pressure relief should be used to avoid build-up of pressure. Leave at least three inches of empty head space in the drum to minimize pressurization.
2. Open top drums must be properly gasketed and have rings tightened securely.
3. Closed head drums with heads cut out cannot and will not be accepted by our drivers or plant.
4. Leaking or damaged containers will not be accepted by Chem-Trol drivers or plant.
5. Chem-Trol code number and product name must be clearly marked on each container. Gross, tare, and net weights are desired whenever possible.
6. Markings may be on labels, tags or stencilled onto the drum. Markings should be on the side of the drum but near the top.
7. Caution labels and placards and/or precautionary statements (poison, explosives, corrosive, etc.) must be applied as defined and required by the ICC/DOT.
8. Additional handling charges apply to small containers (e.g. 5, 15, 30 gal.)
9. Drums are not normally returnable to the customer.

B. PALLETS, CARTONS, CASES

1. Pallets when used, are to be 48" x 40", must meet Material Handling Association specifications, and will not be returned by Chem-Trol.

B. PALLETS, CARTONS, CASES

2. Bags, cartons, cases, etc., should be covered with an over-pack of cardboard or plastic, and banded or strapped as necessary.
3. When two or more products are on the same pallet, a separator must be used.
4. Palletized loads require the same markings and identification as to drums as noted above.
5. One label should be fastened to each side of each pallet.
6. Drums are not normally shipped on pallets.

C. SCHEDULING A PICKUP

To schedule a pickup, simply call Chem-Trol's order desk far enough in advance of the desired pickup date to permit timely scheduling. Two working days is generally adequate within a 300 mile radius.

1. When placing an order, in addition to standard information required, you should also provide us with product name and code, quantity of each product, type of containers, and tentative scheduling requested.
2. At that time, Chem-Trol will provide you with a Work Order number applicable to that shipment.
3. In addition to the Bill of Lading, please include with the shipment a packing slip containing the following information:

   Drum or container count per each product
   Product name
   Chem-Trol code number
   Chem-Trol Work Order number

   This is required by ICC/DOT regulations.

4. When our truck arrives at your site, our driver will be prepared to assist in loading, once you have placed the drums on our truck.

   Please do not delay our driver or equipment any more than necessary. He has a tight schedule to follow, and we wish to give our other customers the same high level of service desired by yourself.

5. Shipments may be made by customer truck or by common carrier if desired. In that event, please follow Steps 1 - 3 and notify Chem-Trol of anticipated carrier and scheduled arrival ahead of time.
6. If we can be of further assistance regarding packaging or identification of waste products, please contact our Marketing Department.



Rev. 8/12/73

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POLLUTION SERVICES, INC.

P O BOX 200, MODEL CITY, NEW YORK 14107 • TELEPHONE 716—754-8231

# STANDARD PRODUCT DESCRIPTION

## DISPOSAL OF PACKAGED LABORATORY CHEMICAL WASTES

General Description: Waste laboratory chemicals individually packaged in labeled containers made of glass, metal, fiber or plastic. These chemicals must be combined into specific code groups and packaged into properly sealed and labeled DOT approved shipping containers, with adequate padding to assure intact arrival.

Each shipping container may contain chemicals from only one of the following code groups A through F.

Chemical Code Groups: Packaged Laboratory Wastes

Group A
(1) Inorganic acids, (eg: hydrochloric or sulfuric acids)
(2) Elements and inorganic salts that do not liberate gaseous products when acidified (eg: Sodium chloride, barium sulfate)

Group B
(1) Inorganic alkaline chemicals (eg: Sodium hydroxide, ammonium hydroxide)
(2) Organic bases (eg: Triethanolamine, pyridine)
(3) Elements and inorganic salts that liberate gaseous products when acidified (eg: Potassium cyanide, Sodium Sulfide)

Group C
(1) Solid organic compounds (excluding organic acids and bases) (eg: pentachlorophenol, glucose)

Group D
(1) Organic liquids including organic acids but excluding organic bases (eg: acetone, xylene)

Group E
(1) Inorganic oxidizing agents, (eg: potassium nitrate, sodium peroxide)
Note: Use non-oxidizing packing material such as vermiculite

Group F
(1) Solid pesticides, insecticides, fungicides, etc.

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**POLLUTION SERVICES, INC.** P O BOX 200, MODEL CITY, NEW YORK 14107 • TELEPHONE 716—754-8231

STANDARD PRODUCT DESCRIPTION

DISPOSAL OF PACKAGED LABORATORY CHEMICAL WASTE

Exceptions: The following exceptions will not be allowed under this product description:

(1) Shock sensitive materials (eg: Mercury fulminate)
(2) Organic oxidizing agents (eg: Benzoyl peroxide)
(3) Pressurized gas containing cylinders (eg: Hydrogen sulfide)
(4) Materials that react violently with water producing heat and flame. (eg: Sodium metal)
(5) Radioactive materials of any type.
(6) Carcinogenic compounds of any type.

Packaging & Shipping: Packaged in 55 gallon non-returnable open-head steel drums with gaskets, covers, and rings to tightly seal. A packing slip specifically listing the contents of each drum is required. See Chem-Trol's Guide to Packaging and Identification of Waste Products.

Process Charges: \$80.00 per 55 gallon drum plus freight. Minimum price \$200.00 per order plus freight.

Terms: Net 30 days. Prices are subject to change without notice. Subject to Chem-Trol's Standard Terms and Conditions.

Effective Date: May 1, 1975

Shipping Address: Chem-Trol Pollution Services, Inc., 1550 Balmer Road, Model City, New York 14107. Obtain authorization to ship from our Order Department before shipping.

5/1/75/mlc

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POLLUTION SERVICES, INC. P O BOX 200, MODEL CITY, NEW YORK 14107 • TELEPHONE 716—754-8231

## GUIDE TO PACKAGING AND IDENTIFICATION OF WASTE CARCINOGENS

All provisions of the general Guide to Packaging and Identification of Waste Products apply to these wastes.

Additionally, under the provisions of Chem-Trol's approved disposal permit, the following provisions must be strictly followed:

1. Materials shall be shipped in sturdy, physically sound steel drums or pails with covers firmly affixed and sealed. Containers must meet D.O.T. requirements.

2. Any liquid components shall be soaked up in a suitable absorbent (such as "Speedi-Dri"). Small bottles of liquid may be packed in absorbent inside an outer container.

3. Waste material inside the drum shall be enclosed in a poly bag liner, closed and sealed securely.

4. Drums shall be identified as per A.5., plus numbered sequentially on a portion of the drum capable of being checked by the receiver.

5. Three copies of the attached affadavit must be completed, signed, and attached to the bill of lading accompanying the shipment.

Any deviation from strict accordance with these provisions requires advance formal approval by Chem-Trol based on full written disclosure of such proposed variance by the customer, the reason why the variance is necessary to the customer, and may require additional affadavit and/or handling charges.

If we can be of further assistance, please contact our Marketing Department.

10/29/74
ERS/fcb

Attachment

**chem-trol**

**POLLUTION SERVICES, INC.** P O BOX 200, MODEL CITY, NEW YORK 14107 • TELEPHONE 716—754-8231

# PCB PRICE LIST

## CHEMICAL DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCB"S)

(Some Trade Names Used Are Pyranol, Inerteen, Askarel, Arochlor 1242, 1254, 1260)

GENERAL DESCRIPTION OF WASTE PRODUCT FOR DISPOSAL:

LIQUIDS: - POLYCHLORINATED BIPHENYLS (PCB'S) AS IS OR MIXED WITH OTHER WASTE OILS AND SOLVENTS.

SOLIDS: - CLEAN-UP ABSORBENTS AND RAGS SATURATED WITH PCB'S: EARTH OR GRAVEL FROM SPILL CLEAN-UP: CAPACITORS AND MISCELLANEOUS DEBRIS INCLUDING VARIOUS ELECTRICAL EQUIPMENT.

PACKAGING AND SHIPPING:

LIQUIDS: - IN TANK TRUCK QUANTITIES AND 55 GALLON OR LESS NON-RETURNABLE STEEL DRUMS.

SOLIDS: - IN 55 GALLON NON-RETURNABLE OPEN-HEAD STEEL DRUM WITH TIGHT FITTING COVERS.

SEE - *GUIDE TO PACKAGING AND IDENTIFICATION OF WASTE PRODUCTS* FOR UNUSUAL PACKAGING REQUIREMENTS.

DISPOSAL: IN ACCORDANCE WITH STATE AND FEDERAL POLLUTION CONTROL REGULATIONS.

PRICING:

LIQUID PCB PRICE SCHEDULE

| Container | Contract Price | Non-Contract Price |
|---|---|---|
| Bulk, T/T | $0.07 per pound | $0.075 per pound |
| Drums, 55 gallon * | $52.00 per drum | $54.00 per drum |
| Drums, less than 55 gal.* | $35.00 per drum | $37.00 per drum |

* - Minimum 15 drums; 14 drums or less add $25.00 handling, Minimum order $200.00.

SOLID PCB PRICE SCHEDULE

| | | |
|---|---|---|
| Bulk ** | $5.00 per cubic foot | < 50 Cu Ft. $6.50/Cu. Ft.<br>> 50 Cu Ft. $5.00/Cu. Ft. |
| Drums, 55 gallon * | $28.00 per drum | $30.00 per drum |

* - Minimum 15 drums; 14 drums or less add $25.00 handling, Minimum order $200.00
** - *Pricing based on outer measurement of overwrap or array.*

TERMS: NET 30 DAYS - F.O.B. MODEL CITY, NEW YORK, PRICES ARE SUBJECT TO CHANGE

IIPPING ADDRESS: CHEM-TROL POLLUTION SERVICES, INC., 1550 BALMER ROAD, MODEL CITY, NY

EFFECTIVE DATE: NOVEMBER 15, 1975



SCA SERVICES SUBSIDIARY

chem-trol

POLLUTION SERVICES, INC. P O BOX 200, MODEL CITY, NEW YORK 14107 • TELEPHONE 716—754-8231

# ORDERING PROCEDURE

Customers are asked to follow this procedure in order to be assured of timely, coordinated service:

1) To order a pickup by Chem-Trol's vehicle, or to schedule a delivery by customer's own vehicle or carrier, please telephone Chem-Trol during normal business hours.

2) Ask the Chem-Trol operator to connect you with the Sales Order Department. She will connect you with Mr. Clyde Mollon or Mr. Jim Hattler who will take your order. In their absence, you will be connected with Mrs. Balcom.

3) Be prepared to provide the following information:

   Customer Name and Address
   Your name and phone number
   Purchase Order No. or other authorization
   Name of Waste Product (s) and Chem-Trol Code (s).
   Quantities of each Product, Container Type, Date,
   Time, and Specific location of pickup (or Delivery).

   On receipt of this information, you will be assigned a Chem-Trol Work Order Number. Please make note of it and refer to it in all subsequent communications regarding the transaction.

4) If it is not possible to meet your desired schedule, Chem-Trol will promptly call you back to discuss best alternatives.

5) See also Chem-Trol's Guide To Packaging & Identification of Waste Products.

## Outside of Normal Work Hours

1) The main plant phone number (716-754-8231) is in service 24 hours a day. For emergency service or service requiring communication during off hours, telephone this number only.

2) Tell whoever answers that you wish to place an order for pickup. Determine to whom you are speaking. Provide all information as requested above. If you do not receive immediate confirmation, or confirmation within a reasonable time, follow up with another phone call.

3) Home phone numbers for Emergency Use if unable to reach the plant are:

| | |
|---|---|
| 716-745-3747 | Terry Hailey, Transportation Manager |
| 716-634-4399 | Robert Stadelmaier, Operations Manager |
| 716-875-0716 | Randy Rakoczynski, Process Supervisor |
| 716-773-3743 | Leonard Lorber, Transportation Director |



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CHEM-TROL POLLUTION SERVICES, INC.
Subsidiary of SCA Services, Inc.

P. O. Box 200, 1550 Balmer Road
Model City, New York 14107
(716) 754-8231

CHEM-TROL DIVISION

I. BACKGROUND

A) Services provided
- Collection/Hauling
- Recycling/Reclamation
- Processing/Treatment
- Disposal
- Oil/Chemical Spill Clean-up - Tank Cleaning

B) Service Area - U.S. and Canada
- Chiefly 30 Eastern States, Ontario, Quebec.

C) Date established - 1969

D) Licensed by - New York State
- Supplemental collection/hauling permits throughout areas served.

E) Organizational structure - wholly owned Subsidiary of SCA Services, Inc. of Boston (as of October 1973). Originally located at Blasdell, N.Y. Relocated to Model City, N.Y. in 1972 to accommodate rapid growth. SCA/Chem-Trol Sales Offices throughout U.S. and Ontario.

II. WASTE STREAMS

A) Accept - Most types of chemical-related wastes including solvents/cleaners, halogenated hydrocarbons, paint & coatings sludges, oils and oily waste, toxic acids, alkalis, plating/etching wastes, cyanides, heavy metal solutions & residues, pesticides/PCB's, carcinogens, sludges & solids, arsenic and mercury wastes.

B) Exclude - Radioactive wastes, shock-sensitive wastes & explosives

C) Volume - Capacity in excess of 100 million gallons annually at Model City facility.

III. WASTE HANDLING

A) Collection/hauling - 12 tractors, 25 assorted bulk tankers, 16 closed van trailers, 4 vacuum trucks available. All in compliance with D.O.T. Regulations.

B) Receiving storage - 24 hour operation
- Receive by truck, common carrier, and rail in bulk or drum form
- 2.0 million gallon tank storage
- 6.7 million gallon lined lagoon storage.
- 25,000 drum storage area.

C) Laboratory analysis
- Modern well-equipped facility, advanced instrumentation.
- 7 B.S.-M.S. Chemists, 1 PhD, Biologist, 4 Technicians
- 5 B.S.-M.S. Engineers (Chemical, Environmental)
- Perform R & D, Quality Control, Process Control, Waste Product evaluation
- Over 18,000 waste materials analyzed/evaluated to date.
- Pilot plant facility.
- Close to $100,000 in Laboratory Equipment and Instrumentation with additional purchases anticipated.

D) Treatment - Depending on composition, volume and economics, wastes are processed for resource recovery with disposal of unrecoverables.
   1) Chemical detoxification
      · Firm employs a patented neutralization process for acids & alkalies.
      · Company has developed and used proprietary physical/chemical detoxification technology.
   2) Chemical Fixation - Stabilization and fixation process using propreitary chemicals with wastes in a reactor vessel.
   3) Recovery processes employ distillation, centrifuging, settling, decanting and/or blending techniques to recover saleable materials (e.g., solvents, fuels, oil and inorganics).
   4) Incineration - Only approved PCB incinerator in New York State.
      · Liquid injection thermal oxidizer (@2700°F or greater)
      · Alkaline gas scrubber removes air contaminants and cools effluent gas to 180°F.
      · Operates 24 hrs./day for 60-120 days then shut down for maintenance.

E) Controlled Landfill
   Reinforced membrane-lined clay cells that receive solids, sludges, and chemically fixed wastes.
   Internal sump within each cell collects liquids for treatment.
   3 - dimensional inventories of buried wastes are maintained for possible recovery at later date.

F) Wastewater Treatment - Complex physical-chemical wastewater treatment facility followed by biological treatment.

G) Technical Services - Assistance offered in preparation, identification, and packaging of wastes for safe shipment, storage, and processing.

IV. ECONOMICS

A) User costs vary greatly in accordance with recovery values and processing requirements.
   · Transportation charges stated separately.
   · Company purchases many recoverable wastes.
   · Many bulk liquids disposed in 5-20¢ gallon range.
   · Scientific Landfill of chemical residues with leachate collection and processing. \$10.00 - \$15.00 per drum base price.
   · Packaged laboratory wastes accepted. Pricing depends on composition and packaging.
   · Accommodation made for small and large volumes.
   · Hazardous/toxic wastes more expensive.

B) Costs - Custom facilities were constructed by modifying available equipment. Company estimates \$15-20 million capital costs to duplicate in 1975.

C) Resource recovery constitutes over 40% of current business. Percentage of reclamation expected to be 70% within 5 years.

D) Percent capacity - currently below 50% of available capacity, growing rapidly.

E) Expansion potential - Actively considering sites and markets in several industrialized states.

V. COMMENTS - Firm operates total waste handling, disposal, and resource recovery facility for chemical wastes.



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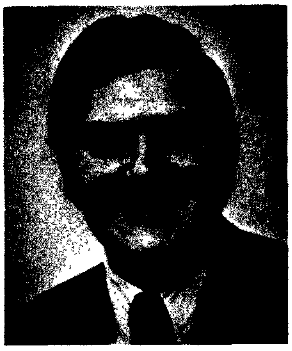
# Stressing Safety Makes Extensive Recovery Viable

*Reprinted From*
*June 1975 Issue Solid Wastes Management Magazine*



## Chemical Wastes

# Stressing Safety Makes Extensive Recovery Viable

**Louis E. Wagner is founder and president of Chem-Trol Pollution Services, Inc., Model City, N.Y.**

Any company attracted to the challenge of handling chemical discards should be prepared to cope with the demands of an irresistible force. safety. There is no casual way to deal with potentially hazardous materials — around every corner, behind each problem, waits a safety consideration, ready to draw the wastes manager deeper into this highly specialized field.

One firm, Chem-Trol Pollution Services, Inc., located in the Buffalo suburb of Model City, N Y , began to tackle this challenge six years ago. Simply by attempting to eliminate the dangers in handling a wide spectrum of chemical wastes, the company grew in various directions. In the process, it not only relieved the industries concentrated in the Niagara Falls area of many of their troublesome discards, it also gave a dramatic demonstration of the economic viability of resource recovery in the liquid wastes field.

Chem-Trol's president, Louis E Wagner, founded the company in 1969, starting out on a modest site of approximately 20 acres in the Blasdell area, just south of Buffalo. Acquired by SCA Services, Inc. in 1973, the firm is now a wholly owned subsidiary of the national corporation.

During the first two years at the Blasdell site, the operation concentrated on the disposal aspects of the business. When poorly packaged materials began to arrive with improper labels, the firm saw that it was essential to have its own transportation component.

Recognizing the enormous chemical and energy values contained in the wastes, Chem-Trol shifted its orientation to reclamation activities, following its move to the Model City site in 1971 A large stainless steel distillation tower, installed at the new location, formed the nucleus of a refinery operation, so that the company could function as a chemical processing facility.

Currently, the firm accepts materials originating from Maine to the Gulf of Mexico, and receives quite a bit of business from Canadian industries, too. It collects chemical wastes, processes them into marketable substances and usable energy, maintains careful inventories, manufactures its own products and scientifically disposes of all residues. The technological capabilities of this complex operation allow it to harness the *liquid* wastes stream in a manner that appears more advanced than anything practiced in the *solid* wastes field.

The hauling of chemical discards is a specialized service that the common carrier simply is not equipped to handle. There are obvious problems in transporting wastes products in trailers that may be subsequently used to carry such items as food. Trucking firms are reluctant to handle these consignments for many reasons. the inexperience of drivers, the mandatory paperwork, the very real possibility that certain chemicals could leak and damage even the metal parts of the vehicle, and other related problems

Early on, it became apparent that if Chem-Trol expected to receive large quantities of chemical discards, it had to provide many wastes generators with a safe and assured means of getting such material to the site.

Today, deliveries are made by a variety of means Some customers ship by rail or send their own trucks; substances in drums or packaged in an approved fashion are collected by Chem-Trol trucks and personnel; bulk liquid materials are hauled in tank trailers, owned by the company. In all cases, the nature of the loads requires constant maintenance and repair of all vehicles.

During transport, proper packaging is always important. The very fact that these materials are being sent to a central processing facility for appropriate disposal or recycling, indicates a concern that they don't escape back into the environment. All shipments, even solids such as pesticides and agricultural chemicals, must be properly covered in containers, sealed or packaged according to U.S Department of Transportation standards.

Large quantities of pumpable materials are generally carried in the bulk tankers — oily wastes from refineries or acids from metal working facilities fall into this category. Sludges that are too thick to pump would usually be placed in 55-gallon drums, the standard for the chemical wastes industry. Products in a solidified form would be packaged, according to accepted practice, and taken to the site by vans Care is taken so that even if the truc were to tip over in an accident, the chemicals would not mix or escape

The company never agrees to transport a wastes product, or even accept a shipment, unless it knows the characteristics of the material in advance All potential customers are asked to complete a wastes products survey form, providing all information, on a "best effort" basis, relating to the composition and quantity of the material under consideration. They are required to state any known hazards associated with the component substances, and report all safety precautions practiced at their own facility Safety is the most important consideration, and Chem-Trol wants to make sure that it can handle the wastes at least as safely as the personnel at the customer's plant.

Based on the survey data, the Model City operation makes a determination as to whether it can process the wastes. At this point, either a sample or a trial shipment is solicited and the actual material is analyzed by the firm's laboratory staff. The immediate acceptance of a trial shipment is a practice limited to cases in whic' the firm is familiar with the product, process and generating industry.

The laboratory not only checks the accuracy of the submitted data, but tests to see whether the substance is hazardous in ways not reported, checking for characteristics that could cause processing difficulties, safety risks or possible damage to equipment.

After these steps are completed, a description of the wastes product is submitted to the customer along with a proposal to process the material under contract. From that point on, all shipments are sampled to make sure they conform to the description contained in the contract.

When pickup is made by one of the Chem-Trol vehicles, the drivers are prepared in advance, so that they know what's in the load, how to handle it, and whether to accept the shipment Most of the drivers have the capability of sorting the wastes and determining such characteristics as whether the material is acid or alkali. Where appropriate, they are instructed to use such safety equipment as face shields, and rubber gloves and coats

The trucks are marked with placards, as required, and carry a manifest describing the load, following the same DOT rules applied to the transport of primary commodities.

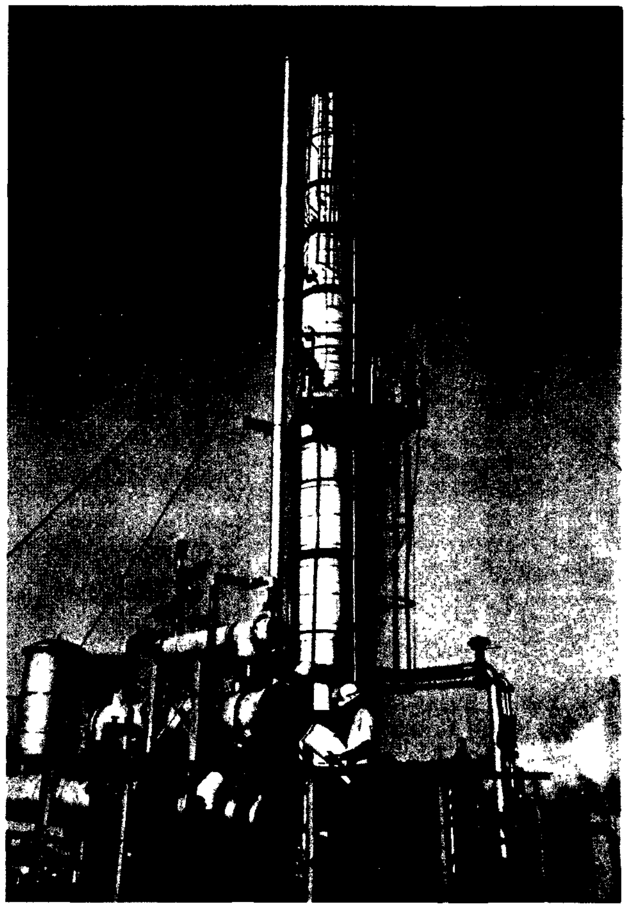
If the driver encounters material that is not properly packaged or marked, he is not permitted to accept the shipment; when other firms transport such non-conforming material directly to the plant, it normally will not be off-loaded. In cases where a check by production people or analysis by the laboratory indicates that the incoming chemicals were incorrectly identified, the expense of finding out what actually is in the drums must be borne by the customer.

It is company policy not to accept any radioactive material or loads that may explode due to sensitivity to pressure or shock. Excluding these two categories, the operation is able to process 99% of the products offered to the company for disposal.

Those materials that are accepted at the plant are identified by code and enter the firm's exact process inventory. From this point on, the precise location of each product can be quickly determined by company personnel. Storage facilities for bulk deliveries consist of approximately 1.5 million gallons of closed tankage, ranging from 3,000 to 35,000 gallons per tank

The storage tanks are constructed of a variety of materials, including carbon and stainless steels, glass and rubber linings, and resin coatings — different products are assigned to tanks based on their chemical characteristics.

Separate storage facilities are maintained for incoming wastes, feedstocks for various recovery processes, and tanks for the finished products that the company manufactures and markets



**This 40-tray stainless steel distillation tower represents one of the processes by which Chem-Trol recovers the chemical and energy values of incoming wastes.**

Chemical discards from many sources are held in the inventory until they can be utilized by the process in a smooth and practical way

From the customer's viewpoint, sending the wastes to a central processing site eliminates secondary effluent problems, and the need to test and monitor the bothersome discards. Shipping the wastes out effectively transfers a problem, allowing the manufacturer to concentrate on more primary and productive concerns

Chem-Trol, however, sees the wastes products in an entirely different light. The ability to collect, store and refine large volumes of discards transforms the wastes into useful raw materials. Large quantities of waste acids, for instance, can be used to neutralize discarded alkalis, should a manufacturing company attempt the same process, raw materials would have to be purchased and the problem of secondary effluents would have to be faced

Separate consideration is given to each of the more than 2000 wastes products that are regularly accepted at the facility. Some require pretreatment, some do not. Where necessary, materials are converted either chemically or physically into forms that can be co-mingled with other materials for joint treatment.

At the Model City site, the emphasis is always on recovery This thrust is indicated by the fact that when a particular lot is ready to be processed, "manufacturing instructions" are

## Chemical Wastes

# Reuse Strongly Emphasized; Disposal Considered Last Resort

placed on the waste substances. Disposal is considered only as a last resort. Even when material is routed to the landfill, a three dimensional inventory is maintained, showing exactly where everything is buried, so that at a future date the material can be retrieved and further worked by new technologies.

One resource recovery process used at the facility is fractionating taking a mixture of waste materials and separating the component parts according to physical properties in a boiling situation. This takes place in a stainless steel distillation tower, equipped with 40 trays The process is based on the theory that every material has a specific boiling point and will come off on one of the trays.

Heat is applied at the bottom and as material rises through the tower it gets cooler, allowing substances to be separated on the basis of their different boiling temperatures. Material that boils at the lowest temperatures will rise highest, condensing only when it reaches the trays on the top of the tower, where the temperatures are the coolest Heavier materials, that require high temperatures to come to a boil, will condense closer to the source of heat in the bottom of the tower

Materials recovered through the process are circulated for blending, to make sure that they are uniform throughout. A sample is taken to laboratory for analysis to ascertain that the product meets specifications, and then it is marketed back to industry.

Some of the reclaimed materials can be sold to industry on the basis of their chemical values, others are recovered for their energy value and marketed as specialized industrial fuels, part of the firm's Trol-Fuel family of products

These liquid fuels are composed of mixtures of solvents, oil-type materials and other chemical wastes. A few years ago, such waste products were fed into the facility's thermal oxidizer and burned

Trol-Fuels are not chemically identical to fuel oil and require some modifications in the customer's storage, handling, pumping and burning systems Once the conversion is made, the buyer can utilize both Trol-Fuels and regular fuel oil The savings are such, the company claims, that the investment is paid back within a year.

Marketing efforts are aimed primarily at the industries which supply the waste materials in the first place Edward R Shuster, manager of technical services and market development, explains a manufacturing company is offered a total wastes program in which its discards are processed and a specialized industrial fuel is returned in place of the wastes As such, about seven million gallons of Trol-Fuels are now being sold in bulk quantity

### Generators of wastes provide market for recovered fuels

Wastes that have no reuse value are fed into the facility's thermal oxidizer, where combustion takes place at temperatures in the range of 2200-2700 degrees Fahrenheit. This process is fueled exclusively by other wastes materials and reduces all substances to carbon dioxide and water which are released into the atmosphere, or materials of an oxide or acid form which are scrubbed out, creating a small amount of sludge.

In the thermal oxidation process, there is an area of intense heat, where the burning takes place, and a secondary zone, where waste water is sprayed to cool the gases, in order to render them scrubbable In this manner, large quantities of waste water are constantly being processed as hot gases burn out all organic components and convert the water to steam.

Other material is prepared for disposal by the neutralization of its acid or alkali nature

Only innocuous solid materials, primarily inorganics, are placed in the landfill Some contraction takes place as the proportionally small amounts of organic materials, buried in the fill, convert to carbon dioxide and water

The landfill, itself, rests on 55 feet of solid clay and reinforced hypolon liners are installed in each excavation. Thus, the three-dimensional cells — much like swimming pools — are sealed to prevent leaching. During filling, any rainwater that gets into the cells is withdrawn through a vertical standpipe and transferred to the company's aqueous wastes treatment facilities. Once the chambers have been filled and capped with clay, the rainwater can no longer penetrate the dry cells but runs off into ponds These ponds serve as a resource, since they provide water in case of fire — so far, they haven't been needed. This water is tested on a regular basis.

The company's advanced water treatment process is so complete that the discharge is referred to as recycled water rather than treated industrial wastes The chief chemist is so confident of its purity that he drinks some on occasion. ■

**The limited number of discards that have no reuse value are generally fed into the thermal oxidizer and burned at 2200-2700 degrees Fahrenheit**

MR. LEHMAN: Thank you, Mr. Shuster. Do we have some questions? Mr. Sanjour?

MR. SANJOUR: Mr. Shuster, both you and everyone else in the waste disposal business who has been up here today, has referred to the prime difficulty in your business as competition with shady waste disposers. And, since there is no one here from the shady waste disposal industry, I wonder if you could elaborate, for your entire industry, if you would like, to just what specifically do you mean by this kind of competition?

MR. SHUSTER: Okay, I would like to quote from Bill Burns, from the Department of Transportation, who is looking into that aspect of hazardous wastes and did visit our site and spent several days with our people, learning about hazardous wastes. He subsequently made a comment at a public meeting, I believe it was in Washington or else in Atlanta, to the effect that, there are approximately 80 businesses in the Buffalo area that do plating, generate plating wastes, and very few of these people are using our services. Now, everything has got to be someplace, you tell me where it is going. We know where it is not going, it is not coming to us.

I can't site authoritatively. There are cases where the generators themselves don't know where it is going. We have always put it into this strain and we still are. There are cases where material is being landfilled, that in our feeling should be treated, should be processed prior to landfilling. This is a substantial part of it, there is more of it that is going into sewers, in areas which are not served by modern secondary, tertiary treatment plants, where these things may be getting some kind of a crude pre-treatment, or possibly ust discharged raw. And these things will come to a screeching halt once the generators are forced to pre-treat effectively at their own plant and put this through a plant where they are going to be charged based on the parameters under the water regulations.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: On page 2 of your statement you say government should also consider incentive programs to encourage voluntary compliance. Would you elaborate a little bit on what you see happening there?

MR. SHUSTER: There are a number of these type things, to some degree some of these are being practiced now. We looked at tax incentives, in the form of rapid depreciation allowances, tax relief on processing equipment. You'd look at such things as the environmental bond programs where you would get a government guarantee behind your money. You would pay it back over a period of time. These are just some ways. The transportation aspect of it would be a substantial benefit to encourage people to ship wastes long distance to a processing center.

MR. LEHMAN: Mr. Kovalick?

MR. KOVALICK: I guess that sentence is full of interesting thoughts. I'll finish it and ask you about it. You say:and eminent domain actions where needed to assure appropriate siting of processing centers and disposal sites based on technological factors. That's one of the first comments we have had today, which I relate to one of our discussion questions, 14 on mechanisms and experiences for soliciting acceptance of hazardous waste facilities. Could you comment on that, since you have apparently suggested a fairly extreme solution.

MR. SHUSTER: I think this is going to be covered to a great degree by NSWMA. But as we all know, not only in the hazardous waste business but simply in the matter of landfills and solid waste resource recovery plants, the difficulty that we have encountered with local governments, regional and county governments, in getting the necessary local approvals to put in a facility of this type, and this is probably true in spades in the hazardous waste treatment business.

Now, our plant happens to be built on the site of an old TNT plant, and there is a rocket engine test center next to it and the Atomic Energy Commission has a place just to the south of us. But, had we not moved into an area that had the ideal geology and geography, market location and previous use and appropriate zoning for this kind of thing, I think it was once in a million lucky fluke that we found this kind of site that we are in. I know other people that are in this type of business, other people that have probably spoken today, have had troubles with their existing plants, with the feeling that they are a bad neighbor in the community. There is outright pressure on them either to go somewhere else or to disappear. But, as long as we want the marvelous consumer goods, that the marvel of the present day technology, chemical manufacturing gives us, we are going to have to address the subject of the wastes that come along with them, and place these plants where they need to be. They need to be placed where the geology, where the land use, where the population, a whole block of parameters are appropriate. And, you go through all this and then a local township or a county or some local unit of municipal government says, well we don't want that here.

We need to resolve that and one alternative solution is eminent domain, by the state, placing this on federal lands, which I think has been suggested on occasion in the past.

Does that answer your question?

MR. KOVALICK: Yes, thank you.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: One more if I may. You have advocated the use of private enterprise to, as a mechanism for treating and disposing of these types of wastes. You have also indicated that landfills are, at least at the present time, a part of this whole scheme as you see it. Given both of those things, could you comment on how we could insure perpetual care of these facilities, permanent monitoring for the long haul, things of that nature?

MR. SHUSTER: I don't have all the answers. One way in which we can do a simple record keeping job on where these sites are for future generations, who will probably go on long after all of us, is through recording this kind of information in the deeds on the property, where the recorder of deeds or the county treasurer, whatever office it is in your area that keeps track of the land, to record the fact that areas where residues from hazardous waste material processing have been buried, what is in there, at least in generic terms, and the location and so on. The kind of provisions that are made.

The best situation, if we had our brothers, would be to put these in places where they would take care of themselves after awhile. And in order to do this you have to do a substantial amount of treatment, to put them into a form, as I have mentioned, which would be compatible with the environment you are going to put it into. If you are going to solidify and fix heavy metals, which can be done, and you are going to put them in the ground, you want to put them in the ground where they are not going to be reacidified and dissolved and subjected to that kind of forces. Now, we can't really predict natural forces. We have some pretty good predictors but we still have uncertainty factors on them. This would be an example.

MR. LEHMAN: Another question? Mr. Newton?

MR. NEWTON: A question from the floor, Mr. Shuster. Is there any noticeable difference between the quantities of wastes you are receiving from states with regulations or strong regulatory programs than those you receive from states without such programs?

MR. SHUSTER: A leading question. Certainly this is a factor. Distance is a factor to some degree. I think that by and large once you get outside of your backyard market, that your business relates largely to the corporate citizenship attitude of the companies you are doing business with. They are willing to make this kind of additional voluntary investment in doing the job right. And, in working with us, certainly we haven't done all there is to do, and we are continuing our research and development programs and the dollars that these companies pump into our company, helping to support this. And, so, for this reason, I think that overwhelms the current regulatory aspect of it, to some degree.

MR. LEHMAN: Did you have another question, Mr. Newton?

MR. NEWTON: Also from the floor. Are you in favor of Federal hazardous waste legislation versus state legislation with reference to the NSWMA guidelines?

MR. SHUSTER: Okay, the NSWMA, we are now going into blindly, and I wasn't in on the inception of this, but I know that the people in the Office of Solid Waste Management programs have been, at least informally, over the back fence, involved in these things and they have put some personal comments in and things of this sort. So, I don't think that the NSWMA guidelines are contrary to Federal "druthers".

The desirable aspect of having Federal legislation here would be that the hazardous waste political community would be then taken out of the realm of state borders, where we feel that there has got to be a smooth inner flow of wastes from one state to another.

There are cases now where the whole transaction takes three or four states to complete, and so Federal legislation could aid on that basis. I think NSWMA, and I can't speak for them, but from my own interpretation is advocating these guidelines to states, because many states are moving ahead prior to Federal legislation being on the books and it would be nice if the states do move ahead, if most states had systems where the forms were at least a little bit alike and the programs were similar in their functional aspects, so that, for example, the manifest documents, that are generated in one state and went to a processor in another state, that it would be the same kind of a form that he would get from the other states he is doing business in. We are doing business in over 30 states now. And, the paperwork could get very hairy.

MR. LEHMAN: Mr. Shuster, I have a question. One of the discussion topics that we wanted to talk about today and hasn't been raised so far, I'll raise it with you and see if you have any comment. It concerns the Federal government itself as being a generator of waste, and the question would be, has your company ever been approached by an agency of the Federal government to have its wastes processed by you, and if so, under what conditions was that carried out?

MR. SHUSTER: We regularly and routinely do receive and process a number of industrial wastes from various Federal agencies, including Air Force, Army, EPA themselves, there is a long list of them and we could provide you that list. There is more of a need for this. For example, the U.S. Government operates the largest plating shop in the world at the San Diego Naval Base in California, and so there is a great need for that there as well.

I have spoken to a few people from EPA laboratories about what do you do with your laboratory wastes and there is not without some shuffling of the feet before we get the straight answer, and the answer is, we are glad to know about you fellows.

So, as it goes, everybody has wastes, there are household wastes which once you take them out of the aerosol can, the housewife throws in her garbage can, are hazardous chemicals by definition.

MR. LEHMAN: Okay, are there any other questions? I guess not. Well, thank you very much, Mr. Shuster. Next I would like to call Mr. Warren Kinsman of the Atlantic Terminal Corporation. Is Mr. Kinsman here? Yes.

MR. KINSMAN: Gentlemen, I'm going to direct my talk to primarily one phase of waste and this is lube oils.

My name is Warren Kinsman, Atlantic Terminal Corporation, we are a wholly owned subsidiary of the A. Johnson & Co., Inc. It is also an affiliate company of C. H. Sprague Co., well known marketers, of heating fuels in New England. We are a diversified company with interests in many fields. However, petroleum and petroleum related activities are our primary business in this area.

Reclamation of waste oils has rapidly become one of our major objectives, especially with the current concerns towards environment and conservation.

Our oil reclamation unit has been 5 years in developing, having done extensive research and development work in Ventura, California. Upon perfecting it, our first commercial size unit was constructed in Newington, New Hampshire in 1974. It is still being used considerably for extensive R&D work, as well as commercially treating waste lubes and oils.

The unit itself, in very basic terms, is a thermal distillation process for reclaiming waste oils. It has several unique features that make it the most efficient and effective way of recycling used lube and waste oil in the country today. It is a completely enclosed system, and every precaution has been taken to make it the cleanest and most environmentally safe unit in the industry. We have welcomed many visits from both state and Federal E.P.A. people, and have received nothing but praise regarding our entire operation.

Contrary to the outdated acid-clay method of treating waste lubricants, we have much greater flexibility with our unit. It has tremendous emulsion breaking capacity and allows us to handle a wide variety of feedstocks. To date we have effectively handled waste crankcase oils, tank bottoms, a variety of industrial slop oils, ship bilges or bottoms and oil from various spills. We do not produce quantities of contaminated acid-clay that present a disposal problem. Our system is also designed to produce more than one type of finished product, allowing us great versatility in meeting market conditions. Our intent, in the near future, is to batch process oil from industry and return them in their original state, at a great cost saving, with conservation of a valuable natural resource a major aim.

While we are able to handle most forms of hydrocarbons, it should be noted that there are several items we cannot, or will not accept. They are as follows: chlorinated hydrocarbons, volatile solvents, some cracked hydrocarbons, synthetic oils, coal tar and their derivatives and water soluble oils.

Naturally, on any questionable products, we have the ability to do a complete lab analysis prior to acceptance or denial. Our lab is equipped to handle the entire range of hydrocarbon products, from light hydrocarbons, such as methane, ethane, etc., to heavy residuals such as Bunker-C or asphalt. We have some of the most modern equipment available for many tests, and are unique in New England for our depth of analytical coverage for hydrocarbon analyses.

In addition to routine analyses our staff (two chemists and several technicians) conduct research amd development work on new methods for converting wastes into assets. Our R&D equipment includes: Atomic Absorption Spectrophotometry, Gas Chromatography, X-ray Flourescence, Spectrophotometry and Column Chromatography, to name a few.

Lastly, we have a complete effluent analysis lab, which includes a state-of-the-art, two minute automatic analysis for Chemical Oxygen Demand, as well as the usual Biological Oxygen Demand, Oil & Grease, Total Suspended Solids, pH, etc.

Regarding the actual operation of the Oil Reclamation Unit, our gross energy balance is a very favorable 6% or 6 gallons of fuel necessary to process every 100 gallons of waste oil. Our average recovery rate of usable products is 90%, after deducting bituminous solids and water from the feedstock. Naturally, these figures can vary some depending on type of feed and desired end product. Our existing process capacity is 43,000 gal/day, however, the unit can be expanded if volume of feedstock demanded same. We currently operate in a tank farm area containing over 1,000,000 bbls of storage. Of this, we currently have 42,000 bbls allocated to waste oil. This allows us to handle large volumes at any one time. The bulk of our product comes in by truck, but we do have the capability to bring in barges at our deep water facility.

Our company is totally committed to waste oil recovery. Our opinion is that hydrocarbons are too valuable a resource to be used as road oil, or indiscriminately burned. It should be put to its best possible use if we are to conserve our own resources and become less dependent on foreign supplies, as well as protect the environment in which we live.

Already, many areas of the country are passing laws prohibiting road oil use, and the indiscriminate burning of crankcase oils. It is only a matter of time when these same laws will be passed in New England. There is much proven evidence that road oil and burning of untreated oils put thousands of tons of toxic materials into our air and water streams every year, and do nothing to conserve petroleum. Rigid controls are necessary regarding hauling, disposal, and end use if we are to obtain these goals.

Only a coordinated effort by industry, State and Federal government and the public at large will help us attain these goals. Generators of these waste oils and lubes must be made responsible for the way in which they are disposed, going only to government approved disposal facilities, keeping in mind that again, they should be reclaimed whenever possible. These generators should bear full responsibility of any costs or fines accrued for indiscriminate dumping which would affect the environment or create a loss of a natural resource. Upon receipt of the product, the re-refiner must bear these responsibilities.

Accurate records must be kept beginning with the source of the product, the hauler and the re-refiner or disposal agent. It must be determined quantities of waste generated by each plant, factor, etc., and these figures followed through to disposal or reclamation.

Until such a time as these laws and regulations are enacted, we will continue to diminish our resources and pollute our environment.

And, I would like to add to this that we look to the EPA to protect our environment, but we also hope that you people would be a leader in conserving our natural resources through reclamation whenever possible.

Thank you.

MR. LEHMAN: Thank you, Mr. Kinsman. Will you answer questions?

MR. KINSMAN:: Yes.

MR. KOVALICK: The first one from the floor. What happens to the lead in used motor oil and also the sulfur in the oil?

MR. KINSMAN: To date, I should say first of all the lead in our process, lead solids are oxidized, we do have some lead solids that drop out in our tank bottoms. This is, as I said, a thermal installation process. We are recovering 90% or better of the oils in the bottom of our tank, we are getting certain amounts of sludge. I should say we have been operating for better than a year now and we have not had to clean our tank bottoms yet. We are getting a build up of residue in there; this is where the lead is at this time.

Now, we have done extensive research and development work on this, and one favorable aspect of this has been that to date we have found, and this is strictly on lab test scales, that these bottoms will become intrained and become a very favorable additive to asphalt if added in the proper quantity. In fact, it can be an asphalt additive that will increase the ductility of the asphalt, and reduce the overall cost of the product.

Hopefully, we will be able to develop a commercial market out of this, which will be one way of disposing of it. As I said, we really haven't generated large quantities to date. I would say right now, if we were to dispose of this product right now, today, it would have to go to an improved incineration site, but this has not been the case.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: I have a two part question here from the floor. I guess actually you have answered the second part, so I'll ask only the first. What do you do with filter cakes containing 10 to 15% oil? Do you handle things like that?

MR. KINSMAN: I don't understand the question. Are you talking water primarily? We don't use the clay treatment.

MR. LINDSEY: I think the question should be, do you handle only liquid wastes or do you handle solids that have liquid waste oil embedded in them?

MR. KINSMAN: No, we do not handle solids. It has to flow. As I said, initially, we handle crankcase oil, which is a small percent of our feed and is one reason lead hasn't been a really big problem yet. The bulk of our product has been coming from tank bottoms from tank firms, primarily No. 4 oil, No. 6 oil. We have been getting a lot of oil spilled material. Again, this is heavily contaminated with water.

We have taken some contaminated product off of ships, again working with the Coast Guard, we have taken contaminated products from the government, the Air Force particularly.

MR. LINDSEY: Another question from the

floor. Other speakers have referred to the transporter or hauler being controlled or regulated as you do, can you elaborate on how you visualize that?

MR. KINSMAN: Yes, I think that the hauler certainly has an obligation. I also feel the producer of the waste has an obligation to see that it goes to an approved hauler to an approved disposal site. Now, we work two ways ourselves. We take full responsibility of the product if we haul it in our own vehicles. However, I would say that 30 to 40% of our product comes from outside haulers, they are responsible for the product until it is disposed at our plant.

MR. LEHMAN: Do we have any other questions? I guess not. Thank you very much, Mr. Kinsman.

Ladies and gentlemen, we don't have enough time really, to have another speaker before we have our scheduled break, so I think we'll have it now. Before we do that I just want to say that I believe we have made excellent progress today, and it appears that we will be able to finish the scheduled speakers in the allotted time period, finished by 5:30 this afternoon, and we will not have to go into an evening session. So those of you who have perhaps travel plans are probably glad to hear that.

So, at this time we will take the break

a little early.

(Whereupon a break was taken.)

MR. LEHMAN: I would like to open the meeting again now after our break. I would like to call as the first speaker in this part of the session, Mr. Robert Canace of Maplewood, New Jersey. Mr. Canace.

MR. CANACE: Good day. My name is Robert Canace; I am a graduate student in geology at Rutgers University, here in Newark. I have prepared a statement and I would like to read it to you.

By concentrating on hazardous waste sources we can, by extension, ameliorate management problems at the disposal end. A prevention-oriented approach would reduce problems associated with non-radioactive hazardous wastes and those that are radioactive.

With respect to non-radioactive wastes, I offer the following recommendations:

a) Require pre-market screening of potentially dangerous substances. For dangerous substances, reuire a statement or available substitutes and alternatives.

b) Private interests should divulge research findings on health aspects of the toxic substances they produce and use. Testing should be done by EPA-prescribed methods and conclusions as to a substance's carcinogenicity, mutagenicity, etc., should be reported to the EPA. Regular consideration should be given to disallowing the continued use of substances found to be highly detrimental to the biosphere.

c) Consider on-site storage of wastes in a prescribed manner to allow for management solutions to arise and a management industry to develop.

d) Detoxification of existing hazardous waste stockpiles is an urgent need. Existing stocks of chlorinated still bottom residues can be subject to chlorinolysis to convert thosetoxic wastes to carbon tetrachloride and hydrochloric acid. Large volumes of the latter should present a less severe problem than stockpiles of Vietnam-era defoliants, banned insecticides, polychlorinated biphenyls, etc.

e) Recent alarm concerning the health aspects of PCB should be taken with utmost seriousness. A moratorium is needed on discharging PCB's into rivers like the Hudson, until the epidemiological consequences of PCB in the physical environment can be more firmly established.

f) There is a need to regulate interstate traffic of toxic wastes. Some states New Jersey for instance, have accommodated themselves to those seeking outlets for hazardous wastes and as such carry a disproportionate burden of the danger.

g) In-state there is a need for toxicity-oriented land disposal. California has a landfill designation system that should be examined for possible nationwide application. Land disposal sites should be classified on the basis of their geology, hydrography and their relationship to population. Wastes of various toxic levels can then be relegated to disposal sites fit to accept them.

h) Existing land disposal sites should be monitored regularly for a broad range of leachates. University based labs could be established to regularly analyze and report on water quality in proximity to disposal sites.

j) The many cases of accidental contamination point to the need for obvious and ubiquitous labeling of dangerous substances. Container manufacturers could be the ones to which the responsibility of labeling is given. As trite as it may sound, the Jolly Rodger (skull and crossbones) is universally understood to represent poisonous qualities; it should be blatantly and indelibly embossed on all toxic waste containers, for the sake of the public.

In the absence of large-scale plutonium recycle and breeder reactor "burn-up", radioactive waste management must be commensurate with the magnitude of demands imposed by trans-uranium contaminated wastes -- high-level radioactive wastes with long half-lives. This calls for solutions which will stand the trials of millenia.

Promise for geologic disposal of radioactive wastes faded with the AEC failure of actively-pursued salt-deposit emplacement at Lyons, Kansas and Carlsbad, New Mexico. ERDA continues to balk at engineered Retrievable Surface Storage. And the track record and reprocessing facilities (West Valley, New York) and the Federal waste repositories (Hanford, Wash., Valley, New York) and of the Federal waste repositories (Hanford, Wash., Savannah River, S.C. and Idaho Falls, Idaho) is badly stained. A lack of disposal options causes "rubbernecking" throughout the entire nuclear fuel cycle-- witness the stockpiling of wastes at West Valley, New York, for the improvement and expansion of that facility.

Therefore, with respect to radioactive wastes, diminishing the quantity is the only foreseeable way in the near term to mitigate potentially extreme adverse impact. In light of existing technological options, radioactive waste reduction can only be accomplished through a moratorium on commercial nuclear power generation and weapons production.

Existing radioactive waste stocks should be converted to a dry calcine product to reduce the potential for contamination via leakage of "hot" liquid wastes.

In conclusion, hazardous wastes are both perplexing and frightening. Toxic wastes denote morbidity, which demands high priority research and development initiative. The Environmental Protection Agency should continue to solicit advice from the public, the private sector and academia, in formulating hazardous waste management policy.

Thank you.

MR. LEHMAN: Thank you, Mr. Canace. Do we have any questions. Are you willing to answer questions?

MR. CANACE: Yes, I would.

MR. LEHMAN: Do we have any questions from the audience or from the panel? Mr. Kovalick:

MR. KOVALICK: Your Point G, where you noted in state, referring to New Jersey, I imagine, there is a need for toxicity oriented land disposal. Could you elaborate a little bit on that? From your geological background or are you referring solely to the California system there?

MR. CANACE: Well, the California system is based on, I guess, inertness of environments, if you have a geographically inert environment you can in that environment emplace wastes that are more toxic than in a leachate pond fill, for instance. This is what I mean, the more toxic the fill, the more inert the environment should be in which it is in place, if land disposal is to be used.

MR. LEHMAN: In any of your studies, have you attempted to look at the geology of your home state, for example, New Jersey, to see whether there are areas within the state that would fall into the various categories you are talking about?

MR. CANACE: Not formally, no, but in general, this being a very moist state, I'd have to say no.

MR. LEHMAN: Are there any other questions of Mr. Canace? I guess not. Thank you very much, Mr. Canace.

Next I would like to call on Mr. John E. Witty of the U.S. Soil Conservation Service.

MR. WITTY: Thank you. My name is John Witty, I'm a soil scientist working for the Soil Conservation Service with headquarters at the Northeast Technical Service Center in Broomall , Pa. And I have a very brief position statement to read, presented by the Soil Conservation Service.

For disposal of many kinds of hazardous wastes, the safest method is land disposal. The capacity of the soil to safely absorb and hold such materials is influenced by its chemical and physical properties, including: Cation exchange capacity, percent base saturation, pH, organic matter content, permeability and depth.

These properties are identified by soil surveys prpared by the U.S. Soil Conservation Service. Such soil surveys are completed for nearly 60 percent of the land in the United States.

For disposal of specific hazardous wastes, soil chemists and physicists of the SCS, using data from soil surveys, can determine the limiting soil properties and make useful evaluations of the potential of soils at specific sites to safely dispose the wastes.

Thank you.

MR. LEHMAN: Thank you, Mr. Witty. You have a question, Mr. Sanjour?

MR. SANJOUR: I wonder what kind of data you have to support the statement in the case that disposal of many kinds of hazardous wastes, that the safest method is lime disposal. I ask the question because our research in the EPA in recent years, the more we learn I think the less confidence we have in that kind of statement. Specifically, our recent research has shown cation exchange capacity doesn't really have much effect, that the organic matter is capable only up to a point of attenuating and when loading, more typical of what is actually practiced, in fact the attenuation practice breaks down. I was just wondering whether you have done research or have data, on what basis these conclusions are founded.

MR. WITTY: Well, things like cation exchange capacity, the soil has, the higher the capacity it is for absorbing certain kinds of heavy metal for example, and in sand which may have very low exchange capacity.

MR. SANJOUR: Is this based on theoretical considerations or have you actually studied disposal sites or done laboratory experiments of wastes, or something of that nature?

MR. WITTY: Most are theoretical considerations, yes.

MR. LEHMAN: Another question?

MR. KOVALICK: A question from the floor. Of what value are soil conservation surveys below 4 feet from the surface? I guess another way of asking it, is your data base, what portion of the soil did your data base complete?

MR. WITTY: It is based essentially on the upper five feet, below that we have to go more to the geological kind of information.

MR. LEHMAN: Mr. Witty, your statement leaves one to believe that SCS is perhaps available for consultation to various people who are interested in these aspects.

MR. WITTY: That is true.

MR. LEHMAN: That is true, that if someone wanted to talk to you about these aspects that they could contact SCS and get some help, some technical assistance?

MR. WITTY: Yes.

MR. LINDSEY: I guess related to that, more specifically, can or does your agency, Soil Conservation Service, recommend a specific site for specific wastes?

MR. WITTY: We have prepared guidelines for evaluating the soils for some kinds of waste, not all kinds and these guidelines would be available for evaluating soils for a specific site, a long list, you need the soil survey, the maps and so forth.

MR. LINDSEY: Are those sufficiently formulated that you could submit them for the record to the address in the Federal Register?

MR. WITTY: Pardon?

MR. LINDSEY: Could you submit them for the record or are they voluminous?

MR. WITTY: I brought along a draft of a set of guidelines that I'm working on now and I could send that to you later.

MR. LINDSEY: If you would please.

MR. LEHMAN: I have another question, Mr. Witty. You indicated that soil surveys are completed for 60% of the land in the U.S. Could you characterize in general what the geographical areas are that are completed, or another way, those that are not yet completed, or is it sort of a patchwork quilt all over the U.S.?

MR. WITTY: It is patchwork type of completion; in the more populated areas we have a higher density of the surveys completed. In the Far West, for example, in the range country, they are not completed to the extent that they are here.

Now, I believe that 60%, it is the 60% that we have mapping completed, I suspect that there is somewhat less than that 60% that is actually published. It's probably around 50% that is published, but I'm not sure on that.

MR. LEHMAN: Mr. DeBonis?

MR. DeBONIS: Would it be safe to say that a state like New Jersey is 100% all completed?

MR. WITTY: No, it is not

**UNITED STATES DEPARTMENT OF AGRICULTURE**

**SOIL CONSERVATION SERVICE** - Northeast Technical Service Center
1974 Sproul Road, Broomall, Pennsylvania 19008

SUBJECT. Hazardous Waste Management - Public Meeting, 12/2/75, Newark, New Jersey

DATE December 3, 1975

TO: John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs (AW-565)
Environmental Protection Agency
Washington, D. C. 20460

At the public meeting in Newark, New Jersey, on the above subject, Mr. Walter W. Kolvalick, Jr. requested me to send you some of the guidelines, developed by the Soil Conservation Service, for selecting sites or rating soils concerning their limitations for use in land treatment systems of wastes. Mr. Kolvalick requested that this information be entered as part of the records.

I am sending two items:

1. A draft of a paper titled "Site Selection as Related to Land and Soil Properties" by John E. Witty and Klaus W. Flach, and

2. Guide for Interpreting Engineering Uses of Soils, USDA, Soil Conservation Service.

Limitations for using these kinds of guides are discussed in both the paper by Witty and Flach and on page 2 of the "Guide for Interpreting Engineering Uses of Soils."

I believe the two enclosures pretty well describes how soil surveys can be used for aiding in the selection of sites for land based treatment systems of wastes.

John E. Witty

JOHN E. WITTY
Soil Correlator (Class. & Corr.)

ITEM #2 DETACHED AND RETAINED IN SOLID WASTE MANAGEMENT FILES

Enclosures

cc:
J. D. Rourke

D R A F T

Paper presented at the SSSA Symposium on "Soils for Management and Utilization of Organic Wastes and Waste Waters." Muscle Shoals, Alabama, March 11-13, 1975.

SITE SELECTION AS RELATED TO LAND AND SOIL PROPERTIES

by

John E. Witty and Klaus W. Flach[1/]

The purpose of this paper is to discuss site selection criteria for management and utilization of organic wastes and waste waters with emphasis on land and soil properties. Criteria or properties considered are those that will lead to the utilization or disposal of wastes without causing environmental problems outside the site perimeter and any buffer zones. The basic objective, therefore, is to utilize or dispose of the wastes in such a way that they are either rendered harmless or prevented from moving onto adjacent land, into surface waters, into the ground water, or into air.

In discussing site selection criteria, one can give only general principles that apply to wastes from many sources and to waste management systems that are in common use. Soil chemical, physical, and biological properties related to waste interactions with soils are discussed in earlier chapters. The list of soil properties, their limits, and intra-actions is almost infinite. However, some properties may be crucial for a specific waste disposal problem at a given location but may be unimportant elsewhere. Also one set of properties of a given soil may maximize its ability to renovate wastes, another set may minimize its ability to accept significant amounts of wastes, and a third set may even influence management of the disposal site. Final decision as to whether a site should or

1/USDA, Soil Conservation Service, Broomall, Pennsylvania and Washington, D.C.

should not be used for a specific system almost always represents a compromise. The properties of many soils are known and can be used to make initial selection of disposal sites. Additional studies may be needed, however, to determine soil properties that may be critical for a specific use.

Three general sets of criteria can be considered: First, those criteria that are important if the soil is to act primarily as a container for highly concentrated wastes and where the wastes do not interact with the soil to a significant degree, such as in sanitary landfills or in feedlots; second, those criteria that are important if the soil is to react with important components of the wastes so as to immobilize or destroy them and where utilization is not or cannot be a primary consideration. Examples are sewage effluent disposal sites or sludge disposal sites; and third, those criteria that are important if waste utilization is the primary consideration.

Each of these three sets of criteria is discussed with emphasis on soil properties, followed by a discussion on the use of soil surveys as an aid for locating potential sites and some hydrological and geological considerations in selecting potential sites. Regional limitations such as soil temperature, length of growing season, or amount and distribution of precipitation are not discussed. The above items are important considerations for regional planning, however, because they do affect decisions on the feasibility of soil-based systems or on costs if winter storage facilities are necessary.

The following presentation is centered around guidelines (Tables 1-5) that have been developed and are now being used by the Soil Conservation

Service. However, these quidelines are under continual review and subject to change from time to time.

In these guides, individual critical soil properties are rated as to how severely they limit the usefulness of soils as treatment media for certain wastes. No attempt is made to evaluate the ease with which limitations can be overcome through appropriate design of the system or through modification of the soil.

The approach is simple and can serve as an initial guide in rating kinds of soils on the basis of criteria that have been published (Soil Conservation Service, 1971) or are available in computer storage for the 11,000 or so soil series of the United States.

I. SITE SELECTION CRITERIA FOR WASTES DISPOSED ON LAND AT HIGH RATES

Examples where wastes are concentrated or applied at high rates include sanitary landfills, sewage lagoons, feedlots, and areas of stockpiled organic material. The wastes, when disposed on land, are generally highly concentrated in small areas and have a high potential for causing environmental problems. Of prime importance is the design of facilities and proper management of the wastes because the soil will not normally have the capacity to dissipate them adequately. The basic function of the soil is to act as a container. Proper site selection can greatly reduce the problems of design and management.

A. Sanitary Landfills

The process of sanitary landfilling is to bury wastes in soil. Loughry (1974) described four functions that soil has in relation to landfills, as follows:

1. Soil serves as container and support.
2. Soil serves as the most commonly used cover material.
3. Soil retains intermediate products, providing time and a favorable medium for change and recycling of some of the wastes.
4. Soil, if used as the final cover material, supports vegetation and can be used for farming, forestry, or recreation.

The Soil Conservation Service (1971) has published guides for assessing the suitability of different kinds of soil for sanitary landfills. Two guides are provided, one for the trench-type sanitary landfill and the other for the area-type sanitary landfill.

1. Trench-type Sanitary Landfill

The trench-type sanitary landfill consists of trenches in which refuse is covered at least daily with a layer of soil material at least 15 cm thick. Soil excavated in digging the trench is used as the covering material. When the trench is full, the landfill is covered with a layer of soil material at least 60 cm thick.

Table 1 lists the soil limitation ratings for the trench-type sanitary landfill. Soil properties considered are: depth to seasonal high water table, soil drainage class, flooding, permeability, slope, soil texture, depth to bedrock, stoniness class, and rockiness class. The degree and duration of soil wetness as related to seasonal water table, soil drainage class, and flooding are considered because they affect earth moving operations and the likelihood of contaminating the ground water. As degree of soil wetness increases, the site becomes increasingly less suitable as a sanitary landfill site.

Soil permeability is important because it affects vertical or lateral movement of leachate. Soils with low permeability are most desirable because seepage is minimized.

Soil slope is an important consideration since it may affect runoff and ease of constructing trenches and roads. On moderately steep and steep soils, leachate may concentrate in downslope trenches (Apgar et al, 1971) thus increasing the potential for ground water pollution.

Soil texture affects the workability and trafficability of the soil, both wet and dry. Soils with textures that are workable over a wide range of moisture content are most desirable. Many coarse-textured soils have a low degree of workability and trafficability when dry, while many fine-textured soils have low workability qualities when either wet or dry. The final cover should be soil material that is favorable for plant growth.

Bedrock, stoniness, and rockiness affect the ease of excavating trenches to suitable depths. Fractured bedrock immediately underlying the trench also creates a potential for the pollution of ground water.

2. Area-type Sanitary Landfill

In this type of landfill, waste is placed on the soil surface and covered with soil. The waste is covered daily with at least 15 cm of soil and is covered with soil at least 60 cm thick when the landfill is completed.

Table 2 lists soil limitation ratings for the area-type sanitary landfill. Soil properties considered are: depth to seasonal water table, soil drainage class, flooding, permeability, and slope. The importance of these properties for workability or potential pollution of ground water is the same as discussed above for the trench-type sanitary landfill. Stoniness, rockiness, or bedrock are not important considerations because no excavating is done in the area-type sanitary landfill.

The daily cover material and final cover material for the area-type sanitary landfill generally must be imported from other soil areas. A table giving the "suitability ratings of soils as sources of cover material for area-type sanitary landfills" has been prepared by the Soil Conservation Service (1971). This table is not included in this paper; soil properties listed for the cover material are moist consistence, texture, thickness of material, coarse fragments, stoniness, slope, and drainage class. Soils with very friable or friable consistence are good sources of cover material, those with loose or firm consistence are fair sources, and those with very firm or extremely firm consistence are poor sources. Soils with good textures for cover material include sandy loam, loam, silt loam, and sandy clay loam; those with fair textures are silty clay loam, clay loam, sandy clay and loamy sand; and those with poor textures are silty clay, clay, muck, peat, and sand. Thick, well drained soils with gentle slopes and without coarse fragments are better sources of cover material than shallow, gravelly or stony soils or soils in wet areas.

## B. Sewage Lagoons

A sewage lagoon or stabilization pond is a flat-bottomed pond used to hold sewage for the time required for its bacterial decomposition

(Soil Conservation Service, 1971; Clark et al, 1971). In sewage lagoons the soil serves two functions: (1) a container for the impounded sewage, and (2) material for the enclosing embankment. The lagoon must be capable of holding water with minimum seepage. Material for the enclosing embankment does not have to come from the sewage lagoon site.

Table 3 gives soil limitation ratings for sewage lagoons. Criteria considered are: depth to water table, permeability, depth to bedrock, slope, coarse fragments less than 25 cm in diameter, percentage of surface area covered by coarse fragments more than 25 cm in diameter, organic matter, and Unified soil classification groups.

Depth to water table is important in that water should never rise high enough to enter the lagoon. If, however, the floor of the lagoon consists of at least 60 cm of essentially impermeable material, depth to water table can be disregarded. If the floor of the lagoon consists of slowly permeable material, at least 120 cm of material is needed between the bottom of the lagoon and the seasonal water table or any cracked and creviced bedrock.

Limitation classes for slope are determined by the requirement that, for the lagoon to function properly, the liquid depth should range from 60 to 150 cm. The slope must be sufficiently gentle and the soil material sufficiently thick over the bedrock to make land smoothing practical so as to obtain a uniform depth in the lagoon.

A high percentage of coarse fragments interferes with the manipulation and compaction needed to prepare the lagoon properly; hence, limitation classes for coarse fragments should be considered.

Soils subject to flooding are normally unsuited as sites for sewage lagoons because of the potential of floodwaters to mix with and carry away polluting sewage before sufficient decomposition has occurred. If, however, floodwaters do not damage the lagoon embankment or do not overflow the lagoon, this limitation does not apply.

Soil materials placed in the Unified soil classification groups (U.S. Army Corps of Engineers, 1968) of GC, SC, CL and CH (defined below) can be compacted to a satisfactory low permeability for a lagoon bottom. The coarse groups with few fines and soil materials high in organic matter have severe limitations and are poorly suited. Soil materials in the Unified soil classification groups GM, ML, SM and MH are suitable if properly compacted or used in combination with soils classified as GC, SC, CL, and CH.

The Soil Conservation Service (1971) has published a guide showing the general relationships between the Unified soil classification groups and USDA texture classes. The relationship is not perfect but it can be used for predicting the likely group or groups for each textural class. The following shows a simplified relationship between the Unified soil classification groups listed above and the USDA texture classes.

GC - very gravelly silty clay loam, gravelly silty clay loam, and very gravelly silty clay.

SC - heavy sandy loam, sandy clay loam, and sandy clay.

CL - heavy silt loam, clay loam, and silty clay loam.

CH - heavy clay loam, heavy silty clay loam, silty clay, and clay.

GM - very gravelly sandy loam, very gravelly loam, very gravelly silt loam, and gravelly silt loam.

ML - fine sandy loam, very fine sandy loam, loam, silt loam, and silt.

SM - fine sand, very fine sand, loamy sand, sandy loam, and fine sandy loam.

MH - silty clay loam and clay loam.

The Soil Conservation Service (1971) has rated separately soils that are suitable for lagoon embankments and those that are suitable for lagoon floors. Properties considered in rating soil materials for their suitability as lagoon embankments are: sheer strength, compressibility, permeability of compacted soil, susceptibility to piping, and compaction characteristics. They are evaluated for each Unified soil classification group. Basically, soils in the Unified soil classification groups listed as having slight limitations for the floor of a sewage lagoon are also suitable for the embankment.

C. Feedlots

Under this subheading, major emphasis is placed on site selection for animal pen areas. Criteria for selecting sites for lagoons or catch basins associated with pen areas are virtually the same as those discussed in the previous section on sewage lagoons. If the manure is stored outside the pen areas, then criteria discussed under the subheading "Areas for Stockpiled Organic Materials" apply.

General guidelines for evaluating soils for feedlots have been published by the Environmental Protection Agency (Kreis et al, 1972).

The guidelines specify that soils with slopes of 2 to 6% are suitable and that highly permeable loose soils, shallow soils over fractured bedrock, and soils with a shallow water table should be avoided. Sloppy pen conditions may develop if the slope is less than 2%, and uncontrollable runoff may occur if the slope is greater than 6%. Loose, shallow, or wet soils may lead to contamination of ground water.

If a feedlot is managed properly and continuously stocked, and a manure mulch left after cleaning, an impermeable layer forms at the manuare-soil interface that effectively seals the floor of the feedlot against downward movement of pollutants (Elliott et al, 1973; Mielke et al, 1974). This seal apparently forms in any soil regardless of texture or permeability. Therefore, texture and permeability are not considered in rating except for very rapidly permeable soils (>50 cm/hr.). These may have moderate limitations because of the potential instability and time lag before a seal forms.

Soil drainage is important because of its effect on trafficability. Well drained, somewhat excessively drained, and excessively drained soils as well as sloping, moderately well drained soils have slight limitations; poorly and very poorly drained soils have severe limitations. If slopes are less than 2 or 3%, however, moderately well drained soils have moderate limitations and somewhat poorly drained soils have severe limitations.

Soil slope is important; erosion is a hazard on steep slopes but sloppy pen conditions may result if the soil are level or nearly level. Gilbertson et al (1970) reported no significant difference in runoff volume or solids removal from feedlots near Mead, Nebraska, having slopes of 3, 6, and 9%. Swanson et al (1971), however, found that in eastern Nebraska a feedlot with 13% slope lost more solids than one with an 8.5% slope. This indicates that possibly slopes as high as 10% have slight limitations while steeper slopes might have moderate or severe limitations. The slopes in these studies, however, were relatively short, about 30 meters and less, and may not represent solids removal for longer slopes under similar precipitation characteristics. E. J. Monke (Department of Agricultural Engineering, Purdue University, personal communication) and N. P. Swanson (Agricultural Research Service, University of Nebraska, personal communication) suggests general slope limitation classes of 2 to 6% as slight, 0 to 2 and 6 to 10% as moderate, and greater than 10% as severe. N. P. Swanson also suggests that if snowmelt or rainfall is not a problem, soils with slopes of 15 to 20% should be useful for feedlots. Slopes steeper than about 20% present a safety hazard for machinery operations. Hence the general slope guidelines, as given above, should be adjusted according to snowmelt or precipitation characteristics.

Depth to bedrock should be considered because it affects feedlot construction if terracing or, on level soils, mounding is required. The soil must be deep enough so that the feedlot can be cleaned properly and revegetated when it is abandoned. This is important to remove nitrogen compounds that might otherwise pollute the ground water (McCalla, 1972). Depth to bedrock should probably be more than one meter.

Stones affect feedlot construction and cleaning. Stoniness classes of 0 and 1 present slight limitations, 2 and 3 present moderate limitations limitations, and 4 and 5 present severe limitations (Soil Survey Staff, 1951).

D. Areas for Stockpiled Organic Materials

The stockpiled materials considered here are organic materials handled as solids rather than as liquids. Materials are stockpiled in open piles and are not covered with soil material as in sanitary landfills. The materials may be stockpiled for either a short or long time but the site is used continuously. Of primary concern here are animal wastes but included are organic materials such as logs in the lumbering or pulp industry, sewage sludge, leaves, or other kinds of organic materials that are composted in large quantities. It is assumed that the stockpiled materials are managed to minimize odor and vector problems. The primary function of the soil is that it serves as container and support.

Specific guidelines have not been published. The same soil properties and limitation ratings used for making soil limitation ratings for the area-type sanitary landfill (Table 2), however, can be considered.

II. SITE SELECTION CRITERIA FOR WASTES DISPOSED ON LAND AT LOW RATES

Under this heading are discussed criteria for selecting sites on which wastes can be applied at a rate that is in equilibrium with rate of decomposition. Hence the site should be usable on a continuous basis. Side benefits may be realized, such as harvestable crops or recharge of ground water, but the primary objective is to dispose of wastes.

Kinds of wastes disposed of on land at low rates may be sewage sludge, sewage effluent, animal wastes, and cannery wastes. The major function of the soil is to dissipate the wastes, to recycle them through crops, or to purify them through filtering and adsorption.

The Soil Conservation Service has prepared an interim guide that is being tested (Tables 4 and 5). Soil properties used to rate kinds of soils by this guide are: permeability, soil drainage class, runoff, flooding, and available water capacity.

Soil permeability influences length of time liquid wastes remain in the soil and potential loading rates. If permeability is very high, liquid wastes or soluble components of solid wastes may pass through a soil so fast that any potential pollutants are not adequately dissipated, especially during periods of high rainfall. On the other hand, if permeability is too low permissible application rates would be too low to be practical, or anaerobic conditions would be induced. Moderate and severe limitations do not apply for moderately slow, slow, or very slow permeabilities if layers having these permeabilities are below the rooting depth and evapotranspiration exceeds water added by rainfall and waste, or if solid waste is not plowed or injected into these layers.

In humid areas (udic moisture regimes), excess water in a soil can be predicted according to its soil drainage class. Soil drainage classes are a measure of the length of time the soil is naturally at or near saturation during the growing season. They reflect both the ability of the soil to remain aerobic and to support traffic. Well drained and moderately well drained soils are considered to have slight limitations, while excessively drained or poorly and very poorly drained soils have severe limitations.

It is important that the applied waste stay on the site, therefore soils are also rated for surface runoff and flooding. Runoff is closely related to infiltration rate, soil slope, and cover. It has been argued that the infiltration rate should be considered in rating soils for receiving liquid wastes. However, the actual infiltration rate depends so much on management practices that it is omitted from Table 4. If soil is managed to maximize infiltration, e.g., by maintaining plant cover, by keeping traffic to a minimum, or by interjecting drying cycles, then the effective infiltration rate is primarily dependent on soil permeability. The degree of soil limitation for runoff is given in terms of runoff classes as defined in the Soil Survey Manual (Soil Survey Staff, 1951). In general, soils that flood are considered to have severe limitations for disposal of wastes. If the soils flood only during the nongrowing season, however, they are considered as having only moderate limitations at some localities.

The available water capacity is primarily a measure of the capacity of a soil to supply moisture to plants. It is used here as a measure of the minimum soil volume needed to dissipate the wastes through plant nutrient uptake, microbial decomposition, and soil adsorption. The depth considered is from the soil surface to 150 cm, or to a limiting layer less than 150 cm deep. Soils with more than 15 cm available water have slight limitations, those with 8 to 15 cm have moderate limitations, and those with less than 8 cm have severe limitations. The moderate limitation, however, does not apply for liquid wastes in an arid climate.

## III. SITE SELECTION CRITERIA FOR WASTES UTILIZED FOR CROP PRODUCTION

Considered here are the organic wastes and waste waters that can be used as fertilizer, soil amendment, or irrigation water to supplement precipitation. For example, wastes may be used on golf courses, on parks, or for crops. Yield of vegetation or crop, rather than disposal of waste, is the primary objective. Although the site selection criteria concerning soil properties are practically the same as for waste treatment on land at low rates, they are discussed separately because of possible differences in the extent and distribution of suitable soils. Furthermore, arrangements for use of the wastes are usually made with individual landowners or governing bodies, such as an irrigation district. The parcels of land may be widely scattered and economic factors may influence the feasibility of the system.

The success of a project in which the primary objective is to utilize the waste ultimately depends on the value of the wastes compared with costs of alternative methods of satisfying the landowner's needs. Liquid wastes have much greater value in the arid western part of the United States than in the humid eastern part. As a rule, if arrangements for utilization of the wastes have to be made with many landowners, the total extent of soils with suitable properties must be much greater than if the municipality or industry purchases or leases land for its waste disposal. Under these circumstances the amount of land needed is likely to be inversely proportional to the value of the waste in a given farming system.

## IV. SELECTING A SITE

Soil surveys are probably the most useful single source of information for making initial judgments on the suitability of potential sites for disposal or management of wastes on land (Flach et al, 1974). Soil surveys are available for more than 40% of the country (Flach, 1974) and are generally available where soils are used most intensively. They consist of detailed soil maps usually at a scale of 1:31,680 to 1:15,840 on photographic background, a general soil map, description of the soils by series and mapping unit, data on engineering and agronomic properties of soils (usually with some characterization data on major soil series), and interpretive tables. Soil surveys are prepared by the Soil Conservation Service in cooperation with agricultural experiment stations and units of local government.

A report prepared by Sopper and Kardos (1972) regarding the suitability of soils in the Tocks Island Region of the Delaware River Basin for potential use of treated municipal sewage effluent is an excellent example of the use of soil surveys for making an inventory of potential disposal sites.

Sopper and Kardos reviewed published soil surveys and supplementary information for the area to establish criteria for the selection of desirable kinds of soil. After development of the criteria, the soils were evaluated and those that did not measure up to the standards were rejected. Next, suitable soils were located on soil maps, color coded, and acreages of the various soil parcels measured. This provided information on the extent and distribution of soils in the area which were potentially suitable for spray irrigation.

The guidelines discussed in our paper are useful as a first approximation for making a general survey of soil resources suitable for waste treatment systems.

The guidelines do not consider interaction among soil properties, between treatment systems, or combinations of soil properties. The guidelines consider soils in a pedologic sense. Also, they do not take into account underlying unconsolidated regolith that may be an important part of treatment systems, and they do not allow one to pinpoint soils with the best potential for a particular treatment system if all soils in the area available as treatment sites have the same degree of limitations.

More sophisticated and complex guides could be developed, but because of the large number of waste materials, treatment systems, and soils, the utility of such an effort is questionable.

Hence, after an initial screening using these guides, further evaluation is still necessary in which all information on the properties of soils of a given area and the requirements and alternatives of the treatment system are used.

Information on the properties of individual soils can be obtained from soil descriptions and tables of soil properties in published soil surveys (Table 6). A computerized inventory of properties of the 11,000 or so soil series in the United States is being prepared by the Soil Conservation Service. An example of the kind of data in the inventory is shown in Table 7. In addition, a great many site data, representative of many kinds of soils, are contained in the Soil Conservation Service, USDA, Soil Survey Investigations Reports and in other technical publications. In fact, for a first approximation, many soil properties important for waste treatment systems can be deduced from the placement of soils in Soil Taxonomy, the system of soil classification adopted by the National Cooperative Soil Survey. Hence, a competent soil classifier working closely with other specialists in soil science and with engineers, geologists, and hydrologists can identify potential sites that meet as many requirements as is possible for a given area.

In any case, practical experience with a specific kind of soil should be an overriding consideration in judging the suitability of a particular kind of soil. If a system works well in one area with a specific soil, it can be expected to do equally well with the same or a similar soil elsewhere.

Soil surveys, however, are concerned primarily with the top 2 meters of the regolith. For many disposal systems, particularly trench-type sanitary landfills and lagoons, the nature of the underlying unconsolidated material and the depth of the regolith to inert bedrock also must be determined. This is particularly important if the regolith is permeable and chemically active and if the rock is jointed, fractured, or contains other open channels such as tubes in basalt or solution channels in limestone. In addition, the hydrology of the site as it might be affected by the construction and the operation of the disposal site must be evaluated. For example, the site may have limited capacity to accept added waste water and the addition of waste water may cause the ground-water level to rise (Keeley, 1972); Parizek, 1973).

Some information on the geology and the hydrology of the site can be obtained from geologic maps and the geologic literature of the area but careful onsite studies are usually necessary. Onsite studies are also necessary for a detailed evaluation of the soil resource. Soil mapping units of the published soil survey may include small areas of contrasting soils that could not be shown at the scale of a published survey but that may influence the design of the system or render a site unsuitable. Small areas of shallow soil where deep soils were delineated, for example, may create difficulties for trench-type sanitary landfills or pollution hazards for liquid waste disposal systems.

In the design of treatment sites for liquid wastes, other points to consider are the probable loading from rain and snow and the periods when the soil is warm enough to be microbiologically active. In considering climate, the probability and magnitude of extremes, particularly in precipitation, must be carefully evaluated.

## V. CONCLUSIONS

Site selection requires the following steps:

1. Determine kind of waste and method of disposal or utilization.

2. Assess the soil properties and select criteria to determine the suitability of the soil for receiving the waste in question. Various guides are avilable for rating suitability of soils for receiving many kinds of wastes.

3. Using soil surveys, determine which soils in the area are

suited for receiving wastes.

4. Locate the suitable soils on the soil map to determine extent of potential sites.

5. Provide onsite investigations by a soil scientist, hydrologist, and geologist to determine the actual suitability of the potential site for receiving wastes.

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Table 1.--Soil Limitation Ratings For Trench-Type Sanitary Landfills1/ 2/

| Item affecting use | | Degree of soil limitation | | |
|---|---|---|---|---|
| | | Slight | Moderate | Severe |
| Depth to seasonal high water table | | Not class determining if more than 180 cm | | Less than 180 cm |
| Soil drainage class | | Excessively drained, somewhat excessively drained, well drained, and some3/ moderately well drained | Somewhat poorly drained and some3/ moderately well drained | Poorly drained and very poorly drained |
| Flooding | | None | Rare | Occasional or frequent |
| Permeability4/ | | Less than 5 cm/hr | Less than 5 cm/hr | More than 5 cm/hr |
| Slope | | 0-5% | 15-25% | More than 25% |
| Soil texture5/ (dominant to a depth of 150 cm) | | Sandy loam, loam, silt loam, sandy clay loam | Silty clay loam6/ clay loam, sandy clay, loamy sand | Silty clay, clay, muck, peat, gravel, sand |
| Depth to bedrock | Hard | More than 180 cm | More than 180 cm | Less than 180 cm |
| | Rippable | More than 150 cm | Less than 150 cm | Less than 150 cm |
| Stoniness class7/ | | 0 and 1 | 2 | 3, 4, and 5 |
| Rockiness class7/ | | 0 | 0 | 1, 2, 3, 4, and 5 |

1/ From "Guide for Interpreting Engineering Uses of Soils" (Soil Conservation Service, 1971).

2/ Based on soil depth (1½-2 m) commonly investigated in making soil surveys.

3/ Soil drainage classes do not correlate exactly with depth to seasonal water table. The overlap of moderately well drained soils into two limitation classes allows some of the wetter moderately well drained soils (mostly in the Northeast) to be given a limitation rating of moderate.

4/ Reflects ability of soil to retard movement of leachate from the landfills: may not reflect a limitation in arid and semiarid areas.

5/ Reflects ease of digging and moving (workability) and trafficability in the immediate area of the trench where there may not be surfaced roads.

6/ Soils high in expansive clays may need to be given a limitation rating of severe.

7/ For class definitions see Soil Survey Manual, pp. 216-223 (Soil Survey Staff, 1951).

Table 2.--Soil Limitation Ratings For Area-Type Sanitary Landfills[1/]

| Item affecting use | Degree of soil limitation | | |
|---|---|---|---|
| | Slight | Moderate | Severe |
| Depth to seasonal[2/] water table | More than 150 cm | 100-150 cm | Less than 100 cm |
| Soil drainage[2/] class | Excessively drained, somewhat excessively drained, well drained, and moderately well drained | Somewhat poorly drained | Poorly drained and very poorly drained |
| Flooding | None | Rare | Occasional or frequent |
| Permeability[3/] | Not class determining if less than 5 cm/hr | | More than 5 cm/hr |
| Slope | 0-8% | 8-15% | More than 15% |

1/ From "Guide for Interpreting Engineering Uses of Soils" (Soil Conservation Service, 1971).

2/ Reflects influence of wetness on operation of equipment.

3/ Reflects ability of the soil to retard movement of leachate from landfills; may not reflect a limitation in arid and semiarid areas.

Table 3.--Soil Limitation Ratings For Sewage Lagoons[1/]

| Item affecting use | Degree of soil limitation | | |
|---|---|---|---|
| | Slight | Moderate | Severe |
| Depth to water table (seasonal or year-round) | More than 150 cm | 100-150 cm[2/] | Less than[2/] 100 cm |
| Permeability | Less than 1.5 cm/hr | 1.5-5 cm/hr | More than 5 cm/hr |
| Depth to bedrock | More than 150 cm | 100-150 cm | Less than 100 cm |
| Slope | Less than 2% | 2-7% | More than 7% |
| Coarse fragments, less than 25 cm in diameter: percent, by volume | Less than 20% | 20-50% | More than 50% |
| Percent of surface area covered by coarse fragments more than 25 cm | Less than 3% | 3-15% | More than 15% |
| Flooding[3/] | None | None | Soils subject to flooding |
| Soil groups (Unified)[4/] (rated for use mainly as floor of sewage lagoon) | GC, SC, CL, and CH | GM, ML, SM, and MH | GP, GW, SW, SP, OL, OH, and PT |

1/ From "Guide for Interpreting Engineering Uses of Soils" (Soil Conservation Service, 1971).

2/ If the floor of the lagoon is nearly impermeable material at least 60 cm thick, disregard depth to water table.

3/ Disregard flooding if it is not likely to enter or damage the lagoon. (low velocity and the depth less than about 1.5 m)

4/ Disregard if permeability is less than 1.5 cm/hr and it does not increase as a result of building the lagoon.

Table 4.--Soil Limitations For Accepting Nontoxic Biodegradable Liquid-Waste

| Item affecting use | | Degree of soil limitation | | |
|---|---|---|---|---|
| | | Slight | Moderate | Severe |
| Permeability of the most restricting layer above 150 cm | | Moderately rapid and moderate 1.5-15 cm/hr | Rapid and moderately slow2/ 15-50 and 0.5-1.5 cm/hr | Very rapid, slow and very slow2/ > 50 and < 0.5 cm/hr |
| Soil drainage class3/ | | Well drained and moderately well drained | Somewhat excessively drained and somewhat poorly drained | Excessively drained, poorly drained, and very poorly drained |
| Runoff4/ | | None, very slow, and slow | Medium | Rapid and very rapid |
| Flooding | | None | Soils flooded only during non-growing season | Soils flooded during growing season |
| Available water capacity from 150 cm or a limiting layer | Humid5/ | > 15 cm | 8-15 cm | < 8 cm |
| | Arid6/ | > 8 cm | | < 8 cm |

1/ Modified from an interim guide for use in the Soil Conservation Service.

2/ Moderate and severe limitations do not apply for moderately slow, slow, and very slow permeability if layers having these permeabilities are below the rooting depth and if evapotranspiration exceeds water added by rainfall and waste.

3/ For class definition see Soil Survey Manual, pp. 169-17 (Soil Survey Staff, 1951).

4/ For class definition see Soil Survey Manual, pp. 166-167 (amended to use "None" for "Ponded") (Soil Survey Staff, 1951).

5/ Humid, as used here, includes soils that have aquic, udic, or ustic moisture regimes if utilized throughout the year. For definitions, see "Soil Taxonomy".

6/ Arid, as used here, includes soils that have aridic or torric moisture regimes and xeric moisture regime if utilized only during the dry season. For definitions, see "Soil Taxonomy" (Soil Survey Staff - in press).

Table 5.--Soil Limitations For Accepting Nontoxic Biodegradable Solids

| Item affecting use | Degree of soil limitations | | |
|---|---|---|---|
| | Slight | Moderate | Severe |
| Permeability of the most restricting layer above 150 cm | Moderately rapid and moderate 1.5-15 cm/hr | Rapid and moderately slow2/ 15-50 and 0.5-1.5 cm/hr | Very rapid, slow, and very slow2/ >50 and <0.5 cm/hr |
| Soil drainage class3/ | Well drained and moderately well drained | Somewhat excessively drained and somewhat poorly drained | Excessively drained, poorly drained, and very poorly drained |
| Runoff4/ | None, very slow, and slow | Medium | Rapid and very rapid |
| Flooding | None | | Soils flooded |
| Available water capacity from 0 to 150 cm or to a limiting layer | > 15 cm | 8-15 cm | < 15 cm |

1/ Modified from an interim guide for use in the Soil Conservation Service.

2/ Moderate and severe limitations do not apply for moderately slow, slow, and very slow permeability unless the waste is plowed or injected into the layers having these permeabilities or if evapotranspiration is less than water added by rainfall or irrigation.

3/ For class definition see Soil Survey Manual, pp. 169-172 (Soil Survey Staff, 1951).

4/ For class definition see Soil Survey Manual, pp. 166-167 (amended to use "None" for "Ponded") (Soil Survey Staff, 1951).

## Table 6.--Information Available From Published Soil Surveys

### TABLE A.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. The symbol < means less than, > means greater than The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated]

| Soil name and map symbol | Depth | Permea- bility | Available water capacity | Soil reaction | Shrink- swell potential | Risk of corrosion: Uncoated steel | Risk of corrosion: Concrete | Erosion factors: K | Erosion factors: T |
|---|---|---|---|---|---|---|---|---|---|
| | In | In/hr | In/in | pH | | | | | |
| Addicks: | | | | | | | | | |
| Ad---------------- | 0-11 | 0.6-2.0 | 0.15-0.24 | 6.1-8.4 | Low-------- | High----------- | Low------------- | 0 32 | 5 |
| | 11-49 | 0.6-2.0 | 0.15-0.24 | 6.6-8.4 | Low-------- | High----------- | Low------------- | 0 37 | |
| | 49-78 | 0.6-2.0 | 0.15-0.24 | 6.6-8.4 | Moderate | High----------- | Low------------- | 0.37 | |
| [1]Ak. | | | | | | | | | |
| Addicks part----- | 0-11 | 0.6-2.0 | 0.15-0.24 | 6.1-8.4 | Low-------- | High----------- | Low------------- | 0 32 | 5 |
| | 11-49 | 0.6-2.0 | 0.15-0.24 | 6.6-8.4 | Low-------- | High----------- | Low------------- | 0.37 | |
| | 49-78 | 0.6-2.0 | 0.15-0.24 | 6.6-8.4 | Moderate | High----------- | Low------------- | 0.37 | |

### TABLE B.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

| Soil name and map symbol | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas- ticity index |
|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | | | | | Pct | |
| Addicks. | | | | | | | | | | |
| Ad---------------- | 0-11 | Loam------------ | CL, CL-ML | A-4, A-6 | 100 | 95-100 | 95-100 | 51-75 | 20-30 | 5-14 |
| | 11-49 | Loam, silt loam | CL, CL-ML | A-4, A-6 | 95-100 | 90-100 | 75-95 | 60-75 | 20-40 | 5-20 |
| | 49-78 | Loam, silt loam, silty clay loam. | CL | A-6, A-7 | 95-100 | 90-100 | 90-100 | 60-80 | 25-45 | 11-27 |
| [1]Ak | | | | | | | | | | |
| Addicks part----- | 0-11 | Loam------------ | CL, CL-ML | A-4, A-6 | 100 | 95-100 | 95-100 | 51-75 | 20-30 | 5-14 |
| | 11-49 | Loam, silt loam | CL, CL-ML | A-4, A-6 | 95-100 | 90-100 | 75-95 | 60-75 | 20-40 | 5-20 |
| | 49-78 | Loam, silt loam, silty clay loam | CL | A-6, A-7 | 95-100 | 90-100 | 90-100 | 60-80 | 25-45 | 11-27 |

### TABLE C.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than, > means greater than]

| Soil name and map symbol | Hydro- logic group | Flooding: Frequency | Flooding: Duration | Flooding: Months | High water table: Depth | High water table: Kind | High water table: Months |
|---|---|---|---|---|---|---|---|
| | | | | | Ft | | |
| Addicks | | | | | | | |
| Ad---------------- | D | None----------- | --- | --- | 1.0-2.5 | Apparent | Jan-Feb |
| [1]Ak: | | | | | | | |
| Addicks part---- | D | None----------- | --- | --- | 1.0-2.5 | Apparent | Jan-Feb |

1/This mapping unit is made up of two kinds of soil.

Table 7.--Data Included in Computer Records for Soil Survey Interpretations1/

PA0134 S O I L S U R V E Y I N T E R P R E T A T I O N S

MLRA(S): 128, 130, 148, 147 STEINSBURG SERIES
SCE, 8-74
TYPIC DYSTROCHREPTS, COARSE-LOAMY, MIXED, MESIC

THE STEINSBURG SERIES CONSISTS OF MODERATELY DEEP, WELL DRAINED SOILS ON UPLANDS. THEY FORMED IN MATERIAL WEATHERED FROM SANDSTONE AND CONGLOMERATE. TYPICALLY THESE SOILS HAVE A BROWN GRAVELLY LOAM SURFACE LAYER 8 INCHES THICK. THE SUBSOIL FROM 8 TO 18 INCHES IS BROWN SANDY LOAM. THE SUBSTRATUM FROM 18 TO 30 INCHES IS STRONG BROWN GRAVELLY SANDY LOAM. BEDROCK IS AT 30 INCHES. SLOPES RANGE FROM 3 TO 35 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

| DEPTH (IN.) | USDA TEXTURE | UNIFIED | AASHTO | FRACT >3 IN (PCT) | PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4 | 10 | 40 | 200 | LIQUID LIMIT | PLAS-TICITY INDEX |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-8 | L, SL, FSL | ML, SM | A-4 | 0-5 | 95-100 | 90-100 | 65-90 | 30-70 | | |
| 0-8 | GR-L, GR-SL, GR-FSL | SM, ML | A-4 | 0-15 | 80-95 | 65-85 | 38-60 | 35-55 | | |
| 8-18 | L, GR-SL, FSL | SM, SM-SC | A-2, A-4, A-1 | 0-10 | 70-98 | 45-88 | 30-60 | 18-40 | <25 | NP-5 |
| 18-30 | GR-SL, GRV-LS | SM, GM | A-2, A-1 | 10-40 | 40-88 | 40-80 | 30-60 | 15-35 | <25 | NP-3 |
| 30 | UWB | | | | | | | | | |

| DEPTH (IN.) | PERMEABILITY (IN/HR) | AVAILABLE WATER CAPACITY (IN/IN) | SOIL REACTION (PH) | SALINITY (MMHOS/CM) | SHRINK-SWELL POTENTIAL | CORROSIVITY STEEL | CONCRETE | EROSION FACTORS K | T | WIND EROD. GROUP |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-8 | 2.0-6.0 | 0.10-0.14 | 4.5-6.5 | - | LOW | LOW | HIGH | .28 | 2 | - |
| 0-8 | 2.0-6.0 | 0.10-0.14 | 4.5-6.5 | - | LOW | LOW | HIGH | - | - | - |
| 8-18 | 2.0-6.0 | 0.10-0.14 | 4.5-6.5 | - | LOW | LOW | HIGH | - | | |
| 18-30 | 2.0-6.0 | 0.04-0.08 | 4.5-6.5 | - | LOW | LOW | HIGH | - | | |
| 30 | | | | | | | | | | |

| FLOODING FREQUENCY | DURATION | MONTHS | HIGH WATER TABLE DEPTH (FT) | KIND | MONTHS | CEMENTED PAN DEPTH (IN) | HARDNESS | BEDROCK DEPTH (IN) | HARDNESS | SUBSIDENCE INIT. (IN) | TOTAL (IN) | HYD GRP | POTENT'L FROST ACTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NONE | | | >6.0 | | | - | | 20-40 | RIPPABLE | - | | C | - |

| SANITARY FACILITIES (B) | | SOURCE MATERIAL (B) | |
|---|---|---|---|
| SEPTIC TANK ABSORPTION FIELDS | 0-15%: SEVERE-DEPTH TO ROCK<br>15+%: SEVERE-SLOPE, DEPTH TO ROCK | ROADFILL | 0-25%: POOR-THIN LAYER<br>25+%: POOR-SLOPE, THIN LAYER |
| SEWAGE LAGOON AREAS | 0-7%: SEVERE-DEPTH TO ROCK<br>7+%: SEVERE-SLOPE, DEPTH TO ROCK | SAND | UNSUITED-EXCESS FINES |
| SANITARY LANDFILL (TRENCH) | 0-25%: SEVERE-DEPTH TO ROCK, SEEPAGE<br>25+%: SEVERE-SLOPE, DEPTH TO ROCK, SEEPAGE | GRAVEL | UNSUITED-EXCESS FINES |
| SANITARY LANDFILL (AREA) | 0-15%: SEVERE-SEEPAGE<br>15+%: SEVERE-SLOPE, SEEPAGE | TOPSOIL | 0-15%: POOR-SMALL STONES<br>15+%: POOR-SLOPE, SMALL STONES |
| DAILY COVER FOR LANDFILL | 0-8%: FAIR-THIN LAYER, SMALL STONES<br>8-15%: FAIR-SLOPE, THIN LAYER, SMALL STONES<br>15+%: POOR-SLOPE | | |

| COMMUNITY DEVELOPMENT (B) | | WATER MANAGEMENT (B) | |
|---|---|---|---|
| | | POND RESERVOIR AREA | DEPTH TO ROCK, SLOPE, SEEPAGE |
| SHALLOW EXCAVATIONS | 0-15%: SEVERE-DEPTH TO ROCK<br>15+%: SEVERE-SLOPE, DEPTH TO ROCK | EMBANKMENTS DIKES AND LEVEES | PIPING, LOW STRENGTH |
| DWELLINGS WITHOUT BASEMENTS | 0-8%: MODERATE-DEPTH TO ROCK<br>8-15%: MODERATE-SLOPE, DEPTH TO ROCK<br>15+%: SEVERE-SLOPE | EXCAVATED PONDS (AQUIFER FED) | DEEP TO WATER |
| DWELLINGS WITH BASEMENTS | 0-8%: MODERATE-DEPTH TO ROCK<br>8-15%: MODERATE-SLOPE, DEPTH TO ROCK<br>15+%: SEVERE-SLOPE | DRAINAGE | NOT NEEDED |
| SMALL COMMERCIAL BUILDINGS | 0-4%: SLIGHT<br>4-8%: MODERATE-SLOPE<br>8+%: SEVERE-SLOPE | IRRIGATION | SLOPE, ROOTING DEPTH |
| LOCAL ROADS AND STREETS | 0-8%: SLIGHT<br>8-15%: MODERATE-SLOPE<br>15+%: SEVERE-SLOPE | TERRACES AND DIVERSIONS | SLOPE, DEPTH TO ROCK, ROOTING DEPTH |
| LAWNS, LANDSCAPING AND GOLF FAIRWAYS | 0-8% NON-GR: MODERATE-DEPTH TO ROCK<br>0-8% GR: MODERATE-DEPTH TO ROCK, SMALL STONES<br>8-15%: MODERATE-SLOPE<br>15+%: SEVERE-SLOPE | GRASSED WATERWAYS | DROUGHTY, SLOPE |

1/A copy of part of the form (SOILS-5) used for entering data into computer storage.

MR. LEHMAN: Okay, are there any other questions? If not, thank you very much, Mr. Witty. I would like to call next Mr. Anthony L. Falla of the Kawecki Berylco Industries, Inc. Is Mr. Falla here?

MR. FALLA: My name is Anthony Falla, I'm an environmental engineer and I work for Kawecki Berylco in Reading Pennsylvania. And, this is not a prepared statement, I have nothing written. It's extraneous in nature. I drafted it as I listened to the speakers, and bear with me if I sound nervous, I am nervous because talking about pollution is like talking about sex. Nobody really talks freely about it but everybody does it.

So, I appreciate this opportunity to present my personal views regarding legislation on hazardous wastes. And, the word hazardous to me means dangerous, and I think if you use that word sometimes that may help you put things into perspective.

Many years ago I was told that you solved your pollution problem when you got rid of the waste off of your property. If you didn't get rid of the waste you didn't solve your problem. And, the challenge that we face today is that we have to do this in a way that's natural to the environment and it doesn't interfere with the health or welfare of your neighbor.

So, again, when you think of hazardous waste, I think the word dangerous would help define it a little more. You are talking about impact and how does it relate to the community, which sometimes could be not only a city, it could be along a whole seaboard.

I think that any regulation regarding disposal of hazardous waste should include some of the following items, I certainly don't cover them all.

1. You should establish regulatory responsibility. I think this should be spelled out clearly. For example, I think the ultimate responsibility of hazadous, defining hazardous waste should not lie in the jurisdiction of local governments or municipalities. I think it should be a state and/or Federal responsibility. A guideline, for example, I think is the Water Pollution Control Act, the Public Law 92-500 which set up some relationship between state and Federal regulations.

Another item, I think, is you should establish guidelines for disposal, and the key word here is disposal, not treatment, although sometimes the two are hard to distinguish. For example, if you take organic wastes, I think you should establish guidelines that are related to say incineration, thermal decomposition or say chemical breakdown of the substance or something like that, you take inorganic acids or alkalis. If the procedure chosen say is neutralization and removal of heavy metals, then I think there should be guidelines on what to do with the solids, what to do with the filtrate. For example, putting into a landfill for solids and filtrate, clear filtrate say disposed via ocean barging.

something like that. Take solids, and I don't know if the technology exists here, but you take encapsulation, solidification. Another principle I think has been mentioned is segregation in a landfill, where you can geographically segregate wastes and you know where they are at.

Another thing maybe you should cover in that establishment of guidelines would be, for example, to establish control tests, like leaching tests and this has been mentioned for years. Our company has been using, with our consultant, a leaching test where we use 100 grams of material and one liter of leachate from a landfill. And you do successive leachings on the same solid, maybe four, five, six leachings, using landfill leachate and this gives you, say, initial solubility, and then eventually should give you an equilibrium solubility. And, this, I think, simulates to some degree, what goes on in a landfill, because eventually in a landfill you must hit an equilibrium condition, although it is constantly changing probably to a certain degree.

The third thing I want to mention, I think legislation should include or should establish a certification procedure for waste treatment firms and for firms who supply a treatment procedure for hazardous waste. It seems to me that in today's economy and with the available technology today, private waste treatment firms are desirable and I think some kind of certification procedure would help a person choose an acceptable outlet. It is my opinion that most people want to get rid of their wastes in an acceptable manner and this would certainly be a big help.

The last one I have here, and I don't know how to exactly describe it, is the legislation shouldn't close all doors. This has been mentioned previously by Mr. Roy. He talked about the best practical treatment, the best available treatment. Here again, Public Law 92-500, I think, may serve as a guide where you have certain available technology today, best practical technology today. You could set up the law such that it could be something that could change in time and work with what you've got today and then as time goes on make it better.

Thank you very much for allowing me this opportunity.

MR. LEHMAN: Thank you, Mr. Falla. Will you answer questions?

MR. FALLA: Yes.

MR. LEHMAN: Mr. Lindsey?

MR. LINDSEY: Mr. Falla, you mentioned the landfill leachate test, could you elaborate on how that works? In other words, I guess one question I would like to have you elaborate on is, how is the concentration issue handled in this test? What concentrations of the hazardous material, must be reached before you become concerned, and secondly, could you send us information on this test?

MR. FALLA: The second one, yes. We could send you an outline of procedure that we use. It is something that is not formal but I have no reference for it. But, the way we have been using it and did use it on one occasion with the Pennsylvania Department of Environmental Resources, and they accepted it, in fact they were the ones that made us do it. We did it with distilled water, and I think this point was brought up before, they are the ones that said you've got to go out and do it with landfill leachate because landfill leachate is a lot different from distilled water.

And, we set up successive leachings. We would take 100 grams of air dried material, usually if you put some of this stuff in an oven, you may decompose it, so we set up the criteria, air dry it, so it is reasonably dry, and not very wet. So you take 100 grams and then you take a liter of leachate. In other words, the philosophy here is to take a large volume of water and a small amount of sample, so that you will hopefully reach an equilibrium. Your first leaching generally will have your highest concentrations because with some of these solids you might have mother liquors attached with it or something like that, so you leach out the most soluble portions in the very first leaching and that gives you some idea of what the initial leachate will look like, and then the successive leachates will slowly decrease until you reach an equilibrium, or some constant value. You should repeat these tests until you reach that constant value and you'll end up with a curve that starts out high and comes down to some steady number. And, I interpret that number as being the solubility or equilibrium value of the iron that we are looking for and usually analyze for heavy metals or whatever else you are interested in, in that particular environment.

MR. LEHMAN: Do you have another question?

MR. LINDSEY: You mentioned the possible certification of people who are in the treatment and I guess disposal business, what did you have in mind? Or, what is involved in certification, is that a permit system, that's what I think of, but maybe you have --

MR. FALLA: Well, I didn't want to go as far as permit, but first I think it should be state or Federal. I don't think certification should be on a local level, not when you are dealing with hazardous wastes, and I want to emphasize the fact that we are specifying hazardous wastes. You define a waste as hazardous, that should put it into a category which is beyond the local and municipal government's capability.

So, certification, what I am trying to do here is, I think these waste treatment firms should be evaluated and it is pretty hard for an individual to evaluate because we can't always get the facts sometimes and I think the governmental agencies are in a better position to evaluate a waste treatment firm and certification to me would just say that they are complying with rules and regulations that are applicable to that area.

Now, it doesn't necessarily mean you have to have a permit, although I would think that they would have to have permits to get rid of say the liquid effluent and the solid waste.

MR. LEHMAN: Are there any other questions? No. Thank you, Mr. Falla.

**KAWECKI BERYLCO INDUSTRIES, INC.**

P. O. Box 1462, Reading, Pa. 19603
*Telephone:* 215 / 929-0781

15 December 1975

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs AW-565
U.S. Environmental Protection Agency
Washington, D.C. 20460

Dear Sir:

At the public meeting on hazardous waste held in Newark, N.J. on December 2, I presented a statement in which reference was made to a solids leaching test procedure. A request was made by a member of the panel for details on the leach test procedure. The leach test procedure is given below with comments for inclusion as part of the record of that public meeting.

LEACH TEST ON SOLIDS FOR DISPOSAL IN LANDFILL:

A. OBJECTIVE

The objective of the leach test is to determine which ions leach from the waste solids; determine whether the leaching is a continuing process; and determine equilibrium solubility levels.

B. TEST PROCEDURE

One hundred grams of dry solids (usually air dried if solids are sensitive to heat) are mixed with 1000 cc of filtered landfill leachate (if available) and agitated continuously for 24 hours. The slurry is then filtered and the solids portion subjected to another 24 hour leach with 1000 cc of fresh landfill leachate. The above procedure is repeated for four to six consecutive leaches.

Notes:

(1) On occasions, it may be desirable to run simultaneous



*METALS • ALLOYS • CHEMICALS*

leach test using distilled water as the leaching media to determine if the leachability differs from landfill leachate which usually may contain acidity and organics.

(2) On occasions, if there is evidence of a chemical reaction, e.g. oxidation of Chromium 3 to Chromium 6, then the 24 hour leaching period should be increased to 72-96 hours to determine equilibrium conditions of the reaction.

(3) Other than air drying and utilizing proper sampling techniques, no attempt is made to regulate the characteristics of the solids to be tested. One factor which would influence the results of this test is particle size.

(4) This test is suitable for industrial waste precipitates and for solids that are not too bulky.

C. REPORTING OF RESULTS AND INTERPRETATION OF DATA

Results are generally tabulated or plotted to show changes in concentration of the leachate with each succeeding leach.

Ion concentrations which continually decrease and reach a constant value lower than that originally present in the landfill leachate indicate that the solids being evaluated have a beneficial effect on the landfill. This result could occur for example on parameters such as iron, BOD, COD, and some heavy metals when the alkalinity or pH of the leachate is increased.

Ion concentrations which increase very rapidly and then reach a constant value imply either a chemical reaction or solubility limit.

Ion concentrations which increase slowly and then reach a constant value imply solubility limit.

Ion concentrations which increase initially and then decrease to a constant value imply presence of a very soluble constituent which eventually is depleted or reaches an equilibrium value, e.g., adhered mother liquor if from a filtering operation.

Ion concentrations which show no change imply no adverse effect by solids being evaluated.

Ion concentrations which continually increase imply degradation of material resulting in increased solubility.

KAWECKI BERYLCO INDUSTRIES, INC.
Reading, Pa. 19603

Ion concentration which vary and show no definite trend imply analytical error or solubility effect from particle size variation.

Note: Our experience has generally been that ion concentrations usually reach a constant value either on the upward side or on the downward side.

Thank you very much for the opportunity to present the above information.

Very truly yours,

KAWECKI BERYLCO INDUSTRIES, INC.

Anthony L. Fala

Anthony L. Fala
Environmental Engineer

ALF:pad

MR. LEHMAN: Our next speaker, Mr. Lawrence Cushman from Plymouth State College. Is Mr. Cushman here? He was down on our list of people desiring time to speak and yet this must be about the fourth time we have called. I gather he is just not able to come.

Well, ladies and gentlemen, that completes the roster of people who have requested time for prepared statement, or not a prepared statement. Let me just issue one last call. Is there anyone in the audience who would like to make a statement at this time? Mr. Sanjour?

MR. SANJOUR: I just want to say, it has been suggested to me that these proceedings, Mr. Chairman, be published, and I thought I would throw that idea up to you, perhaps in TIS, or some other mechanism like that rather than merely have them available to someone to come in and read.

MR. LEHMAN: All right. It has been suggested by several members of the audience that the proceedings of this hearing, or this public meeting, excuse me, and the others that are pending, in the other three cities be published rather than being merely made available for public inspection, which is our current plan.

And, let me just comment on that, that our original thinking on this was that the record might be a very voluminous document. When you get as much information as has been developed here today, and multiply that by four, it might be an excessively large document to reproduce and to distribute.

However, what I think we should do and will do is hold that decision in abeyance until we see what the response is from the other meetings around the country. And, if it turns out not to be an onerous task, then perhaps we can do that. I'm just trying to point out why we were not planning to publish this in the first place.

Now, if the demand is there, then perhaps that would influence our decision too. So, if you feel a necessity for this, that might influence it, you might let us know.

We are about ready to close the meeting now. Is there anyone who has a statement for the record that they did not wish to present orally? All right. As we pointed out earlier, this is not the last chance, you can also submit any statement to the record, to the address given in the Federal Register by January 31, 1976 and it will be considered as part of the record.

I would like very much to thank you all. Excuse me, we have one point here.

SPEAKER: Do you have a feel for when the proposed law might be written, when it might be promulgated?

MR. LEHMAN: Well, the appropriate person to address that question to would be the gentlemen in the U.S. Congress and not to me. All I can do is just comment in general terms, we have made reference to Senate Bill 2150 today, which is under active consideration in the Senate Public Works Committee, called the Solid Waste Utilization Act, 1975, and it is our understanding that a companion bill is in the draft stage in the House of Representatives. But, really to go beyond that and make some opinion about how fast the Congress is going to move, I think would be hazardous. Let's say that we are hopeful that they will move quickly on it, but have no indication as to when they intend to move on it.

All right, with that, I want to again thank you all very much for coming and participating in this public meeting. Speaking for EPA, I can say that we have learned an awful lot and I hope you in the audience have too, and we will look forward to the next series of meetings in the other cities, and hopefully they will be as productive as this one was. With that, I'll adjourn the meeting and call it a day. Thank you.

(Whereupon the meeting was adjourned.)

## INDEX

PUBLIC MEETINGS

held at the

O'HARE-KENNEDY EXPRESSWAY
HOLIDAY INN

ROSEMONT, ILLINOIS

Thursday,
December 4, 1975

8:30 A.M.

PANEL MEMBERS

John P. Lehman, Director
Hazardous Waste Management Division (HWMD)
Office of Solid Waste Management Programs, EPA

Walter W. Kovalick, Jr., Chief
Guidelines Branch, HWMD
Office of Solid Waste Management Programs, EPA

Emery Lazar, Program Manager
Environmental Damage Assessment, Technology Branch, HWMD
Office of Solid Waste Management Programs, EPA

Alfred W. Lindsey, Program Manager
Technology Assessment, Technology Branch, HWMD
Office of Solid Waste Management Programs, EPA

Murray Newton, Program Manager
State Programs, Implementation Branch, HWMD
Office of Solid Waste Management Programs, EPA

Karl J. Klepitsch, Jr., Chief
Solid Waste Branch
EPA Region V

MR. LEHMAN: Ladies and Gentlemen, may I ask you to take your seats and we'll get started.

I call this public meeting to order. Good morning ladies and gentlemen, my name is John P. Lehman, and I'm Director of the Hazardous Waste Management Division, office of Solid Waste Management Programs, United States Environmental Protection Agency, Washington, D.C.

I would like to introduce Mr. Valdis Adamkus, Deputy Regional Administrator for Region V of the U.S. Environmental Protection Agency, who has some opening remarks.

Mr. Adamkus.

MR. ADAMKUS: Thank you Mr. Chairman, good morning ladies and gentlemen. I hope you can hear me over there.

I would like to welcome all of you who have come to Region V to attend this public meeting. This meeting is designed to gather information from industry, government and public interest groups concerning the area of hazardous waste management.

Samples of hazardous wastes include toxic chemicals, pesticides, acids, caustics, flammables and explosives, biological and radiological residuals.

It is estimated that the total volume of non-radioactive hazardous wastes is generated annually in this country -- it's approximately 10 million tons per year, or roughly 10 per cent of all industrial waste.

The primary source of this waste is the industrial sector where contributions are being made by hospitals, laboratories, and Federal government itself.

Of the national total of hazardous wastes generated, this region is estimated to generate about 25 per cent. Only in the last year or two has the public heard and felt effects of improper hazardous waste management been under serious study.

This problem has manifested itself in groundwater contamination by wastes leaching through the soil and surface water contamination via run-off and air pollution via open burning, and food contamination via improper storage, and personal injury via direct contact and explosions which may result from the improper mixing of wastes.

The problems of improper handling

of this waste can have both short term acute effects and long term chronic effects.

We are now faced with increasing possibilities for adverse impacts from hazardous waste management from at least three sources. The first is the expansion of industrial production, which is tied directly to hazardous waste generation. Second, is the transfer of hazardous materials from other media as a result of air and water pollution controls. Third, is the increased hazardous waste materials generated as a result of ocean dumping controls, and bans on certain materials such as cancellation of pesticides.

When all of these factors are considered it is estimated that the growth of hazardous waste generation in this country will be between 5 and 10 per cent per year.

In order to minimize those impacts to the public health, due to existing and future production of hazardous wastes, we are beginning to look at the future role of the Federal government in the management of these wastes.

Fulfillment of this development of the Federal role will require a major cooperative effort on the part of many different organizations to make this all happen. Waste generators, waste treatment and disposal contractors, local, regional and state governments, academia and the Federal government must all communicate and work together as we are doing here today.

Your participation in today's public meeting will aid us in finding the answers to problems we find in managing this waste and perhaps more important the future direction of the Federal program.

To offer further comments and to expand upon the reasons for today's meeting, I would like at this time to formally introduce Mr. John Lehman, Director of the Hazardous Waste Management Division, Office of Solid Waste Management Programs of the United States Environmental Protection Agency.

Thank you and welcome all of you.

MR. LEHMAN: Thank you Mr. Adamkus.

Let me add my welcome to that of Mr. Adamkus. The purpose of this public meeting as announced in the Federal Register of September 17th, 1975, is to gather information and data for the agency as to the scope and nature of the hazardous waste management problem in this country, and the need for and extent of guidance that should be developed by the agency to help cope with this problem.

For the purpose of this meeting, hazardous wastes are non-radioactive discards of our technologically based society. They include toxic, chemicals, biological, flammable and explosive by-products of the nation's extractive, conversion and process industries.

This is not a rule making or regulatory hearing. The agency does not have a proposal or a statement to issue for comment. This is a fact finding meeting, on the record, to solicit input from industry, labor, Federal state and local governments, and other members of the public as to the extent of the management of hazardous wastes and the available or anticipated systems and the technology to abate this problem.

In order to provide a framework for discussion today, the Federal Register notice announcing this meeting suggested 16 discussion topics that reflect issues of concern to the agency. Commentary on this and any other related topics are what we are mostly interested in hearing today.

Copies of this Federal Register are available on the table in the back of the room, along with our publications.

I am also submitting a copy of the Federal Register notice for the record.

The panel here with me is composed of staff of the Hazardous Waste Management Division in Washington, D.C. and EPA's Region V office in Chicago, who specialize in certain subjects and areas related to this issue.

They are from your left Mr. Karl J. Klepitsch, Chief of the Solid Waste Branch, EPA Region V, Mr. Emery Lazar, Program Manager for Environmental Damage Assessment of the Hazardous Waste Management Division, Mr. Walter Kovalick, Chief Guidelines Branch in the Hazardous Waste Management Division, Mr. Alfred Lindsey, Program Manager for Technology Assessment in the Division, and Mr. Murray Newton, Program Manager for State Programs also from the Hazardous Waste Management Division.

Also assisting us are Mr. Alan Corson and Mr. Donald Farb who I also understand are there at the back of the room and will be assisting us with questions, and also Mr. Metcalf who stepped out for a moment.

In addition to this meeting in Chicago today, three other identical sessions are being held in Houston, San Francisco and two days ago we had one in Newark. During these first two weeks of December, persons not wishing to deliver a statement here or at the other meetings, may send a written statement to the address noted in the Federal Register before January 31st, 1976.

As our time here is limited, I would now like to describe the procedural rules for this meeting, which I feel will maximize the opportunity for persons interested in speaking to be heard and yet make the best use of all of our time.

Persons wishing to make an oral statement who have not made an advance request by telephone or in writing, should indicate their interest on the registration card. If you have not indicated your intention to give a statement, and if you decide to do so, please return to the registration table and fill out another card and give it to one of the staff.

As we call upon an individual to make

a statement, he should come up to the lectern and after identifying himself for the court reporter, deliver his statement. At the beginning of the statement I will inquire as to whether the statement -- the speaker is willing to entertain questions from the panel. He is under no obligation to do so, although within the spirit of this information it would be of great assistance to the agency if questions were permitted.

It is expected that statements will not exceed 15 minutes in length, for extraordinarily long written statements I would suggest a brief oral summary, and submission of the full text for the record.

The Chairman reserves the right to close off statements which are excessively long, irrelevant and extraneous, or repetitive.

Assuming that the speaker is permitted questions members of the audience will not be permitted to direct question to the speaker, but rather members of the audience may obtain a 3 by 5 card from a member of the staff upon which questions may be written.

You can obtain such a card by merely

raising your hand. These cards will be collected by the staff and returned to the panel for consideration during the questioning period.

If a written question from the audience is not presented to the speaker because we run short of time, I will then ask the speaker to respond to those questions in writing for the record.

A transcript of this meeting is being taken, a copy of the transcript together with copies of all documents presented at the hearings, and all written petitions will constitute the record of the meeting.

A copy of the record will be available for public inspection by March 30th, 1976, at the U.S. Environmental Protection Agency, Public Information reference unit, Room 2404, 401 M Street S.W., Washington, D.C. 20460.

Finally I would like to describe today's activities as we currently see them. We will recess for 15 minutes at 10:30 A.M., a one hour luncheon break at 12:15 P.M. and reconvene at 1:15. And then hold another 15 minute break at 3:30 P.M. Depending on our progress, I will announce plans for a dinner break after lunch.

At this time we plan to conclude this meeting today. In order to facilitate the comfort of all I suggest that smokers sit on the left side of the room facing front, and non-smokers toward the right. This concludes my opening remarks.

I now call upon Mr. W. S. Brenneman of the Illinois Power Company to deliver the first statement.

Mr. Brenneman indicates he will entertain questions.

MR. BRENNEMAN: First I want to preface these remarks with a few ad lib ones.

Last night after gorging on a gourmet dinner, I thought this may not be a hazard to your health but it certainly is to your pocketbook. Similarly 20 copies of this dissertation may not be a hazardous waste but I pray if it is, it's not a great waste of a renewable resource, and that is wood fiber.

Today I have two main thrusts, one is please don't over-control. This is a real hazard to our health, and remember today's waste may be tomorrow's resources.

Now this is an oral statement for this public meeting. My name is William S. Brenneman and I'm employed by Illinois Power Company of Decatur, Illinois. I received a degree in Forestry at Michigan State University in 1948, and my present title is Land Use and Conservation Supervisor in the Company's Department of Environmental Affairs.

Like most of the public, I'm not certain what wastes are hazardous, or if they are really wastes. Today's time constraints, plus my limited knowledge, will, you'll be glad to hear, limit this statement to three substances which are usually wasted now.

So-called waste number one, fly ash. Prior to World War II, the nation's power was generated in a multitude of small plants. Some of the ash generated in burning coal was discharged into the air via short stacks and fell nearby as soot.

Heavier ash or cinders, were used on roads during snows, spread on the roads to prevent skidding. Today's efficient plants, which generate possibly 100 times more electricity than the old teakettles, electrostatically precipitate perhaps 99 per cent of the fly ash. This ash, plus bottom ash or cinders, is stored in a large pit adjacent to the plant.

In metropolitan areas, varying quantities of ash are sold or given away for manufacturing cinder block, fill and cindering roads.

In rural areas, at mine mouth plants, uses for ash are limited and most must be stockpiled, or if you will, wasted.

But future technology and economics may allow this waste to become a resource. Effluent from ash pits may contain trace amounts of heavy metals, may be alkaline, and may contain suspended solids. But these constituents should not cause coal ash to be classified as a hazard or toxicant. It may become a valuable future resource.

William T. Plass, Northeastern Forest Experiment Station, U.S. Forest Service, and John Capp Morgantown Energy Research Center, U.S. Bureau of Mines, have suggested using fly ash for reclaiming extremely acid surface mine sites.

Presently they have only suggested this use for fly ash. In the future, it may prove to be a most economical solution to strip mine reclamation. However, if inappropriately classified as hazardous, fly ash could not be used for reclamation.

So called waste number two, wood chips, tree clearance for overhead lines annually generate millions of tons of organic waste.

I extrapolated that from the wet chips that our company generates and what I figured other companies did, and it may be a little high but probably not too much.

In Illinois, the State EPA stipulates such chips must be most expensively disposed of in a registered landfill, where they are covered with six inches of earth each day. Previously, the chips could be disposed of by dumping in a farm gully, dumping in a leased or owned ravine, or burning.

The leachate from a pile of decaying chips should not be considered toxic, at least in my opinion, any more than should the runoff from forest litter or duff.

So-called waste number three, sludge disposal. Chicagoland's Metropolitan Sanitary District, MSD, is said to have a 20 year supply of sludge at Stickney.

Since 1970 MSD has been pioneering in strip mine reclamation with sludge in Fulton County. The semi-liquid sludge is incorporated directly into the soil by discing. Erstwhile barren land now yields crops of wheat, corn and soybeans.

The leachates are monitored in surface and subsurface waters. The harvested grain is analyzed for heavy metals. Todav I understand, toxic leachates have been insignificant.

The trace amounts of heavy metals in the harvested grain are not considered harmful. The MSD received the American Society of Civil Engineers' Outstanding Civil Engineering Achievement award for 1974. It would be a shame to eliminate this valuable resource as hazardous.

In summary, the three previous illustrations demonstrate the need for reasonableness and thorough evaluation by regulators when promulgating future hazardous waste regulations.

Certainly let's dispose of the cyanides and arsenics with great care. But, really now, what's so hazardous about a pile of wood chips. Or a nearly immeasurable amount of heavy metals, in grain harvested from sludge treated lands, is it a real threat to our health?

Thank you.

# Physical and chemical characteristics of surface mine spoil treated with fly ash

WILLIAM T. PLASS and JOHN P. CAPP

*ABSTRACT—Use of power plant fly ash for surface mine reclamation offers an attractive outlet for large tonnages of this waste material. Research by the U. S. Bureau of Mines beginning in 1963 showed that fly ash could be used to neutralize extremely acid surface mine spoil. The agency's treatments favored establishment of grass and legume cover by modifying chemical and physical characteristics of the spoil. Described here are changes that occurred in a spoil following the application of 150 tons of fly ash per acre. The treatment neutralized acidity, added plant-available phosphorus, lowered spoil density, and increased subsurface moisture.*

PRONOUNCED physical, chemical, and biological changes take place on the earth's surface when it is disturbed to expose minerals. In the 12-state Appalachian region where coal is recovered by surface mining, erosion, massive earth slides, acid formation, and stream pollution may result.

Proper reclamation and the establishment of permanent vegetative cover may minimize this environmental damage. However, vegetation may be difficult to establish on some surface mine spoils because of nutrient deficiencies, unfavorable moisture regimes, acidity, and excessive salts or toxic substances.

Many of these conditions can be modified or corrected by treating the spoil with some ameliorating material. Power plant fly ash offers an attractive opportunity. Millions of tons of fly ash are produced annually in coal-fueled generating plants. The alkaline fly ashes, which are rich in some plant nutrients, can be used to revegetate acid mine spoils. Recommendations regarding sources of suitable fly ash and rates of application are being developed by the U. S. Bureau of Mines' Morgantown, West Virginia, Energy Research Center.

This report describes the changes in chemical and physical properties of an extremely acid spoil after treatment with 150 tons of alkaline fly ash per acre.

### Background

In early studies of fly ash use, surface mine reclamation was recognized as a promising outlet for large tonnages. Greenhouse studies initiated in 1963 by the U.S. Bureau of Mines at Morgantown showed several species of grass commonly used for surface mine revegetation would grow in soil treated with fly ash. Field trials in 1965 showed that good stands of tall fescue (*Festuca arundinacea*), orchardgrass (*Dactylis glomerata*), and birdsfoot trefoil (*Lotus corniculatis*) could be established on an extremely acid surface mine spoil after treatment with fly ash. Further field tests in 1966 and 1968 compared application rates and fly ash sources.

In 1970 a demonstration was established on a 65-acre rocky spoil area that had been surface-mined 25 years before and later partially leveled. Fly ash was used to neutralize the extremely acid spoil, then acid-tolerant grasses and legumes were seeded.

Before treatment, spoils at all these sites were extremely acid because of pyritic minerals in the coal and overburden. pH ranged from 2.5 to 3.5

The surface spoil on all sites appeared to dry out rapidly. This could have been due to low infiltration rates, poor percolation, or low water-holding capacity. Soil textural classification of the soil-size fraction (2 mm or less) indicated the soils were loams, sandy loams, or clay loams. In all cases, rock fragments larger than 2 mm comprised a high percentage of the spoil volume

This research showed that applications of large quantities of alkaline fly ash could produce the following chemical and physical changes: lower bulk density, increased pore space, increased available water, an increase in several plant nutrients, and neutralization of some acidity. These changes improved the chances for successfully establishing a vegetative cover. Speculation followed that decreased bulk density and increased pore space may have resulted in greater rates of infiltration and significant increases in moisture below the fly ash-treated surface layer.

The effect of fly ash applications on subsurface moisture was investigated jointly by the Morgantown Energy Research Center and the U. S. Forest Service's Northeastern Forest Experiment Station. This study was established on a 3-year-old, leveled surface mine bench. The fly ash came from the Fort Martin generating plant near Maidesville, West Virginia

### Procedure

Three contiguous 60 × 120-foot plots were established on the site One of the following treatments was assigned to each plot (a) control (no fly ash and unscarified), (b) scar-

Table 1. pH and available phosphorus by treatments.

| | pH | | Available P (ppm) | |
|---|---|---|---|---|
| *Treatment* | *Range* | *Median* | *Range* | *Mean* |
| Check | 3.0-4.2 | 3.6 | 0.7- 4.1 | 1.7 |
| Scarification | 3.1-4.5 | 3.3 | 0.9-15.1 | 5.6 |
| Scarification plus fly ash | 3.6-8.3 | 6.4 | 3.9-24.9 | 16.0 |

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ified (no fly ash but surface scarification), (c) fly ash (150 tons of fly ash per acre and surface scarification). The rate of application, 150 tons per acre, was equal to 15 percent by weight for the plow layer. Scarification was accomplished with a two-chisel subsoiler to a depth of 12 inches. The fly ash and scarification plots were plowed and disked to prepare a seed bed. Both plots were fertilized and seeded to grasses and legumes.

So that measurements of soil moisture and density could be made with a nuclear meter, 10 access tubes, 20 feet apart, were installed on each plot. Plastic tubing (1.5-inch inside diameter) was inserted in each of the 4.5-foot-deep access holes. A seamless aluminum collar was attached to the top of each tube to accommodate the meter.

A recording raingage on the study area documented precipitation during the study period.

Moisture was determined with a neutron-activated density and moisture probe following the method described in USDA Agricultural Research Bulletin No. 41-24, August 1958. A necessary modification of the method substituted plastic for aluminum tubing, since the latter could be quickly destroyed by acids in the spoil. Although absolute values were not determined with the plastic tubing, the error was the same for all tests; so the relative values could be used to determine changes in moisture.

Moisture measurements at depth intervals of 1 foot were made initially on June 11, 1970, and continued at weekly intervals until October 29, 1970.

Once during this period density was measured at 1-, 2-, 3-, and 4-foot depths with a nuclear density probe.

The field data on soil moisture were reduced and analyzed by a computer program written in Fortran IV (*4*). Density data were reduced with a similar program. Each access hole was considered a sampling point. Therefore, 10 subplots or access holes described the moisture and density following each of the three treatments.

Sampling to determine surface soil moisture gravimetrically began early in May and continued at weekly intervals until early August. On each sampling date, a composite of five samples from the surface 3 inches was was collected on each plot. Standard procedures were used to compute total moisture for each composite sample.

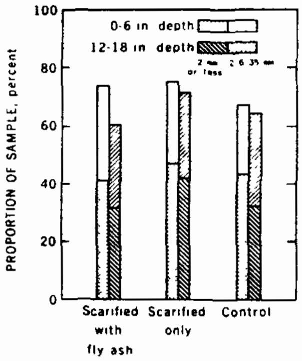


Figure 1. Particle-size distribution of spoil after treatment.

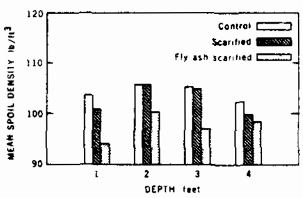


Figure 2. Mean spoil density at various depths by treatment.

At three locations on each plot, a sample weighing approximately 10 pounds was collected from the surface 6 inches of spoil, and another of similar size was collected at a depth of 12 to 18 inches. These samples were used to compare particle-size distribution between treatments. Each sample was air-dried and screened through sieves with the following mesh sizes: 0.75 inch, 0.50 inch, 0.25 inch, and 2 mm. The percentage distribution by weight was computed for each sample.

pH and percentage of available phosphorus for the surface 6 inches were determined for 19 samples from each plot. Laboratory determinations of pH were made with a glass electrode pH meter from solutions using two parts distilled water and one part spoil. Available phosphorus was determined from solutions extracted using the Bray No. 1 procedure.

## Fly Ash Effects on Spoil

### *Chemical Characteristics*

Soil pH is among the more important chemical properties governing the availability of nutrients to plants. For example, molybdenum sorption by plants increases as pH increases. In contrast, zinc sorption increases as pH decreases.

The median pH of the spoil following the fly ash treatment at this test site was 6.4. For the untreated check and scarified plots, pH was 3.6 and 3.3, respectively (Table 1).

Similar increases in pH were observed after fly ash treatment of spoil and refuse banks at other Bureau of Mines experimental sites (*1*).

Martens noted the same effect in studies to determine the availability of plant nutrients in fly ash (*2*). He found that many fly ashes were alkaline and neutralized only 0.04 to 3.37 meq. $H_3O^+$/g, compared with about 20 meq. $H_3O^+$/g for calcium carbonate. From these data he concluded that fly ashes differ in their ability to neutralize soil and that considerably more fly ash than calcium carbonate is required to bring the pH of the spoil to a specified level. Nonetheless, the availability of nutrients in soils is affected by changes in pH resulting from fly ash application.

Investigators have found that fly ashes range widely in plant nutrient content. Except for nitrogen, the percentages of many macro- and micronutrients in fly ash are the same or somewhat higher than in natural soils. When fly ash is applied at a rate of 150 tons per acre, many essential nutrients are added (Table 2). Martens showed that selected fly ashes at controlled rates of application increased boron uptake in alfalfa, increased alfalfa yield by additions of soluble molybdenum, and corrected zinc deficiencies in corn (*3*).

Fly ash may also add phosphorus. At the 150-ton application rate, as much as 400 pounds of phosphorus per acre could be added to the soil.

In this study there was an opportunity to compare the phosphorus on the scarified plot treated with a commercial inorganic fertilizer and the spoil treated with the same amount of fertilizer and 150 tons of Fort Martin fly ash. The fertilizer increased the phosphorus significantly above the control plot (Table 1). On the plot treated with fly ash, the phosphorus was nearly three times higher than on the scarified plot. Presumably some of the phosphorus was available to plants.

### *Physical Characteristics*

There was no significant difference among treatments in the percentage of material passing sieves with a 0.25 inch or 2 mm mesh (Figure 1). Thus, the large quantity of fly ash applied to the surface was not reflected in the particle-size analysis. A consistent difference occurred on all plots between the surface spoil and the spoil over a foot below the surface. The higher percentage of fine particles at the surface probably reflects physical breakdown of large particles by weathering or scarification.

Spoil densities at the 1-, 2-, and 3-foot depths were significantly lower on the fly ash plot, but there was no significant difference at the 4-foot depth (Figure 2.). Densities of the control and scarified plots were similar throughout the soil profile. There were significant differences in density between depths on the plot treated with fly ash. Density at the 2-foot depth was significantly higher than at the 1-foot depth. This may identify a zone of compaction that resulted from the weight of equipment moving over the spoil surface when the spoil was regraded.

The lower density near the surface on the fly ash plot could mean greater porosity and higher infiltration rates. However, the addition of 150 tons of silt-size fly ash should have filled voids between particles and reduce infiltration The paradox might be explained by the pozzolanic nature of the fly ash. The fly ash under these conditions may cause soil aggregates to form. If this were true, the failure to recognize the fly ash in the particle analysis, the greater porosity, and the increased infiltration could be explained. On the other hand, the lower densities on the fly ash plot may merely reflect plot differences.

### *Soil Moisture*

There were no significant differences in soil moisture in the surface 6 inches of spoil during the measurement period (Table 3). Moisture measurements at 1 foot or more showed no significant difference between the control and scarified plots.

Table 2. Elements commonly found in fly ash.

| *Element* | *Concentration (%)* | *Approximate Amount at 150 Tons per Acre (lbs/a)* |
|---|---|---|
| Calcium | 1 00 | 3,000 |
| Magnesium | .36 | 1,000 |
| Potassium | 1 74 | 5,250 |
| Phosphorus | 13 | 400 |
| Cobalt | 01 | 15 |
| Molybdeum | .01 | 20 |
| Boron | .01 | 25 |
| Manganese | 02 | 63 |
| Iron | 9 94 | 30,000 |
| Aluminum | 14.01 | 42,500 |

Table 3. Moisture content in the top 6 inches of spoil.

| *Plots* | *Moisture (%)* | |
|---|---|---|
| | *Range*[a] | *Mean* |
| Control | 10 4-19 7 | 13.4 |
| Scarified | 8 0-13.8 | 11.0 |
| Fly ash, scarified | 8.7-17 7 | 12.1 |

[a]Range for 11 composite samples taken between May 19 and August 6, 1970

Accumulated soil moisture at a depth of 1 foot on the control plot was significantly higher than on the fly ash plot throughout the study period (Figure 3). The high surface moisture on the control plot suggests slower infiltration rates. Retention of water in the top 12 inches would reduce the amount of water that could percolate deeper into the profile. This may also cause greater surface runoff during intense rainfall.

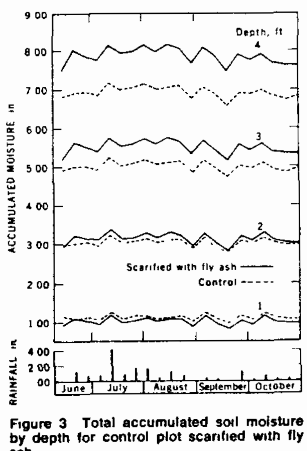


Figure 3 Total accumulated soil moisture by depth for control plot scarified with fly ash.

At depths of 2 feet or more, accumulated soil moisture on the fly ash plot was consistently higher than on the control. These differences became significant at the 3-foot depth. The high soil densities at the 2- and 3-foot depth on the control could have restricted percolation and limited the amount of water reaching a depth of 3 to 4 feet. The lower densities on the fly ash plot at 2 and 3 feet allowed more water to reach the 3- and 4-foot depths.

## Conclusions

Fly ash treatment significantly increased pH and soil phosphorus. The chemical composition of fly ash indicated that other essential plant nutrients were added also.

Spoil density on the fly ash plot was lower than on the other two plots. This probably was due in part to treatment effects and in part to plot differences. This lower density suggests higher percolation rates throughout the soil profile.

Moisture determinations showed high surface moisture on the control plot. At lower depths, fly ash plots consistently recorded more accumulated soil moisture. Fly ash treatment thus increased infiltration rates, increased soil porosity, and increased percolation to a depth of 4 feet Moisture at this depth could provide a reserve for deep-rooted plants during times of moisture stress

The results of this study and past research by the U.S. Bureau of Mines suggest that fly ash applications should be considered in reclaiming extremely acid surface mine sites. Fly ash could possibly be used to supply nutrients and improve the structure of agricultural soils also


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# Conifer seedling nursery in a greenhouse

RICHARD W. TINUS

*ABSTRACT—A new greenhouse system for growing containerized tree seedlings avoids many problems of outdoor nurseries. In one year, seedlings equal in size 3- to 4-year-old nursery stock grown outdoors on the Great Plains.*

TREES have many important conservation uses on the Great Plains. Wind reduction, farmstead beautification, feedlot protection, snow distribution for moisture conservation, wildlife habitat, erosion control, and noise reduction are perhaps the most obvious of these uses.

Conifers are particularly desirable for these purposes because they are long-lived, maintain their density and color in winter, and tend to be freer of disease and insect pests than many hardwoods. Compared with hardwoods, however, conifers grow slowly, especially in the first years after planting, and establishment is less certain

Conifers also are expensive to produce. It takes 3 to 5 years in an outdoor nursery to produce the size of stock needed for planting on the Plains. If adverse growing conditions reduce a nursery's seedling stock at an early age, there is no way to catch up. Likewise, too much seedling stock can result in costly surpluses Even if a nurseryman experiences ideal growing conditions and produces exactly as much stock as he wants, it is still difficult for him to predict the demands for trees 3 to 5 years into the future.

Some nurseries are poorly situated Soil may be unfavorable or the water supply inadequate. Climatic uncertainties include torrential rain, wind, extremes of heat or cold, and unseasonable frosts. Insect and disease control is a constant battle

Nurseries also depend heavily on seasonal labor, the quality and quantity of which is often unreliable A production system that could offer more year-round employment and reduce the need for seasonal labor would solve a major personnel problem (*11, 12*).

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### Answer: Move Indoors

At the Forest Service Shelterbelt Laboratory in Bottineau, North Dakota, our solution to these problems was to move the nursery into a greenhouse and grow trees in containers. The greenhouse provides a controlled environment in which most environmental factors are optimized for maximum growth We can grow the equivalent of a 3- to 4-year-old tree in 9 months. The container and intact root ball protect the root system, provide a ration of moisture and nutrients to help the tree get established, and greatly increase the tree's resistance to mishandling and poor storage.

### Container Shape

The container we helped develop is made of thermoformed sheet plastic folded and welded with solvent into self-supporting units of 52 cavities, 2 × 2 × 8 inches each (Figure 1). The cavity shape is designed to develop a root configuration that will not strangle itself in future years, but will help the tree establish a balanced root system and escape from the original root ball after outplanting Pines especially need to have their root configuration controlled

Experiments to determine the effect of container shape on the root system have not been completed, but a year of observing seedling growth in these containers indicates that vertical grooves and lack of sharp horizontal corners direct the lateral roots downward and prevent spiraling, which they are prone to do in a circular container. A large opening at the bottom allows root tips to grow out into the air beneath, where they desiccate and die (*6, 7*). This is necessary to prevent roots from balling up at the bottom. New laterals are initiated higher up.

### Cultural Methods

Containers are filled with a 1:1 mixture of peat and vermiculite. This mixture is light, has high water holding capacity, and yet is well aerated. It also is sterilized so it contains no viable weed seeds or pathogens. In fact, it must be inoculated with mycorrhizal fungi, symbionts living on the tree's root system that aid in mineral absorption and protect it from pathogens (*5, 8, 10*).

In forested areas there may be enough spores in the air for natural inoculation, but we cannot rely on this in the Plains. Inoculation makes a tremendous difference in the growth of the tree over a year's time (Figure 1).

A fungus may form mycorrhizae with a variety of species. Duff from under a ponderosa pine stand successfully inoculated blue spruce and nine other conifer species.

Seed must be the best possible, since the quality of tree produced can be no better than its genetic potential. Present information on superior seed sources is meager. Studies in progress show as much as a 3.1 difference in height growth between the fastest and slowest sources of ponderosa pine 4 years after outplanting

If tests indicate that 90 percent or more of the seed will germinate, only one seed per pot is needed If the germination rate is lower, then several seeds per pot are needed, and the pots must be hand-thinned.

The seed is covered with ⅛ to ¼ inch of perlite to insure uniform germination and establishment. This fairly deep, droughty surface prevents moss from growing on the pot surface.

### Greenhouse Design

The greenhouse itself is an aluminum-frame quonset covered with two layers of 6-mil ultraviolet-stabilized polyethylene A small blower inflates the space between the two layers, giving the plastic excellent windfirmness and insulating qualities.

Although fairly conventional in design, the greenhouse has two unique features (*13*). First, it is completely

# RECENT SANITARY DISTRICT HISTORY IN LAND RECLAMATION AND SLUDGE UTILIZATION

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## INTRODUCTION

*Area Served*

The Metropolitan Sanitary District of Greater Chicago, an organization chartered under the statutes of the State of Illinois, serves an 860 square mile area with a population of approximately 5 ½ million persons The non-domestic waste load, including industrial, commercial, infiltration and storm-water, adds the equivalent of an additional 5 ½ million persons. All of the area served is located within Cook County Illinois and is composed of the city of Chicago as well as approximately 120 other cities and suburbs.

*Forms of Sludge*

Three major treatment plants handle the daily flow of 1 4 billion gallons. The major treatment process of heated anaerobic digestion, Imhoff digestion followed by sand bed drying, and heat drying of vacuum filtered waste activated sludge, produce approximately 625 dry tons of solids per day.

Heat dried sludge is disposed of thru a contractor who transports the total output of this process to the southern states and Canada for agricultural use. The Imhoff sludge from the sand drying beds is removed to a storage area for additional dewatering and decomposition Final disposal has been by occasional contract and pickup from the general public. In recent months all of the output of the anaerobic digesters of the major plant, West-Southwest has been sent to Fulton County for storage prior to land application. On a volume basis this amounts to approximately 7000 wet tons per day.

Of the three sludge forms being processed the air dried sludge has the most desirable properties for land utilization. Essential plant nutrient analysis averages 4-6-0 1 for nitrogen (N), phosphorus ($P_2O_5$) and potassium ($K_2O$) while dry matter content varies from 30 to 70 percent. However, the air dried sludge is much more valuable, on a dry matter basis than are the other sludges, because of the much greater stabilization which it has undergone. One appears to be justified in considering the organic content of the air dried sludge to be essentially humic matter As such, its importance for rebuilding topsoil would be well appreciated by the agricultural community.

Heat dried sludge has an N-$P_2O_5$—$K_2O$ analysis of approximately 6-5-0 5 with about a five percent moisture content. However, the valuable components of alkalinity, and humic content are essentially missing because of relatively little biological stabilization prior to the drying operation. Anaerobically digested sludge, on the other hand, has considerable alkalinity, 3-4000 mg/l but the solids content only averages four percent as it comes out of the digesters. Analysis shows the digested sludge to average 6-5-0.5 for N-$P_2O_5$ and $K_2O$. Lagooning concentrates solids to eight percent.

## Projects to Date in Land Reclamation

*Northwestern University Campus*

In April of 1968 the Sanitary District, at the request of Northwestern University officials, began a program of applying digested sludge to University owned land. A five acre peninsula had been constructed from dredged sand by the University. On top of the sand an 18 inch clay layer was placed to hold the sand in place and to provide sufficient water holding capabilities for vegetation. A rate of 100 dry tons per acre of digested sludge was applied to the soil by the ridge and furrow method of irrigation. Test wells for water monitoring indicated no detrimental effects due to infiltration. Soil structure and pH were improved to the extent that shrubs and an excellent grass cover could be established and maintained.

*Ottawa, Illinois*

At a 37 acre site near Ottawa, Illinois, the Libby-Owens-Ford Company disposed of waste silica sand from a glass manufacturing operation. Because of the nature of the sand, the site was bare of vegetative cover so that moderate winds caused severe dust problems Digested sludge was applied to the site by gated pipe irrigation methods The initial soil pH of approximately eleven was reduced to near neutral and sufficient organic matter was added to the soil so that a good vegetative cover of grass could be established and maintained.

*Hanover Park*

The village of Hanover Park, Illinois, located in northwestern Cook County, has a 6 mgd treatment plant serving the residential area In 1968 an eight acre site was developed for investigating the effects of sludge fertilization on agricultural crops. The site was prepared so that surface and subsurface water could be collected for analysis Six plots were established and have been planted to field corn during each of the subsequent years Heavy metal analysis of corn plant tissue and of the grain has been the major research interest. To date, results indicate that corn grown under such conditions does not differ from corn grown under conventional practices except for an increased protein content of the grain

*Calumet Farm*

At the Calumet Sewage Treatment Plant a rubbish disposal site of approximately 60 has been reclaimed for agricultural cropping purposes Surface debris has been removed and sludge applied so that a productive soil has been formed. At the end of the 1973 growing season an accumulated total of 237 dry tons per acre had been accomplished over the five years of sludge application. Application has been done entirely by flood irrigation practices as the fields are essentially level Field corn and wheat have been the crops grown to date at this site.

*Palzo Project*

The Shawnee National Forest located near Carbondale, Illinois has considerable acreage of strip mined land within its confines. Generally, the surface water leaving the mined areas has pH values in the 3.0 range. This prevents most forms of biological growth in and along the receiving streams. In addition to the pH problem, a rock problem exists such that use of the lands for cultivated purposes is economically not feasible

In 1970 The National Forest Service in cooperation with The Sanitary District conducted an application rate study on four test plots. Dry sludge solids were applied at rates of up to 100 tons per acre where the applied material was digested sludge. Various grasses were planted on the plots following sludge application. Companion plots received applications of agricultural limestone and commercial fertilizer.

Only on the plot with the highest application rate of sludge did a substantial grass growth occur. Testing of soil pH indicated that change in the pH was primarily responsible for vegetative growth. The plots receiving limestone tended to have acid leaching through the soil at a later date. This resulted in a reversion of soil pH's and loss of vegetative vigor.

As a result of the pilot plot trials The National Forest Service has prepared a 190 acre site for sludge application. At the present time a contractor is removing sludge from a lagoon at the Calumet Plant site and is transporting it to the application site and will apply it over a period of several years. The Sanitary District has also cooperated with the Forest Service on this larger scale project. Extensive water monitoring is being done on the site to determine the effects of the sludge application and subsequent vegetative establishment.

*Arcola Project*

For the past several years a private firm has applied lagooned digested sludge to a 900 acre agricultural site at Arcola, Illinois. On occasion, loading rates of 150 dry tons per acre per year have been accomplished under the supervision of the Illinois Environmental Protection Agency. The firm has the responsibility for all phases of the operation, starting with sludge removal from the lagoon A unit train is used for transportation of sludge to the site with application being done by traveling sprinklers or by moldboard plow incorporation.

*Elwood Agronomy Research Center*

In conjunction with the University of Illinois, a research center for agronomic studies has been operated at Elwood, Illinois since 1968 A total of 44 plots, each of 10 feet by 50 feet, have been used to study several soil types under sludge application Plot borders are isolated from surrounding groundwater by plastic sheets with total water drainage being collected for analysis. The facility was designed to provide a means of determining the accumulative concentration changes of plant nutrients, non-essential heavy metals, and organic carbon, along with the change in biological status of soils and water from cropped land irrigated with various rates of digested sludge.

To date, one of the significant research results has been the indication that application of freshly digested sludge can inhibit or prohibit seed germination. However, if the sludge is applied approximately one week prior to planting or if the sludge has been lagooned for some time prior to application, germination will proceed normally. Offensive odors from well digested sludge applications have not been a problem.

## The Fulton County Land Reclamation and Utilization Site

*Land Acquisition*

In the fall of 1970 the Sanitary District made an initial purchase of land in Fulton County, Illinois, approximately two hundred miles away from the sludge treatment facilities. The land was a combination of place land and strip mined land. Of the strip mined land, some areas had been partially leveled so that grazing operations could be undertaken.

Fulton County, Illinois is one of three counties in Illinois which traditionally lead the state in coal production. Over the past several years, an average of 1650 acres per year has been stripped in the county. Since approximately 40,000 acres of such strip mined land already exist in the county, it was obvious to concerned county officials that something must be done to counteract this erosion of the economic base of the county As a result, Fulton County officials and District officials got together.

*Steering Committee*

At an early date a steering Committee was formed which had the responsibility of a multidisciplined advisory group to the District Represented on the committee are University research personnel, State Water Survey personnel, University Extension Service, Federal and State Soil Conservation personnel, elected county officials, representatives of various local communities, citizen organizations and District personnel Their task was to review the various proposals offered by the District and to suggest modifications for maximizing benefits of the proposals to all parties.

*Transportation System*

A transportation system was developed for moving digested sludge directly from the digesters and hauling it by barge down the Illinois River. At the downstream end a dock was constructed for handling the barges and associated pumps. The sludge is removed from the barges with portable pumps which discharge into the suction line of booster pumps From this point the material is pumped through an underground 20 inch pipeline a distance of 10 8 miles to holding basins.

*Holding Basins*

The holding basins were constructed near the center of the planned utilization facility. Four individual cells comprise the total storage capacity of approximately 8.1 million cubic yards. Each basin was lined with a two foot thick compacted clay liner to prevent seepage and one basin is ringed with a number of wells for purposes of collecting ground water to detect seepage from the basins.

The basins receive sludge every day of the year barring exceptionally heavy ice or flood conditions on the river, and mechanical breakdowns. Two functions are served by the basins. to accumulate sludge without the need of immediate application, and to separate liquid from solids Separation permits application of a sludge with a solids concentration which can be different from the sludge being input to the basins.

*Distribution System*

A conventional dredge is used to remove sludge from the holding basins. It has a cutter head which can reach depths in excess of 30 feet and is moved in an oscillatory manner when removing settled solids The dredge discharges into a floating pontoon line which conveys the sludge to several large holding tanks.

From the holding tanks the sludge is fed to two pumps in series which have a collective capability of delivering 1200 gpm at 80 psi The output of the distribution pumps is conveyed through a surface layed, ten inch, steel line out to the fields for application Each of the presently installed eight distribution lines services an area of approximately 250 acres.

Within the field, portable, eight inch, aluminum irrigation piping conveys the sludge to the various areas. Traveling sprinklers do the major amount of sludge application and they are connected to the aluminum line with a five inch diameter 660 foot long hose. In some instances a tandem disk equipped with a distribution manifold is connected to the five inch hose for incorporating sludge as it is applied. Either application method can cover a maximum area of approximately ten acres with a single settling of the aluminum pipe. Sludge is applied during the growing months of May through October with the distribution pipeline being flushed with water and then drained for winter periods.

*Site Preparation*

Prior to sludge application each field is leveled by construction equipment to maximum slopes of approximately six percent. Berms are placed around the field so that all surface water runoff is directed to adjacent retention basins for temporary storage and analysis prior to release to the water course. Retention basin capacity is designed to receive the 100 year frequency storm, which for the Fulton County area amounts to a bit over five inches of water. Rocks and other debris are removed from the field during site preparation. Those areas that were scarified and which will not become part of the productive field are seeded to permanent grass for erosion control.

*Environmental Protection System*

The system is designed to operate in a fail safe manner Complete surface water collection is accomplished by directing application field runoff to retention basins. The water is then analyzed prior to release to show that it meets State water quality standards. In addition, several small streams that run through the property are monitored at points where they enter and leave District Property. The State Water Survey, IEPA and the County Health Department also monitor some of these streams as well as several other locations within the property

Numerous shallow wells have been located throughout the property for purposes of supplying ground water for monitoring purposes Shallow wells for ground water monitoring purposes surround the holding basin that was put into operation first. Extensive use of grassed waterways reduces the sediment load that leaves the fields during heavy rains. The waterways also provide for additional utilization of nutrients prior to entry of the runoff into retention basins.

*Cropping Program*

The basic aim of the Sanitary District is to be able to apply as much sludge to a particular location as the environmental limitations will permit In this regard, the agricultural cropping program is a vital component. Information indicates that somewhat less than half of the applied nitrogen in this system ends up in the soil and is thus available for plants. The remaining portion evolves to the atmosphere as gaseous nitrogen. To the present date, nitrogen has been the primary parameter by which loading rates were determined. Of all conventional agricultural crops, field corn has been the crop that used the greatest amount of nitrogen and presented the fewest management difficulties during its production.

The Sanitary District procures the services of local farming organizations through competitive bidding on crop production contracts. The contractor is essentially responsible for all phases of the crop from "bag to bin". During the growth of the crop the District supplies the required fertility to the crop by sludge application. Marketing of the crop has been done by contract through local commercial grain dealers.

Production records indicate that when sludge is applied to strip mined land, corn yield has been increased by approximately a factor of four when compared to those strip mined fields which received no sludge Because strip mined soils have no organic matter to speak of, they have relatively little ability to contain adequate amounts of soil moisture Therefore, it appears important that sludge be applied in the liquid form until soil organic matter is built up to a sufficient level.

Many good agricultural soils range from three to five percent in organic matter. An application of 100 dry tons per acre of the District's air dried sludge would change the soil organic matter content by approximately one percent. At this rate the entire daily solids output of the District, 625 dry tons, could only improve six acres per day by an organic matter change of one percent. On an annual basis this approximately equals the acreage which is strip mined in one county of one state, Fulton County, Illinois. Conservation of a valuable commodity must receive greater attention.

*Research Studies*

The District's Research and Development Department is studying quite a number of factors connected with the long range changes that might result from sludge application in an agricultural setting In addition to the above mentioned parameters that are being tested, lakes on the site are periodically sampled for biological specimens ranging from microorganisms to fish. Grain and plant tissue analysis is conducted on the crops being grown.

In cooperation with the University of Illinois School of Veterinary Medicine a grazing study is underway which involves approximately 100 head of beef brood cows. The cattle consume forages produced entirely from sludge fertilized lands. During the summer the cows directly graze an irrigated crop while during the winter they graze stubble fields or are in dry lot. The cows and their calves are being examined for parasitic changes, heavy metal concentration changes and changes due to disease producing organisms.

A number of small plots have been established on strip mined soil near the holding basins. Studies on these plots involve crop response to sludge fertilization, soil response to sludge fertilization, and the effects, on soil water, of sludge migration down through the soil profile. Because of variable environmental conditions it is sometimes unreliable to extrapolate data collected from plots in a different locale.

*Multiple Use Facilities*

Throughout the early development and implementation of the reclamation site, considerable emphasis has been placed on multiple utilization. Various integral parts of the site have been developed for public uses such as boating, camping, fishing and hiking while other parts have been devoted to improving the habitat for wildlife. Several hundred acres of land, within which are sludge recycle fields, has been leased to the county government. They in turn are responsible for managing the area for public utilization. The State of Illinois Department of Conservation is cooperating in the wildlife habitat improvement and stocking of the strip mined lakes for fishing. Efforts continue on the project for reestablishment of a native population of giant Canada geese.

## Future Developments

*Application Rates*

At present, the Illinois Environmental Protection Agency has approved application rates on the Fulton County site of 75 dry tons per acre per year for strip mined land and 25 dry tons per acre per year for place land. These rates pertain to liquid application wherein the solids content might reach a maximum of eight percent. Over a period of five years the application rates are reduced to a steady-state rate of 20 dry tons.

Infiltration rates for the clay soils of the area restrict the amount of water that can be applied over and above a normal annual rainfall of approximately 35 inches. It appears that an average year would result in approximately four acre inches of sludge being applied to the soils. This factor would limit maximum dry matter application to approximately 36 dry tons per acre per year if eight percent solids are in the irrigant. Therefore, it appears that in the near future, the District will be strongly considering application of a sludge which can be handled as a dry material. Several major benefits of such a move would be that annual application limits could be achieved in a single application, organic matter could be built up in the soils at a much more desirable rate, and that sludge could be incorporated shortly after application to result in much less nutrient and particulate loss from the field due to erosion.

The concentration of heavy metals in the soil is a factor that can be controlled to any desired degree. One can monitor the soil for metal concentration and the crop for toxicity indications. If, and when, crop toxicity is encountered one can relieve the metal concentration in the soil by tilling more deeply. The normal plow layer is considered to be eight inches. It is presently possible to till to a depth of approximately 36 inches with existing equipment. More than a four-fold reduction in concentration would result from such action. Fears that there are no practical responses to too high of a metal concentration in the soil appear to be unfounded.

*Reclamation and Strip Mining*

Some of the land that the District is now leveling and reclaiming has been laying in an unproductive condition for a great number of years. The land has become overgrown with low quality trees and vast amounts of soil has been conveyed to nearby streams over the years. In considering the total cost to society for such practices, it does not appear reasonable that such a time span need exist between strip mining and reclamation.

Recent State of Illinois laws have required current strip mined spoils to be leveled to slopes of no greater than 15 percent. However, this practice can only be viewed as a partial solution to the problem. Long slopes of only several percent on bare soil cause serious erosion problems. This condition is coupled with the fact that soils devoid of organic matter take an exceedingly long time to establish adequate vegetative cover. Before vegetation protects the soil from erosion, ditches are formed which concentrate water flow and cause still more serious erosion. The process is a never ending cycle as soil must be moved to correct the ditch problem and the process is repeated.

The missing key to the reclamation of these soils is organic matter. The incorporation of sludge into freshly leveled mine spoil immediately after stripping appears to present the most desirable benefits for sludge utilization and land reclamation. Nowhere in agriculture are such quantities of organic matter available at a cost which would be comparable to that of sludge.

MR. LEHMAN: Thank you Mr. Brenneman. Any members of the audience then if you wish to pass questions to the speaker, merely raise your hand, and a 3 by 5 card will be handed to you, and then you will -- we will rapidly collect the questions.

Are there any questions on the panel?

MR. KOVALICK: Mr. Brenneman, you made an interesting statement about those things you think should not be called hazardous. Have you had a chance to give some thought as to the criteria that ought to be used, distinguishing between arsenic and cyanide, and the waste you are talking about?

MR. BRENNEMAN: I think it should be established that it definitely is a hazard to our health, and that's what we're really aiming at.

And I would not be able to just off the cuff give a criteria for that. But certainly leaching from wood chips per se, there may be other reasons -- I'm just asserting myself that these should not just be dumped, but it's hard to conceive, that this is a hazard to anyone's health, or to wildlife.

MR. KOVALICK: Would it be your view that the hazard then is a funtction of how that waste is disposed of. That is, those wastes that are disposed of carefully are not hazardous, and those that are not, are hazardous?

MR. BRENNEMAN: I think there should be surveillance to see that there's a hazardous amount of whatever there is. This is being done like at our plants and at the MSD, they're constantly monitoring it.

As far as I know, or understand, the MSD has been doing this -- but I can tell you only what I'm reading.

MR. KOVALICK: Thank you very much.

MR. LEHMAN: I think we have some other questions Mr. Brenneman.

Would you please stay at the podium.

Mr. Lazar.

MR. LAZAR: Yes, I have two questions, Mr. Brenneman.

The first one you mentioned in the case of fly ash which contains trace amounts of heavy metals, that if this were classified as hazardous they would not be used for reclamation.

Could you explain why -- to me it seems we don't have two mutually exclusive things here. The way I understand it, it could be classified as hazardous and still, if carefully handled, be used for reclamation.

MR. BRENNEMAN: It relates to the quantities of heavy metals. If they are in such trace amounts they would be considered negligible.

And therefore I hope they could be used for fill on perhaps interstates and something like that.

We would like to use something rather than waste something, and that's my main thrust. Not waste it, if it can be used and it's not hazardous.

MR. LAZAR: May I ask another question, please.

You say first sewerage sludge in Chicago, and you stated in trace amounts in heavy metals in the harvested grain are not considered harmful, will you cite an authority for this statement.

MR. BRENNEMAN: The authority is Dr. Robert Dowdy, Agricultural Research Service, United States Department of Agriculture, St. Paul, Minnesota.

He made a study, they have been using sludge up there from different suburbs of the St. Paul Minneapolis area, and they know what the heavy metals are, they throw them where they can't escape, and they collect everything and the grain, one statement was that a man who ate 2 heads of lettuce a day for 20 years would not be in any danger. But I'm not certain which metals they are.

He has researched it and he spoke to a soil conservation society meeting, in Pekin last year.

MR. LEHMAN: Mr. Brenneman, could you supply that name to us later for the record, please.

MR. BRENNEMAN: I'll try. I'll get it or send it to you.

MR. LEHMAN: Are there any other questions? From the panel or from the audience?

Evidently not, thank you very much Mr. Brenneman.

Next I would like to call upon Mr.

Donald Eby from Monsanto Company.

MR. DONALD EBY: Mr. Chairman, and members of the panel, ladies and gentlemen, the Monsanto Company appreciates the opportunity to respond to the published questionnaire on solid waste management.

My name is Donald Eby. I am employed by Monsanto as Process Environment Director in its Department of medicine and Environmental Health.

Monsanto produces a broad range of chemicals, plastics and synthetic fibers in 62 domestic plants employing 44,000 people.

We have suggested answers to several of the 16 questions posed, in areas where our experience in manufacturing and the associated wastes management functions is appropriate.

May I ask can you hear me at the rear of the room?

Thank you.

We would like to offer some preliminary comments, some parts of which are not specifically addressed by the questionnaire.

These comments pertain to the chemical processing industry. It is recognized that other types of hazardous wastes, such as radioactive and pathogenic may require a different approach. Also, these suggestions may not be totally appropriate for differing basic processes such as metals, and extractive industrial operations.

First, we accept the responsibility for environmentally acceptable disposal of our wastes and expect to continue to bear the associated costs.

At present, we are disposing of hazardous wastes both at the site of generation and by using services of treaters and processors. We are employing the safeguards and hazard controls that have been found necessary in production and in use of these chemicals.

It may be desirable to establish uniform guidelines for regulation, possibly including an operational permit system for separate facilities handling heterogenous wastes from multiple generating sources. Since local conditions of soil, water and terrain and stage of land use will vary widely, it is recommended that specific regulations be established and implemented by states or municipalities under general national guidelines.

It is suggested, however, that waste

processing and disposal by the generator, on his property, of wastes for which specific knowledge and control procedures exist would require a lesser degree of regulation. In this case, no need for a permit system or handling or processing regulations is needed since the total facility operates under established environmental and Occupational Safety and Health Administration controls.

Second general point is that the desirability of recovery, recycling and secondary uses of waste materials in preference to discard is acknowledged.

It is however, suggested that regulation of waste disposal be concentrated on environmental protection.

The imposition of fees, penalties or restrictions to force re-use will add a cost burden to society without a concomitant environmental benefit.

Thirdly, it is evident that the designation of suitable land areas for hazardous waste disposal is becoming increasingly difficult.

The ultimate discharge to air, surface and sub-surface water after the wastes are converted to environmentally acceptable form must be predicated on natural conditions rather than political boundaries.

Furthermore, the costs of transporting hazardous wastes, as well as the potential environmental risks in transit, are related to the distances involved, and are ultimately borne by the consuming public.

We therefore, suppor t the concept which has appeared in several tentative legislative drafts which provides for designation of appropriate public land for hazardous waste disposal sites; and also the prohibition of local statutes which would prevent acceptance of wastes generated in a different jurisdiction.

We oppose the mandatory use of such designated sites to the exclusion of alternative sites.

Now getting to the questionnaire, the first question relates to definition of hazardous wastes and sampling and analytical features.

Hazardous wastes could be defined as materials destined for ultimate disposal which could create, or have the potential to create, significant adverse effects on human health, or on other beneficial living species.

The criteria for identifying hazardous wastes could then be based on established carcinogenic and toxicological properties of ingredients in the wastes.

For example, a given waste quantity could be classed hazardous for disposal regulation if it contained significant quantities of any substance in one or more of these categories.

Established human carcinogens, highly toxic to humans and mammalian species, highly toxic to beneficial acquatic organisms.

Since the individual substances making up the total lot of waste are generally known, although the exact proportion of each substance can vary widely, the classification by established toxicity of the known ingredients, based on existing data for pure substances could be readily used for most industrial wastes, without special sampling or analytical procedures.

If this hazardous classification of wastes by significant ingredients is feasible for disposal management, it should be noted that the toxic, or poisonous, classification of the composite waste entity should continue to be the criteria for container labeling and transportation requirements.

Additional criteria of importance to the ultimate acceptable processing or disposal of wastes would be their biodegradability and the bio-accumulative toxic effects in acquatic organisms.

It is suggested that these latter be considered in selecting acceptable methods for treatment and/or disposal, and not as a criterion for classifying the waste per se.

There are also hazardous features of materials which must be properly considered in the handling, containerization and transporting of such wastes, whether or not destined for ultimate disposal.

However, the safeguards related to the pure materials such as in the Hazardous Materials Transportation Act and OSHA regulations could be applied to the hazards of explosives, flammables and combustibles, oxidizing and corrosive materials without duplicating these in hazardous waste criteria.

The second question relates to suggested responsibilities for the generator, transporter, processor.

We feel the generator should be

responsible for establishing an environmentally acceptable program for the disposal of his hazardous wastes.

Either A, by self-disposal on his property, via processes and methods which meet the established guidelines for air emissions, effluents to waterways and all other requirements for environmentally safe, nuisance-free operations. Total responsibility and liability rests with the generator in this case.

Alternative B, by initiating an environmentally acceptable disposal method using services of licensed or permitted treaters or disposers. Each transporter, treater and disposer should be responsible for his individual activities while the waste is in his possession.

With alternative B, the responsibilities should be as follows:

The generator should characterize the waste sufficiently for proper handling and disposal. Insure that containerization and transport of the waste is properly designated. And confirm the competence and reliability of transporters, treaters and processors to whom the waste may be transferred.

The transporter should, as with any hazardous material in normal commerce, require adequate information on characteristics of the waste, comply with established Department of Transportation and state and local regulations, ensure proper equipment is employed, and be responsible for safe handling and spill prevention and mitigating action.

The treater, or processor should be responsible for ultimate disposal of wastes to the environment in acceptable form, for accounting to regulatory authority for proper disposal of these wastes, and for accounting for any stockpiled waste inventories and maintaining capability for their future processing or acceptable disposal.

Each party to the waste management cycle should have financial liability for wastes for which jurisdiction is accepted. Contested liability arising from disputes related to responsibilities listed above will probably be issues for court determination.

The generator should bear the costs of environmentally safe disposal either directly or through fees paid to transporters, treaters and/or disposers. However, the generator should not bear the costs of improper handling or treatment due to non-performance or negligence of transporters or processors.

Question three relates to specifics for treatment or prohibition and since we have no substantive comments, I would like to skip that and in the interest of time proceed to question six, which asks the minimal safety and security precautions for hazardous waste handling and treatment.

The necessary safety and security operational controls, as well as personnel exposure protection, and training requirements for hazardous wastes are analagous to those currently employed and regulated for products of comparable hazard in normal commerce.

Thus, no superimposition of another tier of regulations is needed.

The guidelines and restraints of the following nature should be sufficient. Spill controls and reporting under Public Law 92-500 Air Quality Control Region notification for excess emissions. OSHA workplace standards. Local government and insurer's requirements for fire and explosion. Local zoning and land use requirements. Department of Transportation container and shipping regulations.

Question seven asks for provisions for site monitoring record keeping.

For quantitative material accountability records of shipments by generator, receipt and delivery by transporter, and receipt, storage and processing by disposer should be maintained in a consistent manner. Each party to the waste management cycle will need such records to confirm the discharge of his respective responsibilities and to substantiate the payment or receipt of payment for the functions performed.

Periodic summaries or totalizing reports could be provided to regulatory authorities if required.

It is questionable if a massive compilation of such individual data would be effective in monitoring the site, per se. Site control, under permitted stipulations, should consist of monitoring discharges to the environment; liquid effluent by NPDES permit, leachate by test data, air monitoring, appropriate to the AQCR, etc.

In addition, inventory or stockpile records should be required to control the potential concentration of hazard and inherent future environmental loading.

It is not considered feasible to expect one reporting, recordkeeping system to satisfy both the objective of closed loop control for each waste increment and also the overall monitoring of the disposal site.

In the case of on-site treatment and disposal by the generator, it is suggested that records of amounts treated and disposed of, and amounts stockpiled for ultimate disposal would suffice, presuming the operating location is in overall compliance with air and water regulations.

Question nine addresses itself to the requirements for assuring long term security for disposal sites.

It is presumed that the assimilative capacity and capability of the site based on its features will be determined by initial survey and/or by monitoring during continuing operation. The permitted operations will be circumscribed by these conditions.

The long term integrity safeguards then have these aspects. First stockpile controls to limit quantity of wastes on-site to avoid exceeding assimilative capacity after processing or disposal.

Second, financial surety to provide adequate operating funds to process all on-site wastes. Perhaps by performance bond.

And third, a permit requirement for acceptable shutdown or abandonment plans and physical safeguards. This could be updated periodically.

Question ten deals with feasible methodologies to set limits on the amounts of hazardous wastes permitted to be emplaced in the land.

Methodology exists for determining the solubility and bio-degradability of waste substances. Also soil percolation and barrier characteristics can be determined. The limits of the amount of wastes to be stored can only be estimated by evaluation of these factors for the specific conditions of the particular site.

The safety factor allowed should be further influenced by the location and existing conditions of the ultimate receiving ground or surface waters.

Proof of the assimilative capacity of land emplaced wastes can be developed by monitoring infiltration and leachate. Provisions should be included for adjusting quantity limitations as monitoring data is obtained. The capacity of properly operated sites may be found to be quite elastic.

It is also suggested that sufficient flexibility be included to adjust the effluent, leachate and emission limits from a hazardous waste disposal site to a realistic relationship to the measured effluents and emissions from the much larger number of properly operated sanitary landfill disposal sites for domestic garbage and refuse.

Also, it is suggested that disposal of industrial hazardous wastes be allowed in existing processing facilities or landfills where the ultimate environmental effect will not be detrimental.

In the interest of time, our answer to the combined questions 11 and 12 regarding transportation safety and labeling was somewhat answered in question 6 in that the Department of Transportation has and is proposing additional rules which we feel will cover both intra and interstate transportation, including all labeling and containerization.

Therefore we see no need for special regulations as a part of environmental control.

Question 14 asks what mechanism and experiences are effective to obtain citizen cooperation and acceptance.

Public acceptance of the need for land areas to be designated for waste disposal and public understanding of the apparent inconveniences necessary for creating a generally safe environment must be obtained through the programs of governmental statutory and zoning actions.

As a technologically oriented company we will certainly do what we can to support the objectives of government information programs and to explain the problems of waste management in our communications work on the subject.

The final question asked of relations between the Federal and private sector, as covered in our preliminary comments, private sector opportunities should be available within a consistent and practicable regulatory framework. Waste generators, whether private or public, should be responsible for environmentally acceptable disposal.

The selection of a secondary disposer, whether public or private, or the determination of the generator to directly assume disposal/operational responsibilities should be a free choice.

Thank you very much, and I'd be glad to answer any questions.

MR. LEHMAN: Fine, Mr. Eby has indicated he will answer questions, and again I wish to remind any newcomers to the audience if you wish to ask a question merely raise your hand and a card will be provided for you.

Yes, Mr. Lindsey.

MR. LINDSEY: Mr. Eby in the earlier part of your statement you indicated that a permit system is needed for commerical treaters and disposers but that such permit controls are not needed for treatment or disposal by the generator.

Now, could you please elaborate on why the distinction should be made?

MR. EBY: We believe the distinction is

based principally on the fact that the generator is dealing with his specific problems with specific knowledge of their characteristics.

All of the features of his manufacturing, sale and use of these things is regulated based on the hazard involved, and therefore it is top priority and control. Whereas the treater and disposer is accepting heterogenous waste from many generators and therefore needs uniform guidelines and controls to make sure there is consistency to handle the various variables in what he is doing.

MR. LEHMAN: Mr. Newton.

MR. NEWTON: Mr. Eby you made the statement that on site disposal currectly operates under established environmental controls. I would appreciate if you could specify the state and/or Federal environmental controls to which you are referring.

And if you also could specify those which specifically cover ground water.

MR. EBY: Perhaps I should have said existing and near future controls. It is true that the present control for water falls short of control. And falls with the operator.

The on-site waste treatment facilities --

I'm not speaking for the whole industry. Testing the leachate and the run-off -- that's the thing as you are well aware would be needed control for on-site generation.

This may come before or after regulation of run-off and the general water act.

MR. NEWTON: Again, in terms of protecting the ground water, versus the surface water, whether from a point or non-point source, does your company operate under state or Federal departments?

MR. EBY: No, sir, we do not at the present time.

MR. KOVALICK: I have several questions Mr. Eby.

First of all, on a related question in findings of hazardous wastes, you suggested in one of your questions or one of your statements on page 2, that the classification, by establishing toxicity of the substances in the waste, could be readily used in most industrial wastes. Have you had a chance, or do you have any thoughts on whether that's regardless of concentration?

MR. EBY: Yes. Our premise here is regardless of concentration. With the point that the concentration and of course the ultimate characteristic of the waste and the leachate into the environment it's -- and we know and the chemical industry knows what is waste and what their toxicity is. And that data is readily available.

If the waste has -- I think I said a significant amount, and of course that's subject to further technical study, if the waste contains this product whether it's 10 per cent or 85 per cent, we would be willing to classify the entire waste as hazardous, for determination of its treatment site and treatment manner.

Obviously a waste with only 10 per cent of that ingredient would be far less hazardous than if it were exposed to the environment at that time, and that of 95 per cent.

Our premise in classification is to quickly identify these things, so they can be properly designated for treatment or disposal, and not to identify how they would be to the environment right now if they were wastes.

MR. KOVALICK: So the presence of any amount of a toxic substance would cause that to be labeled hazardous just for the purpose of making sure that it's properly managed later, at the disposal site. Is that correct?

MR. EBY: This is concentration with a significant amount.

MR. KOVALICK: All right, significant. Can I ask one more Mr. Chairman?

In -- related to the subject of labeling of hazardous wastes versus hazardous substances, referring then to the Hazardous Materials Transportation Act and you pointed out that they do have a separate label, such as caustic acid and so forth, but you also in your statement which you did read says that the adaptation of shipping names, labeling, packaging and transport under DOT regulations addressed specifically to waste would be advisable.

So, if I understand your statement correctly, you feel that the Department of Transportation regulations are sufficient for the transport of waste, but may not be sufficient -- that is DOT labeling and other requirements may not be sufficient at the waste treatment/disposal site, is that correct?

MR. EBY: That is a correct statement, but that's not what I intended by that particular comment.

DOT is now beginning to promulgate some special labeling for wastes, different from those others I mentioned, and we should modify these to suit their classification of waste products.

MR. KOVALICK: But there is a need to recognize wastes as different subjects and different substances.

MR. LEHMAN: We have a few questions from the floor Mr. Eby.

Mr. Klepitsch.

MR. KLEPITSCH: The question asks how could future owners be protected from on-site disposal of hazardous wastes in wells or landfills unless a record is filed as part of Title II property.

MR. EBY: That's a question I do not think I am expert enough to answer. But I think it's a very logical question, and if as we propose records were kept in total quantities of hazardous waste disposal of properties, I think this has to be done by the generator on his own property or an independent processor.

If those records are kept and then I think it becomes a matter of local statute to require those to be on the property, that's what should be done.

MR. LINDSEY: I have a question from the floor.

The question says does Monsanto use a deep well injection and if so, for what substances? And I would like to amend that if I could to also ask the question if you do use it what criteria and safeguards do you use to decide how and what should be well disposed. That is especially by deep well.

MR. EBY: Yes, we do use deep well injection at several locations. All of these situations are fully permitted to the extent of geological surveys in advance, and I could not cite specific quantities or products at this time.

The second part of the question was how do we determine?

MR. LINDSEY: Yes. What should be disposed of by the well, and so forth.

MR. EBY: Well, this is permitted very rigidly. We only dispose of those things for which we have official permits and in the quantities that are stipulated by the guidelines, and these are mostly state permitted operations.

MR. LINDSEY: Thank you sir.

MR. NEWTON: Mr. Eby, your statement notes that your support for the precept use in several tentative legislative drafts, we'd appreciate the reference to the legislative drafts.

MR. EBY: I'll send notice to you.

MR. LEHMAN: One last question. Mr. Kovalick.

MR. KOVALICK: I wanted to make reference to questions 2 and 7 where you refer to the waste management cycle. If I understand your suggestions correctly, the generator, the transporter and the disposer will maintain records and be responsible certainly on his facility or on his vehicles for integrity.

But I don't understand how the loop is closed by -- if I could use that expression, from preventing wastes from reaching other than sites for which they are destined.

And if it's true, if both the transporter and the well run disposal site what is to prevent waste from leaving that loop and reaching what we would call a non disposal site.

MR. EBY: That's a difficult problem.

I think the prevention would be proper licensing, permit requirements for both the transporter and the user, and that would monitor activity.

My point was not that these records should not be used as a check on activities, but my point was that the sheer mass of the statistical problem of trying to use these individual transit tickets along with disposal records at the site to get an overall material balance is going to be a gargantuan task. And I think if you look at two separate systems one is controling the loop shipment transit delivery, and the other controls the actual activities at the disposal site.

And I'm not trying to combine the two into a computer system, but that could be more effective.

# Monsanto

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December 17, 1975

Mr. Murray Newton
United States Environmental Protection Agency
Hazardous Waste Management Division
Office of Solid Waste Management Programs AW-565
Washington, D. C. 20460

Dear Mr. Newton:

During the Public Hearing on Solid Waste Management at Rosemont, Illinois on December 4, you requested references supporting Monsanto Company's statement (page 2) that -

> We therefore support the concept which has appeared in several tentative legislative drafts which provides for designation of appropriate public land for hazardous waste disposal sites; and also the prohibition of local statutes which would prevent acceptance of wastes generated in a different jurisdiction.

Among the several allusions to these concepts which have appeared in various legislative drafts and staff working papers, the following appear to be the most explicit.

> <u>Pertaining to land designation.</u> Senate Committee in Public Works, Staff Working Paper dated October 15, 1974 which designates the Administrator -- "to conduct studies together with recommendations for administrative or legislative action (to remove) the legal constraints and institutional barriers to the acquisition of land needed for solid waste management etc."
>
> <u>Pertaining to acceptance of wastes from a different jurisdiction.</u>
> S-1086, Senator Baker. March 6, 1973.
> "Section 9 - The Administrator shall encourage cooperative ... interstate, interlocal and regional planning for ... and conduct of ... hazardous waste disposal programs."
>
> and "Section 14(b) No State or municipality shall impose, on wastes originating in other States or municipalities, requirements respecting the transport of such wastes into or disposal within its jurisdiction which are more stringent than those requirements applicable to wastes originating within such receiving States and municipalities."

Monsanto appreciates the opportunity to present its views to your panel.

Very truly yours,

Donald L. Eby

Donald L. Eby
Process Environment Director
Department of Medicine and
Environmental Health

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cc: Mr. John P. Lehman, Director
United States Environmental Protection Agency
Hazardous Waste Management Division
Office of Solid Waste Management Programs AW-565
Washington, D. C. 20460

MR. LEHMAN: Thank you very much Mr. Eby.

Again, I have a point from the audience that I'll just raise. It's really not a question. I'll only merely state what it says here. It says if industry is relieved of responsibility waste would be given to anyone who has the lowest charge.

So, that's verbatim, it is not posed, in the form of a question. So I'll just put that into the record.

Next I would like to call upon Mr. John Baker, Indiana Board of Health, or I understand there may be an alternate. Mr. David Fenton, are either of those gentlemen in the audience?

They must not be here. We will have to come back to them.

I'd like to next then call upon Mr. Thomas J. Murphy of the Lake Michigan Federation, is Mr. Murphy here?

While he's coming to the microphone, let me ask the next couple of speakers so we can get a little preparation here. Mr. Bruns from Hyon Waste Management and Mr. Thomas Clark, Illinois EPA.

I now have Mr. Thomas Murphy of the Lake Michigan Federation.

MR. THOMAS J. MURPHY: Yes, I am Thomas J. Murphy and I represent the Lake Michigan Federation and I make the following statement.

There have been numerous incidents in recent years of adverse health and environmental effects due to the improper disposal of hazardous and toxic wastes. These include the following.

The mercury discharges from the chlor-alkali plants into the rivers and lakes of the nation.

The continuing discharge of thousands of tons of asbestos in mine tailings into Lake Superior.

Several incidents where hazardous materials disposed of in deep wells have contaminated aquifers or have been released at the surface upon failure of the well equipment.

The problems with inadequate disposal procedures were highlighted two weeks ago in Chicago at the National Conference on Polychlorinated biphenyls.

These materials are toxic in themselves and contain small amounts of very toxic dibenzo-furans and by-products. Many of the polychlorinated biphenyl are not degraded by sewage microorganisms, high concentrations of P.C.B.'s are present in the sewage received at treatment plants; though P.C.B.'s are so stable that they are not oxidized in most incinerators, thousands of pounds end up each year in refuse burned at municipal incinerators .

Thus this only serves to evaporate these materials into the atmosphere where they are deposited throughout the world in rain and dry fallout.

Though they are not decomposed by ground water or soil microorganisms, millions of pounds are disposed of in landfills each year resulting in a vast accumulation which can only come back to haunt us in the future.

These incidents and many more underscore the need for much more comprehensive and stringent regulations to deal with the disposal of hazardous materials.

These regulations should, we feel, include the following provisions:

One that the responsibility for the safe disposal and the ultimate fate of hazardous materials reside with the producer of the materials, even though the actual disposal is contracted to others.

That chronic testing be part of the testing protocol and that all significant metabolites or degradation products of the hazardous material be tested for their acute and chronic toxicity.

That wastes be chemically detoxified before land or water disposal or incinerated in such a manner that oxidation to non-toxic materials results.

That land, landfill or discharge to a waste water treatment plant not be considered adequate treatment except where it is shown that such treatment will detoxify the material before possible harm can result.

That deep well disposal of hazardous materials not be considered an acceptable disposal method.

That the charges and penalties for improper disposal of hazardous materials, whether or not harm has resulted, be made high enough that the proper disposal of all potentially hazardous materials be economically the cheapest method.

Thank you.

MR. LEHMAN: Will you answer questions, sir? Are there any questions from the floor or the panel?

Mr. Kovalick has a question.

MR. KOVALICK: Mr. Murphy, we are of course interested in many kinds of wastes, not just those containing P.C.B.'s.

Do you have any thoughts on statements that you can point towards regulating of wastes disposal via the substance contained in it?

Is that the position you have? I noticed you focused on P.C.B.'s but have you had a chance to think about that?

MR. MURPHY: I was using P.C.B.'s as a recent example.

Yes, I think every waste has to be treated in its own right. Oxidizing materials are different from flammable materials, and there are many different materials that are different from each other, that have specific toxic values.

MR. KOVALICK: You stated Federal guidelines ought to address wastes by their characteristics or address the operation of the disposal and treatment facilities or both? Do you have a feeling on that?

Do you have a distinction on that?

MR. MURPHY: Okay I think the waste has to be treated on its own properties.

MR. KOVALICK: I guess I was just trying to make a distinction between addressing wastes as a class, instead of addressing sites.

MR. MURPHY: I think wastes have to be treated individually. As some things are different from polychlorinated biphenyls, and they have to be -- there has to be a suitable distinction and disposal method for each of those on their chemical and physical properties.

MR. LINDSEY: Mr. Murphy, I am interested in your P.C.B. statement for the use of that example.

Now, you indicated that millions of pounds of it a year are liberated from municipal incinerators --

MR. MURPHY: No, I'm sorry -- that they were included in the waste which are discharged at municipal incinerators.

That waste containing polychlorinated biphenyls that end up in landfills.

MR. LINDSEY: Oh, all right, but along the same lines it's my understanding that in recent years the sole United States manufacturer has limited that to electronic and electrical equipment and electronic equipment, am I wrong in that?

MR. MURPHY: Well, that's right I believe there's about 40 million pounds presently being produced and these are being used in what is called closed systems, and these are principally large electrical transformers which contain a large amount of polychlorinated biphenyls which are handled differently.

The major amount of polychlorinated biphenyls goes into paper insullated capacitors. And these capacitors are used in air conditioners, for fluorscent lights -- and all electrical applications where these capacitors are used.

When these materials -- when the ballast in the fluorscent lights go bad it is through out. There's no indication what is contained in the capacitor. And most of these materials go to the incinerator and go to landfills and go where refuse normally goes.

With the P.C.B.'s contained within them.

MR. LEHMAN: We have a question Mr. Klepitsch will read it.

MR. KLEPITSCH: Yes. Question from the floor, it asks what would you propose to be done with those wastes which are so complex that analysis is impossible.

MR. MURPHY: I would not generate such wastes in the beginning. I think that this is part of the manufacturing process. If this is a product of the process it must be considered, so I think that planning for the disposal of waste has to begin where those wastes are generated.

MR. LEHMAN: All right. Are there any other questions?

Evidently not, thank you very much Mr. Murphy.

Next I'd like to call upon Mr. R. B. Bruns of the Hyon Waste Management Services. Is Mr. Bruns here?

I see that he is.

MR. R. B. BRUNS: My name is Bruns, I am President of an engineering firm in Jersey, also of a hazardous waste treatment facility known as Hyon Waste Management Services here in Chicago.

My remarks are addressed particularly to discussing topics 3, 4 and 5 which refer or ask something about the state of the art.

The technology, the ability to treat these materials. And to some extent the economics of such treatment.

The size and scope of the hazardous waste problem today is reasonably well identified I think in the Federal EPA publications, which are in the rear of the room, and the reported 10 million tons a year is indeed a formidable number.

Except for a few small, private operations mainly incinerator plants, and some recovery operations, prior to 1970 most of the interest in this business and most of the interest in the disposal of concentrated wastes was shown by the generators themselves.

These people as the gentleman from Monsanto indicated before, certainly are aware of the nature of the wastes they produce.

Then, however, as now most of these materials were rather promiscuously discharged into the land or into the sea.

Since 1970 new efforts to treat and manage have appeared, sufficient experience has been accumulated to permit some comment on progress to date and on the current state of the art.

This work has been done largely by a few private companies with private investment. The risks have been high, the support by the major generators is generally good, and the support by local state level agencies and local agencies I think has left something to be desired.

In the course of five years then since 1970 substantial operating experience with several comprehensive treatment works, each currently receiving and treating a'out 100,000 tons per year, from these operations it is clear that most wastes discharged by most generators contain very little economic value.

This is to be expected, of course. The larger generators are highly sophisticated technologists and they can best extract whatever values there may be They are doing this.

Therefore the reuse or the recycle values of these materials are mainly those which occur at the treatment works where some degree of intertreatability is found.

This is a significant factor I might say to the treatment works operator although it's not a major cost factor.

Treatment techniques have improved with practice and with innovation. The chemistry of combustion is much better known and better controlled. The rigorous conditions to which furnaces are exposed and the gas treatment systems also exposed to these rigorous conditions

have led to somewhat better designs.

Also and most interesting I think

biological treatment techniques, techniques which have often been tried and often abandoned have indeed been developed and successfully applied.

This is a most significant accomplishment. Particularly in the face of day to day or even hour to hour biologically toxic variations in these waste materials.

Certainly biological and chemical treatment procedures are preferred most operators will tell you, they are preferred to incineration. Incineration should be reserved for those highly active and toxic wastes which can only be decomposed at very high temperatures.

As a matter of interest I would like to report we have found facilities costs are predictable. In fact they are rather well established for plant sizes in the 100,000 to 300,000 ton per year range.

For example incinerator systems cost to the order of $15,000 per ton per day capacity. In contrast bio systems can be built for about $3500 per ton per day. And chemical treatment systems which are highly variable may cost on the order of $4500 per ton per day.

Corrections needed here unfortunately because incinerator systems by experience have an average availability of about 60 per cent because of the high maintenance and repair outage.

Therefore the productive cost basis should be corrected from $15,000 per ton per day to about $25,000 per ton per day.

Operating costs have varied in similar proportions and result in customer charges in these more familiar terms of cents per gallon, for bio treatments from 4 to 6 cents, for chemical treatments from 4 to about 15 cents, and for burning for incineration from 15 to as much as 80 cents and more in some cases.

In contract the maximum level of landfill dumping charges today run about 3 cents. You can see the problem.

The operation of these waste plants really is the proper business of chemical and sanitary engineers and the technicians trained and superviseed by them.

It is a high technology business, not because its end products, which are always neutral salts, are sophisticated, but because the requirements of treatment, which must be done within the economics of the market, are highly variable and frequently dangerous. It is not a business for the uninformed.

All available information indicates that the major practitioners of hazardous waste disposal have suffered substantial and continuing operating losses.

I have taken some figures from the public financial statements of those public companies in this business. It is startling, for example, four major installations representing a capital investment of about $25 million, having a treatment capacity of 1.5 million tons per year, operating at about 30 per cent of that capacity, for a period of almost 5 years, have sustained aggregate losses of $9 million. And somebody should ask why. I do.

The reasons I think are apparent. We can talk about them a little bit.

The several technologies involved here, incineration, bio treatment, and chemical treatment have been in a developmental stage during these years. Development is expensive.

It costs a lot of money.

Secondly, there has been a rather inexorable pressure on the charges that these facilities could make to their customers, since there has generally been available landfill dumping as an alternative, at much lower costs.

Even though some landfill controls have appeared and it seems that more will, the enforcement is somewhat limited. This is an attractive business at the moment to the landfill operators.

And so as the chemical waste treatment facilities developed they had tended to set a higher level of charges under which landfill or ocean dumping charges have indeed risen. I don't know whether the costs of landfill management or the costs of ocean dumping have also risen.

Nevertheless it can be stated that -- and it should be stated very plainly that treatment plants cannot compete competetively with landfill or ocean dumping.

Traditionally if we looked only at these figures and we considered only that for five years this industry has not been profitable, if we considered that there is a lower competetive cost available for disposal, one would take this as a traditional

signal, a rather loud and clear signal, that this is not an economic business, that this is not a business and a desire by the user.

I really don't think that's the case. However, it does pose a dilemma as you can see to potential investors. They are not going to rush to invest money into operations of this kind which have as a history a significant loss.

The state of the industry then can be judged. I think significant private investment has been made, substantial support is available from generators, adequate transportation and handling facilities and skills are available.

New and effective technology has been developed, and only two conditions I think remain to be resolved, the local agencies must inform themselves of the nature of this problem, and they must deal with it realistically.

No special dispensations are required, and I might say, further these agencies and the Federal agencies must determine rather quickly the environmentally acceptable fate of this 10 million tons a year.

Obviously much of this material can and it should be disposed into landfills, that's not the question.

It's equally obvious that a great deal of it should not. That is the question to those of us who are in this business, and who have invested in this industry.

For the economic benefit of the generator this difference really should be clarified, so that each of these methods of disposal will then function competitively in its own market place.

The losses of the treatment plant operators some of us feel shouldn't really become the gains of the landfill operators, that accomplishes nothing.

The future of the chemical waste industry, the preservation of the technology so far developed and the fate of that 10 million tons per year rests not therefore with the investors or with the operators or with the technologists. I think rather it rests with the state and the Federal agencies.

If there were no agencies and if there were no regulations at all, there would be a small industry based upon the economic relationship between the major generators, who chose to dispose of their materials properly, and certain regional plant operators, and of course landfill and ocean dumpers, whose place would also be identified.

If the existing regulations at all levels properly recognized the hazardous waste problem, there would develop we think a large sophisticated treatment industry, and the landfills and the sea would receive only those dumpings which were proper.

In the present twilight regulatory circumstances, however, some of the regulations which would be drawn, the purpose is becoming in fact an impediment to operators of facilities of this kind.

For example, and I believe this was mentioned by the gentleman from Monsanto, these operations are going to be regionally based, they are not going to be based on the state lines or the county lines or city lines. This has got to be accepted.

Moreover, I would like to add finally that the serveral levels of regulations, it seems to me can be streamlined. I do not know nor does anyone else who works with regulatory agencies why it is necessary that one operation must deal in parallel with three or four separate agencies all of whom have the same requirements.

I do ask you therefore, that the agencies give some thought to this. Thank you very much.

MR. LEHMAN: Thank you Mr. Bruns, will you answer questions sir?

MR. BRUNS: Yes, indeed, if I can.

MR. LEHMAN: All right, Mr. Lindsey has a question, and we also of course solicit questions from the audience.

MR. LINDSEY: Mr. Bruns, I think the information that you have given us here and the data particularly will be quite helpful to us. You have apparently thought this through quite a bit. Could you elaborate a little bit on how in your opinion we should decide on which types of things should go into landfills and which type of things should not, and if you would give some examples of the types of things that will also be helpful.

MR. BRUNS: I think there are those who probably know more about this than I do, those who have concerned themselves with the characteristics of landfills as they age. And it seems to me that this would inherently be the source of guidelines. And certainly we find in our own facilities as the operator we find we are receiving materials which really don't need to come to our plant.

Simple materials, such as oily waste waters, simple acids, low concentration phosphates, with nothing else involved.

These materials don't at all need to go to an expensive treatment works. They need to go into landfills with the extent that the moisture can be part of the landfill to the extent -- and moreover to the extent where necessary that the landfill itself will get into a treatment procedure. And many landfills can do this.

They can do it rather easily, and I think it would be possible for landfills to receive even more materials than they may now be receiving in some cases, and dispose of them very very rapidly.

The other end of the spectrum, of course, are those materials which do not degrade biologically and do not readily simply neutralize. These are of course, principally the chlorinated and fluorinated materials.

The gentleman previously spoke of P.C.B.s and certainly this is one of the most fearful materials which is produced today, and it's something of course that was in the newspapers.

Any landfill operator who knowingly permits such materials to be disposed is I think very short sighted. So for the most part I would say 90 per cent of the materials available in the marketplace today can be characterized and some of them can be related very directly to landfills and some of them under no circumstances should go to landfills, and there will be some in the middle that we don't quite know about, but they are there too.

MR. LINDSEY: I have another question, which is from the floor.

How does Hyon dispose of large quantities of potentially toxic amounts of chemicals which are not in bulk quantity?

MR. BRUNS: That's a very good question because it's a very nasty problem. We do receive open drums actually filled with small vials, bottles and containers and there may be hundreds of these vials or containers and we do not always know what's in each of them. It is possible that a very small vial will contain a very violently reacting material.

We dispose of them -- we can't sort them or label all of these things and you can't charge enough to permit that to be done. The producer doesn't do this either although he is supposed to characterize these things to some extent.

We just burn them. We subject them to relatively high temperatures, the containers will rupture and the materials will burn to the extent that they will burn, and sometimes they'll damage our equipment to the extent that they are acids. We add that to the cost of our business.

There's not too much of this, but there's enough of it, to be a very great nuisance. It's so much of a nuisance that you can't even envision the man's name -- they are emptying these things all day long.

MR. LEHMAN: I believe we have another

question, Mr. Newton, please.

MR. NEWTON: Sir, you characterize the peculiar posture of some state agencies manifested in the geographic distribution of generators using your services.

MR. BRUNS: I don't fully understand, you mean what states?

MR. NEWTON: Is there a variance in the use and relationship?

MR. BRUNS: Yes, we found a variation in the relationship, a very wide variation. I think that peculiar posture of the words I chose refer principally to the fact that we have not noticed the state agencies directing themselves to this problem specifically.

Rather, we have noticed, that these facilities are incorporated along with -- these are just additional waste treatment plants. Not quite that simple.

MR. LEHMAN: There's another question, Mr. Kovalick.

MR. KOVALICK: From the floor. The question is who do you feel should establish the residue standards of plants such as yours?

And what if state standards regulated that sludge proposal?

MR. BRUNS: I think that the existing standards are directly applicable to the residues for the existing facilities.

Actually these facilities are only staging areas. Their final products are going to be neutrals, salts and some are going to be ash. To the extent that such salts can be disposed locally, they will be. To the extent they can't, they will end up in the ocean one way or the other. Even if we have to barge them all the way down the river.

Salts have been going to the sea for rather long periods of time and that's where they go.

But I think chemically and insofar as toxicity is concerned as far as environmental damage is concerned, the emissions from these facilities should comply with the established standards.

And that's the function of this service.

MR. KOVALICK: I guess another question

relates to your remarks on financial condition of your industry. From the floor -- are regulations controling the disposal of hazardous substances enough or would the industry also need legislation such as Ohio has which authorizes state agencies to issue industrial revenue bonds to help finance facilities?

MR. BRUNS: I don't think that really makes any difference in today's money market, to tell you the truth.

I don't really think you will raise money very much by revenue bonds or whatever. The requirements here are not that large, the investment is not that large. I think the important aspect of the matter is and I could have said this, times have changed and I refer to some five years experience. As of this time the financial circumstances of the several facilities which I looked at have changed. Happily.

MR. LEHMAN: All right. I don't believe there are any further questions of Mr. Bruns.

Thank you very much Mr. Bruns, and I'd like to now make an announcement before we go on.

(Whereupon a discussion was had off the record.)

MR. LEHMAN: On the record. Now, I'd like to next call upon Mr. Thomas P. Clark of the Illinois EPA, is Mr. Clark here?

Yes, and while he is coming up, let me just alert the next speaker, Mr. Dan Kolberg of the Wisconsin Department of Natural Resources.

MR. THOMAS P. CLARK: I hope you can all hear me in the back of the room.

My name is Thomas Clark. I'm employed with the Division of Land Pollution Control of Illinois Environmental Protection Agency, which is a state regulatory group.

Passage of the 1970 Resource Recovery Act brought national attention to the growing problem of hazardous waste management. Since that time, Federal and state initiatives toward control of hazardous wastes have mushroomed to the point where many states have established hazardous waste management divisions within their solid waste programs with legislative authority to inventory and control the generation, transportation and disposal of such wastes.

Illinois is no exception to this

continuing trend. Within the past year and a half, major emphasis has been placed on refining a supplemental permit system for the safe emplacement of liquid and certain hazardous wastes into environmentally sound disposal sites, developing guidelines for management of special and hazardous waste, now in final draft form; preparation for promulgation of liquid and hazardous waste hauling regulations before the Illinois Pollution Control Board; and cooperation to provide means to minimize the volume of hazardous wastes relegated to the land by implementation of the waste-exchange concept.

Rather than discuss these initiatives in any great detail, I will briefly address several key problems and areas in consideration of any hazardous waste management program which will hopefully have some impact on development of a national perspective on guidance for proper management of these wastes.

First, in defining hazardous wastes, it is important that they be distinguished from hazardous materials, or hazardous substances.

Hazardous materials are generally considered pure substances and not wastes. Mixtures of hazardous materials comprise a much larger group of hazardous wastes. Regulations developed by the U.S. Department of Transportation pursuant to the Hazardous Materials Transportation Act of 1974 interpret hazardous wastes to be hazardous materials and therefore subject to the definition of hazardous materials as included in that act.

From the point of view of a regulatory agency in control of the transportation and disposal of hazardous wastes, it is important to remember that such wastes are complex mixtures of pure substances and that no two are exactly alike.

With this in mind, it becomes increasingly difficult to develop specific regulatory definitions for what is hazardous and what is not.

Second, general legislative definitions of hazardous waste must be supplemented by a more specific and rigorous regulatory definition if a state control program is to have meaning.

In Illinois, we favor defining hazardous wastes by specific criteria such as are discussed in our guidelines, supplemented by a suggested list of hazardous materials which would be updated periodically.

This would comprise hazardous wastes within a five-fold waste classification system we have developed. We propose defining hazardous wastes by specific criteria with the understanding that such criteria must be applied carefully if they are to be effective.

Particular care must be taken to consider the whole waste rather than to focus on individual constituents within a particular waste. If there is any question regarding designation of a waste as hazardous or if a waste is comprised of a hazardous material not identified in the list appended to each classification, that specific waste can be tested and an unequivocal decision made based on the specific criteria.

Third, and finally, the most important, the guiding philosophy of any regulatory agency hazardous waste management program should be we believe to minimize hazardous waste disposal on land, that is, to concentrate such wastes at the source rather than to dilute them throughout the environment.

One increasingly significant means of accomplishing this task is through the waste exchange concept which is just beginning to be developed here in the United States, after gaining considerable importance in Europe.

The Illinois Environmental Protection Agency, in cooperation with the Missouri Department of Natural Resources, the U.S. EPA and the St. Louis Regional Commerce and Growth Association, has recently implemented such an exchange in the St. Louis, Mo., E. St. Louis, Illinois, area.

The overall concept is aimed at converting certain wastes from expensive disposal problems to saleable assets, while conserving natural resources and reducing the environmental impact from indiscriminately dumped hazardous wastes.

At the heart of the exchange system is a volunteer task force comprised of local citizen and industry interests, consulting firms, and members of the Illinois EPA, Missouri DNR, U.S. EPA, St. Louis Regional Commerce and Growth Association and the East-West Gateway Coordinating Council.

The exchange is concerned primarily with industrial wastes for which no developed commercial market has been demonstrated. Thus, certain chemical process wastes and metal sludges are included whereas scrap metal, for example, is not.

An initial press release to trade journals and the news media has been provided to include instructions to potential users. For a $5 fee to recover administrative costs, the RCGA arranges for publication of details regarding wastes for sale or being sought in the market.

Information about the waste, it's manufacturer, and geographic origin are kept confidential by RCGA, which then matches prospective buyers with interested sellers.

A listing company decides whether it wishes to do business with the inquirer at which point RCGA and the Waste Exchange relinquish involvement. A survey form will then be sent to involved parties concerning results of the negotiation in order to keep waste exchange files up to date and assess program effectiveness.

It is hoped that programs such as this involving both private and public sectors will at least serve as a start to reduce significantly the volume of hazardous wastes to be disposed on land.

In summary, the State of Illinois through its Environmental Protection Agency and its research arm, the Illinois Institute for Environmental Quality, feels that the business of establishing a comprehensive hazardous waste management program must be carefully defined both in terms of legislative and regulatory criteria for determination of what is and is not hazardous.

Major emphasis should be given to reducing the volume of hazardous waste to be disposed at the source and thus reducing the necessary disposal loci for such waste.

Finally, the regulatory effort must involve control from cradle to grave to be effective. This includes not only source reduction through such mechanisms as the waste exchange, but control of those who haul liquid and hazardous wastes and strict guidelines for those whose job it is to see that they reach a safe final resting place.

MR. LEHMAN: Mr. Clark will you answer questions?

MR. CLARK: Yes.

MR. LEHMAN: Thank you Mr. Clark. Any questions from the audience. Mr. Kovalick.

MR. KOVALICK: Mr. Clark, previously the preceding speaker commented that regulations, state or Federal, should be applied to such facilities as his and should be recognizing the interstate market they serve. Could you comment on Illinois' services?

MR. CLARK: I could comment on that, there's a great deal of movement across state lines. We realize this and we had a meeting of the Region V U.S. EPA yesterday, which includes Minnesota, Wisconsin, Illinois, Indiana and Ohio, and I think there is an increasing awareness on the part of the states that the regulatory effort is going to have to be a cooperative one, and our regulations are going to have to fit together, and definitely take into account both inter-and-intra state movements of these wastes.

MR. KOVALICK: One other request. In fact if any of these documents that you mentioned in your statement, that is the guidelines for the management of special and hazardous wastes or the liquid and hazardous waste hauling regulation for the ITCB are available, would you mind sending them to us for the record.

MR. CLARK: Okay, I believe we have done that already, but we'll certainly provide you with copies.

MR. KOVALICK: It might not be the right draft and so forth, and so on, but we'd appreciate it.

MR. CLARK: We'll certainly do that.

MR. NEWTON: Mr. Clark, I have a question from the floor, please.

When final disposal of toxic materials is controlled by state agencies, should they also determine the number, type and location of facilities, and if so describe a practical method of overcoming the economic incentives in the problems, thereunder.

MR. CLARK: Okay. With regard to the first part of that question, I don't believe it's really the position or the responsibility of the state to control necessarily the number of these locations.

In other words, keep -- have to limit them specifically. In Illinois we feel that the hazardous wastes disposal sites are going to have to be exceedingly good geologically from an engineering point of view, and because of our environmental conditions in this state, with regard to geology we think this is going to be necessarily a self-limiting factor.

Would you go through the second part of that question again.

MR. NEWTON: Describe a practical method of overcoming the economic consensus and/or what we might call the public acceptance or local acceptance problems.

MR. CLARK: I'm not sure I can do that, right now in Illinois due to a recent State Supreme Court decision. The Environmental Protection Agency in its review process has been mandated to overrule local zoning should local zoning not allow for a particular facility at a certain location.

In other words, we have the authority to overrule local zoning, but how long we are going to have this authority is somewhat in question.

Believe me we are looking at this very carefully and we consider this an extremely important responsibility and we also recognize that we are going to have to look not only at engineering geologic criteria, but also land use criteria, due to the hazardous waste situation.

MR. LEHMAN: Mr. Klepitsch, do you have a question?

MR. KLEPITSCH: Yes, I have a question from the floor.

Does Illinois allow disposal of hazardous wastes in sanitary landfills which are primarily used for municipal purposes?

MR. CLARK: Yes. Until we get our guidelines and our liquid wastes regulations we are allowing certain amounts of gaseous wastes from a case by case basis to be disposed of in sanitary landfills, except municipal refuse.

I might add if you look at these on a case by case basis, it is handled through our supplemental permit system, and there are generally very strict requirements as far as acceptance in the community and this is related to cubic yards of municipal refuse.

And currently in Illinois we also have one site at this time which is accepting solely containerized hazardous wastes, at this point that site is unique. But I think in the future we'll probably see more of these sites.

MR. LINDSEY: Yes, Mr. Clark, I have a question from the floor.

A lot of interest apparently in the St. Louis Regional Exchange, could you tell us how successful this has been and what volumes have been handled and also could you comment on whether wastes from outside the St. Louis area would be accepted?

MR. CLARK: This is the waste exchange concept in the East St. Louis area, it's very recent, and it's only been formalized as of the 1st of November.

At this time we really don't have too much of a feeling for how successful it's going to be.

It's patterned pretty closely after several of the waste exchange concepts in Europe. It is my understanding that waste will be accepted from outside the metropolitan St. Louis area.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: I have two questions from the floor, and these first two are related.

You spoke of the source of waste in your remarks and both these questions relate to what is the definition of a source of waste and you suggested concentration of waste at its source.

Are you suggesting that the generator treatment and disposal, as contrasted to off-site management -- should be done by outside companies?

MR. CLARK: I'm not necessarily suggesting that. I think it should be done either place. Or overall we should reduce insofar as possible the amount of waste, in the best possible way.

MR. KOVALICK: And the second question is why are so many disposal operators in Illinois being cited for operation without a permit?

MR. CLARK: I think we have to distinguish the type of permit that's involved here. What I was referring to in my remarks here were supplemental permits to sites which already have EPA permits to operate a landfill.

What the questioner there may have been referring to was our recent initiative to close operating municipal revenue sites, which have not come through the initial process.

Supplemental permits to take liquid or more hazardous waste are the only sites which have Illinois EPA authorization.

MR. LINDSEY: I have one more question from the floor.

What would you propose for a disposal of explosive wastes and related products?

MR. CLARK: That's an extremely difficult question and the answer we have talked about it quite a bit. If at all possible I would say that explosives should be detonated and in a safe area.

Now you'll go on and ask me what a safe area is, and I'm not sure I can answer that question.

Fortunately in Illinois so far the explosives problem has been a minor one. But we agree that it is a very serious and significant one.

MR. LEHMAN: We have another question by Mr. Lazar.

MR. LAZAR: This is also from the floor. Are cadmium and chromium metals among the most hazardous?

MR. CLARK: They have been.

MR. LEHMAN: Mr. Kovalick will read another question.

MR. KOVALICK: You indicate that at the present time Illinois EPA is opposing -- I mean approving the disposal of hazardous wastes on a case by case basis with municipal waste. Will this practice be allowed to continue?

Or are you about to curtail it?

MR. CLARK: I'm not sure I totally understood that question.

MR. KOVALICK: I think the reference is defining hazadous wastes at each site -- is your policy as stated for that?

MR. CLARK: I think we're looking at this as a short term policy, and eventually what we want to try to do is establish hazardous waste sites or by the California definition, class one sites throughout the state and as I mentioned earlier, we have one B site, and I believe as I also mentioned earlier, I think that geology, groundwater situations, and so on are going to limit the number of these sites severely.

I think we're probably talking now about a half a dozen sites.

MR. LEHMAN: Are there any other questions? I believe not. Thank you very much Mr. Clark.

Ladies and gentlemen, I think in view of the timing here, we are not going to have enough time to have another speaker before our scheduled break, so I'd like to do it now.

Please be advised that we have a large number of speakers including a number who have signed up just this morning.

So, I would like to make sure that when we do break that we reconvene and start on time.

At this time, I would like to adjourn the meeting for fifteen minutes, and reconvene at 10:35.

Thank you very much.

(At which time a brief recess was held for a coffee break.)

MR. KOVALICK: Ladies and gentlemen, would you begin to take your seats, please.

MR. LEHMAN: Ladies and gentlemen, please take your seats now. I now call the meeting to order.

I would like to call upon Mr. Dan Kolberg, Wisconsin Department of Natural Resources and while he's coming to the microphone, I want to say that the next speaker will be Mr. Bernard Reese, and following Mr. Dennis Johnson.

Mr. Kolberg.

MR. KOLBERG: My name is Dan Kolberg, I am with the Wisconsin Department of Natural Resources, and I work in the solid waste management section, and also as part of the hazardous waste management committee, that's part of the present work of that section.

What I would like to do this morning very briefly is try to discuss a few of the needs that the State of Wisconsin sees with respect to continued development of the hazardous waste management program, and I would like to make some recommendations as far as the things that it sees important for Federal government and

Federal EPA to consider with respect to development of a hazardous waste management program and any proposed legislation on a national level.

The first thing that we see as being exceptionally important at the present time is the somewhat limited funding of the solid waste programs with respect to state program planning grants in the area of hazardous waste management program development.

At the present time the solid waste programs are funded at a somewhat substantially lower level than either the air or water programs, and one of the problems with this is that the solid waste program in some respects bears the brunt of handling many of the residues generated by control programs in either the air or water areas.

While primary emphasis of some of the air and water programs is aimed at the separation and removal of residues from either the air or water streams. The solid waste section along with the hazardous waste management work is aimed primarily at the total management of those residuals once they are removed.

Now, in order to do this on a wide

scale basis state-wide, with all the various industrial applications from the air and water programs, we find that it is going to require and is requiring at the present time a great deal of sound state planning and program development work which is going to need additional support.

We are going to conduct these planning and implementation functions properly. Another area that I would like to touch on along the lines of the importance of increased funding for planning and implementation of some of these things and programs is the idea that a much greater emphasis, particularly with respect to the management of hazardous waste materials is going to have to be placed on the training and technical assistance portions of those programs.

Now, this would include several basic things. It would include training funds to support development I guess you could say, of qualified people who would be able to both man and implement the various hazardous waste systems.

It would include expanded program support directly to the universities, for training purposes, and would also include the type of funding that solid waste section independently would use to conduct some of its training efforts with respect to training and getting information across to various groups like the industrial waste haulers, to some of the site operators of the management -- hazardous waste management facilities working directly with site operators.

This type of training and technical assistance and support.

The second major thing that I would like to discuss is being critical from the way the State of Wisconsin sees the development of the program at both the State and national levels, is that recognition really has to be made as to the vital role the state does play with respect to all the various concerned agencies in the development of these programs.

Now, this is from the standpoint that the state directly deals with many of the industries and the waste problems that they have. We routinely are requested to provide technical assistance and answers to some very difficult questions, as to what the best alternatives are for managing the certain types of hazardous wastes.

We are involved in attempting to define what the problems are in trying to assess what the best alternatives for handling wastes are, and collecting data and analyzing that to arrive at sound decisions, and planning for all the various aspects of a total hazardous waste management program, and then for the actual implementation of various planning efforts that are undertaken.

Now, as far as some of the planning and implementation functions and the administrative tools associated with those things, on a state level, you can see that there are a good number of things that are included in the development of a total hazardous waste management program.

These things include actual regulation of hazardous waste management, standard setting, enforcement, plan review, license and permit issuance surveillance, very detailed education programs for the various groups that I mentioned before, technical assistance on a case by case basis, to particular industries with waste management problems, and providing financial incentives for the development of new facilities where they are needed.

Ongoing planning work and upgrading

work to improve the program as you go along. Research in critical areas, where the answers are not available right now, but for industry who is interested in trying some unique approaches, to manage a particular problem waste.

Operating certification programs, and some of the questions of both interim and long term monitoring programs for hazardous waste management facilities.

The third main point that I would like to make is that even though I am attempting to define that the state does have a key role in the entire hazardous waste management program, development on both the state and national level we recognize full well that we could not do this entirely by ourselves, and that we do need a great deal of assistance and support from the Federal government in the development of these programs.

It's a little bit more difficult to try to define for myself at least some of the key responsibilities or the limits of authority that the Federal government might have in providing this support but some of the areas that we consider very important for them to address would be helping to define for the states this question of generator responsibility as well as responsibility of any particular point in the entire waste management chain, meaning the transportation or the disposal operators, processors or whatever.

The actual transportation and labeling requirements and the interstate concerns for the shipment of hazardous materials under discussion and some type of uniformity with this manifest system whereby reporting would be conducted to all involved concerned agencies on the flow of hazardous materials, and also some support and technical assistance in resolving some of the questions associated with long term care, maintenance and monitoring of the hazardous waste facilities.

Now, we would anticipate that beyond simply proposed legislation on a Federal level, that the type of assistance that we are talking about in these various areas would also include technical assistance, meetings with the states to discuss plans and approaches that various other agencies throughout the country are taking on for some of these problems.

Serving as a coordinator and able

to disseminate information on the status of programs in other areas to the state so that some fairly uniform approaches to keep us from operating on at least a regional basis.

Final -- the final point that I would really like to try to make this morning, is the state's view of the critical need for what is referred to as the cradle to grave approach for management of hazardous wastes.

We feel in the State of Wisconsin that as part of its total cradle to grave approach for managing wastes, there is definitely a greater emphasis placed on the development and utilization of other alternatives for managing and disposing of hazardous wastes than the simple land disposal function.

And, we have had several very important experiences dealing with specific experiences in our state that seem to indicate to us at this point in time that the industry also perceives the need for some cradle to grave approach if you're dealing with the hazardous waste problem.

Now, this has resulted from the fact that in some cases specific problems were being encountered by the industry with finding a disposal alternative for a particular type of waste and they contacted the state agency in an attempt to find out what other type of alternatives might be available to them for handling the waste materials, and they found that the alternatives were fairly limited but there were some areas where they might be able to channel some of their efforts in dealing with their waste problems.

In simply looking for a disposal alternative they also recognized that other important factors entered in, that they could make various changes directly within their industrial manufacturing processes.

Change the characteristics of the waste, reduce the amounts that they had to get rid of, and they found that not necessarily all of the waste had to be handled or processed or disposed of in the same means at the same facility but they found that different facilities were available for different portions of their wastes.

And so they also recognized the fact and several corporate policy statements were made to the effect that the greater amount of pressure was being placed directly on the industry to utilize licensed facilities and facilities that have all the appropriate permits of the state agency.

And so they did come to us and request on the part of our hazardous waste management program that we look at this entire approach as it relates to all of the phases of hazardous waste management, including generator's responsibilities, transporation and labeling processing, and then final disposal of the waste materials.

That's all I have to say, and I'd be happy to try to answer any questions at this time.

MR. LEHMAN: Thank you Mr. Kolberg.

MR. KOVALICK: Mr. Kolberg, did I understand that one of the recommendations you had for the Federal government was I heard some kind of a manifest system ought to be inaugurated and investigated and I did not get to the thrust of that point, do you feel it's preferable that there be some kind of a transportation tracking that's often referred to as a manifest system at the Federal level versus the state level?

MR. KOLBERG: Not necessarily at the Federal level. That's the point that I have a little trouble with personally, trying to define just how far EPA should go in becoming involved with those things.

But my point was, at a minimum we feel that the EPA does have information available and it would be very important to, interact by way of technical assistance and coordination exchange with the various states on development of plans for a manifest system possibly exchanging information on the approaches being taken by some of the other states.

MR. KOVALICK: One more question. You spent some time in your remarks talking about training as an important element. I presume you are referring to the training of site and facility workers and operators as well as treatment plant operators.

Is it also your view that the training materials that are available to the chemical industry which are very comparable to the kind of plants that Mr. Bruns discussed this morning are insufficient for your needs at the moment?

MR. KOLBERG: That's a little hard to answer because I am not all that sure that I understand or am aware of the materials that you are referring to right now.

But the type of training programs that I am talking about would tie right into the developing of the state programs and making the various interested parties in the hazardous waste management system aware of the approaches that the state is taking, and some of the technical concerns that we are aware of in respect to the operation, development and all of the aspects of the facilities that we have to deal with as well as -- well I guess I mentioned this but make people aware of the progression of the program, the things to look forward to, as it develops further.

MR. KOVALICK: Perhaps as much a public education and training in a technical sense.

MR. KOLBERG: Yes, within the various groups, like you mentioned industrial waste -- well, the operators themselves, and that type of thing.

MR. KOVALICK: Thank you, I see.

MR. LEHMAN: Any other questions? Yes, he's bringing a question up from the floor, would you please remain there Mr. Kolberg.

MR. LEHMAN: Oh, I see this question was for a previous speaker, evidently. Well, anyway, Mr. Kolberg, I want to thank you very much.

Excuse me, -- all right, thank you very much Mr. Kolberg.

I would like at this time to call on Mr. Bernard Reese. Is Mr. Reese here?

Well, we'll have to come back to him later. Let me call then Mr. Bill Walker, from Geraghty and Miller.

MR. WILLIAM H. WALKER: Mr. Chairman, I have cut some of my prepared statement for the sake of time. But may I suggest that all of my written testimony be included in the record.

My name is William H. Walker, and I've worked with the ground water area of this whole thing for about 27 years, now.

First with the Federal government then with the state of Illinois for about 17 years, and now with ground water, so my approach to this will be basically on ground water protection standpoints, but also from an overall environmental protection standpoint slant.

Before I start I would like to say that I would also hope to direct my statements to you the EPA people of the country because everybody everywhere is looking for guidance and we feel that you people must set at least a policy on these areas.

My work has carried me to Europe to investigate their hazardous waste disposal approach to things, and my trip has taken me to Canada in the past, and I see that Canada also is looking to you, and I know that we in the states and the private industries and consulting firms would like to know what you think and how we can adapt ourselves to your thinking and still stay in business.

So with these thoughts in mind, I would like to direct my testimony and if I do run over slightly, please stop me.

At the present time, practically all of the hazardous wastes generated in the heavily industrialized parts of the world are eventually dumped somewhere, on or beneath the land surface, or into some nearby stream or ocean.

Water dilution, land attenuation, and storage generally are the most common methods of treatment employed. Ocean burial and deep mine or well injection are secondary throw away methods used where alternative dumping methods are too costly, or where the wastes involved are too hazardous for land disposal.

Incineration, chemical treatment, and recovery recycling of most types of hazardous waste material are usually uneconomical under prevailing legal constraints, cost considerations, and technological limitations.

Depending upon the nature of the hazardous waste to be treated, land disposal costs now range from about 4 to 50 times less than other available processing or treatment methods. For as long as this wide economic discrepancy prevails, there appears to be little hope or expectation anywhere that anything better or cheaper will be accepted.

As an ever-increasing tonnage of hazardous waste is generated, it just doesn't disappear, it has to go somewhere, we know that the ground then will be receiving and called upon to receive more and more. We are not against this, we think that the ground in its proper use can receive a lot of it. We'd also like to point out though that these other dissipation means are there, surface water, the soil and the vegetation should be called upon to receive its fair share of the load as well. Not just all underground water.

Groundwater and soils contaminated with toxic chemical waste may be potentially much more hazardous than these other dissipation means, you can't see the groundwater pollution, it's out of sight, out of mind, they are not checking for many of the hazardous chemicals that possibly are there.

In the air on the other hand you can see the trees start to die, and the birds start to get sick, much before people start to get adverse affects, as is usually the case, and in streams at least if you dump something in the fish turn belly up before the people do and so then you can start checking to see what's happening, but underground it's not necessarily that.

The bad part about it is that most well water supplies are not checked routinely for hazardous contaminants such as viruses, chlorinated hydrocarbons, cyanides or organophosphates and heavy metals.

It's too costly. Some of them cost two or three hundred dollars if you can get somebody to analyze them in the right way. And they keep changing their analysis procedures and all this, so it's awfully difficult in that regard on some of them. They haven't standardized the laboratory procedures quite yet in most areas, and you don't have dependable fail-safe analytical equipment that's everywhere available and they are still in the development stages with some of that. So it makes it difficult to even identify some of these air contaminants, you have -- you don't have trained persons available really throughout the country that can give you results.

The laboratories aren't registered, so from one laboratory to another you might get results of entirely different degrees.

So, with this kind of thing being as it is, much effort needs to be exerted I think from somewhere in this type of thing.

We don't know the subclinical effects of some of these various hazardous chemicals, and once we dump them somewhere there might be an infinite number of combinations of these things and we'd have to try at least to get some sub-clinical effects of those types of things too, as we go along.

As I have said earlier many of the problems we have had with this groundwater pollution area have been because the laws were passed first for surface water protection and for air protection. So the only place left was the ground to dump it.

We think that industry is trying their darndest to do something about this, and it's faced with a real dilemma. They are getting more concentrated waste because they now have to get it out of the air or surface water, and then these concentrated wastes have to be dumped on the ground somewhere and knowing where to dump them within economical hauling distance gets to be a terrific problem, especially when it may be two or three hundred miles away to the first safe place to dump it.

Rules and definitions of this whole thing keep changing too. The most economical and practical degree of treatment continues to be changed on us.

And then they seemingly are adding a whole stream of pertinent legal and economic technical changes into this to change the regulations because we came into this thing with such a cold water plunge that now we don't have time to do anything but exist with laws that had to be passed but that need badly to be changed.

Air and surface water pollution protection laws which force an ever-increasing quantity of hazardous waste to the land for ultimate disposal must be changed drastically, it seems, and quite soon, if the optimum environmental protection is to be realized.

All new laws developed and finally adopted must be a part of an overall environmental protection act which permits and forces all major pollution dissipation regimes, and that is air, surface water, groundwater, soil and vegetation, to share to their full capability their proportionate part of the burden of total pollutant transport, containment and dissipation.

No longer can we continue to solve pollution problems in one dissipation regime in such a fashion that an even more serious and hazardous problem may be created in some other equally important ecosystem. If laws are to insure protection of the air and surface water, so must they also equally protect the groundwater, soils and plant regimes.

At the present time, these are everywhere being placed in serious jeopardy by existing laws that do -- should be changed.

Hazardous chemical waste materials such as chlorinated hydrocarbons can be best burned in high (incineration type) temperatures. Along this line it's being employed a little bit more in this country, and we think someone should help to develop the incineration equipment to make it easier to do and then have incinerators located where we can do it.

We have to have a lot more wide acceptance of it, and it's going to be more costly and this too has to be considered, in the long run, but this is a better way in which someone should start to think along those lines.

Then by the same token, trace concentrations of many of the toxic metals, and such pollutants as nitrate, chloride, and sulfates, can best be reduced to harmless levels by dilution in very large volumes of surface water flow.

Chemical reconstitution of some of the pollutants to an inert, relatively insoluble form, encapsulation in an impermeable container or polymer for later recovery, and chemical separation or recycling are equally viable alternative disposal methods which must be covered by the law if optimum pollution abatement and control at minimum costs are to be assured.

All new pollution protection laws should reflect the legal philosophy

that poisonous chemicals and other wastes known to be harmful to public health must be considered guilty until proved innocent, instead of innocent until proved guilty as is now widely accepted.

Only in this way can the burden of proof of a pollutant's guilt or innocence be rightfully placed upon the polluter, not upon affected society as is now the case under existing laws.

This new approach in law should encourage hazardous pollutant volume reduction and subsequent pollution abatement from such sources. In unique cases where it fails to do so, volume reduction of the more hazardous pollutants may have to be dictated by imposing true cost disposal assessments on the manufacturer-user and/or placing legal constraints upon the total quantities manufactured.

Also, hazardous chemical wastes from industries, biological, virological, contaminated sewage from hospitals, and chemically contaminated runoff from streets, parking lots, and factory grounds are now commonly dumped into sanitary or interconnected storm sewers.

Such wastes significantly reduce the quality of municipal plant effluents, sometimes to levels not permissible for disposal in streams or on the land. For this reason, any laws passed also must reflect consideration of these adverse factors by encouraging, or even forcing where necessary, separation of industrial and storm runoff streams from existing sewage treatment facilities which are primarily designed for the processing of domestic-type wastes.

In the United States there are no all-inclusive regulations governing hazardous chemical transport, and spill cleanup. Also these regulations in effect are very fragmentated and distributed among so many different Federal, state and local governmental regulatory bodies that it is very difficult to even get in contact with the proper authority controlling any given part of the problem.

The United States Department of Transportation regulates, on the Federal level, rail and highway interstate transport, but is not responsible for intrastate movement of hazardous chemicals. The U.S. Coast Guard deals with barge transport, and some other Federal department is charged with air carriers.

All of these departments are primarily charged with the responsibility of preventing hazardous material spills. If a spill actually does happen, the U.S. Environmental Protection Agency or some state environmental protection agency must be contacted for assistance in cleanup pollution control.

Without exception, all of these agencies are understaffed and underfunded to perform their respective assigned tasks.

For example, one employee of the U.S.

Department of Transportation, Highway Branch, has stated that in their branch there are only 6 specialists in hazardous chemicals assigned to the entire United States. And that these 6 do not have ready access to any emergency spill safety equipment or fast transportation means of getting to a particular spill occurrence.

Nor are they able to routinely inspect the many thousand transport vehicles, or to see that proper training is given the more than 5 million active truck drivers in the country. They don't -- can't see how they can get around to training 5 million truck drivers who -- in the country, that may at one time or another be called upon to drive a vehicle containing hazardous materials.

Most firemen and policemen are not trained to handle spill accidents. State and local laws on the subject are generally nonexistent, and even fewer qualified personnel and less money is available at these lower governmental levels than prevail at the Federal plateau.

No laws are in effect requiring previous notice by the shipper or transporter of most hazardous chemical movements.

No highways or railroad lines are exempted from their transport except for very highly explosive types of loads. Each transport vehicle carrying toxic materials supposedly must contain a manifest description of the materials being moved, and display an obvious placard describing what to do in case of an emergency.

But no routine inspection nor emphasis is placed on this matter, and as a result practically no effort in this area is attempted. Even more important from a groundwater pollution prevention standpoint, groundwater protection is not specifically mentioned or covered in any laws governing hazardous chemical transport anywhere in the United States.

The economics part of it, at the present time a true definition of the actual costs of pollution does not appear to have ever been made. This is particularly needed, especially an exact appraisal of the costs of adverse effects to public health created by current hazardous waste disposal practices, and the true treatment costs of water so contaminated to other downstream users.

These answers are needed now so that the initial sales price of every pollutant can be made to include the total costs of all required control measures.

Only in this way can the people who make, distribute, and use a pollutant be properly assessed for the beneficial values they receive from its use.

In the technical areas a new approach seems to be especially needed. For example, a large number of recent and current research projects costing millions of dollars and many man years of effort are involved with such minor pollutants as hydrocarbons, nitrates and chlorides. It is recognized that these can and do cause objectionable pollution of areally limited portions of shallow aquifers in the vicinity of surficial point source of accumulation.

However, with the possible exception of high nitrate water and its proven harmful effects to pregnant women and newborn infants, these types of materials generally are not extremely hazardous to public health because in concentrations high enough to be toxic such ingredients make the water nonpotable from a smell or taste standpoint.

To illustrate this point, much of the research associated with farm related pollutants is devoted to nitrate pollution from septic tank and animal waste sources. Only slight attention is now being given to the really harmful wastes generated on the farm from highly toxic metals, chlorinated hydrocarbon or organic pesticides, herbicides and fungicides.

Available manpower and resource funds never prove to be enough to do everything that everyone from every field of specialty wants or needs done.

For this reason, it seem imperative to utilize the limited facilities available for hazardous waste management on a priority basis. From a harm to public health standpoint, it follows that major emphasis should first be placed on the abatement and control of the more hazardous wastes instead of devoting most of the available resources to work on those less harmful pollutants such as nitrate and hydrocarbons.

In this regard, a true appraisal of adverse effects to the soil and groundwater resources resulting from past, present and possible future land disposal of hazardous waste has not been made anywhere.

Sufficient data required to make a meaningful evaluation of these effects are not available, and are not being gathered at the present time. A few isolated occurrences of serious soil and groundwater contamination have been recorded. A few small number more are under study at the present time.

Yet, many hundreds of thousands of land disposal sites known to have received all types of hazardous waste in the past remain unmonitored with little if any plans being considered for their investigation in the future.

MR. LEHMAN: Excuse me Mr. Walker, we're running a little short on time, so could you shorten it.

MR. WALKER: Monitoring procedures need to be changed. We are thinking definitely that this has to have a different perspective on it. With all of these dissipation regimes monitored we think that we should control the number of monitored facilities and the depths of them, because this seems to be an expenditure of additional funds, not needed to solve the problem, and since the proper motive is oriented here, we need to have much more attention given to these low level pollutants that there is not much profit in, but that will eventually live to haunt us, and most of all we think that we need some regional types of waste treatment centers that are established on the basis of commercial need instead of pollutant boundaries.

However, before such a scheme can be made viable, effective laws will have to be passed and implemented to accomplish two prerequisite goals.

First, the law must insure that only one center will be permitted to operate in any of the established regions, and that this center must be set up to handle all wastes, not just the commercially valuable ones.

Second of all, the law must insist that all waste producers use the center. Only in this way can optimized process activities be assured.

Also, if every waste producer uses the facility and pays a true price for disposal of all the waste he generates, this in turn will cause him to cut down the volume of his wastes, which is a primary part of the dynamics of the system.

We know that you will have this stuff now, and we want you to consider the fact that groundwater should bear its full share of the load, but don't make it bear it all.

Thank you.

MR. LEHMAN: Thank you very much Mr. Walker. Are there any questions? Mr. Kovalick, you have a question?

MR. KOVALICK: Mr. Walker, one detail, specific on the comment you just made, you suggested that future laws might cause the treatment center to be set up in certain regions and that there be only one in that region. This seems to imply some kind of a -- what I would call a franchise system or some kind of setting aside of certain areas, is that what you are advocating?

Are you advocating that for the public or private sector or both?

MR. WALKER: I'm advocating this be privately run but controlled as government agencies control other types of operations in this business.

But nevertheless, it should be protected enough so that the person running it at least could make a living out of it, and not have a whole bunch of little ones, just taking the cream of the crop and making money off it, and leaving these low levels which waste could be far more harmful.

MR. KOVALICK: And my second question has to do with your initial comments about the guidance. The need for communication there. We like to think that we are sometimes -- perhaps you could suggest some vehicles that we are not using to communicate some of the technology assessment work that you do.

MR. WALKER: Sometimes I think the governor should be taken off the vehicle that you have. Because some of these areas we are working on we don't have the background data that you could take and run with to get the answers.

But you are going this way, as rapidly as time and money will permit. I wish there was some vehicle wherein you could do more to get the prerequisites or the data that you need to write your regulations sooner. If this could be done, and write guidelines for us to follow so that below this level we couldn't consider and above this level would be foolish to consider, and give everybody a definition or broad guideline within which to work.

This I think would be better to correct pollution quickly, than anything else.

MR. KOVALICK: Thank you.

MR. LEHMAN: Do you have any other questions of Mr. Walker?

MR. LINDSEY: You have discussed the needs for regulations and do you have some thoughts on how this might be accomplished either by the state or EPA, and could you comment how you see such regulations taking effect for instance should we specify such things how our landfill should be constructed, or should we impose limits for discharge of chemicals to groundwater, or how would this take place as you see it?

MR. WALKER: It keeps going back to the research needs and everything. And one of the things is that the liners we are now trying to put into landfills for example, they keep saying put the liner in that's impermeable, if we find some of these impermeable "liners" are not good any more, we find under certain adverse conditions they break down which is even more hazardous and we find that some of the people making supposedly impermeable plastic or rubber liners will only make it for one chemical that it can be designed for.

But if you fill and throw all kinds of chemicals into that they cannot assure you that it will hold up on a long term basis, so yes, we may be -- maybe we want to mention that kind of hearing in your approach to it and doing research on that.

So the people that actually design these things will know which materials are good to use and which ones aren't. Which system is good to think about and which one is not.

But I don't think that you could lay out an ABC guideline at your level. I don't believe in my mind that this would be right to do. Because the states have their own hydrologic fuel and chemical needs, and everything else that might vary from place to place.

MR. LEHMAN: There's another question.

MR. KOVALICK: Question from the floor Mr. Walker.

Could you comment on the Federal

department of transportation becoming involved in regulating intra, that's within the state as well as interstate traffic of hazardous wastes?

MR. WALKER: Here again I don't envision their coming in with laws but at least they have to have guidelines out for the states to follow that will be consistent with their Federal guidelines.

It seems to me, and in this area, I think this is very important, from our standpoint, because some of these hazardous spills once they get into groundwater take years to clear up.

One I know about 25,000 gallons of cyanide took about 3 years to clean up and it cost a million and a half dollars before they could finally get 25,000 gallons of cyanide isolated from the environment. And that was due to a train wreck. And this kind of thing is a problem everywhere. So people hauling need guidance in this area.

Or some regulations, at least, to follow.

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CONSULTING GROUND-WATER HYDROLOGISTS AND GEOLOGISTS

Port Washington, New York — Tampa, Florida

December 9, 1975

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Solid Waste Management Programs (AW-565)
Environmental Protection Agency
Washington, DC 20460

Dear Jack:

We appreciated the opportunity to testify at the Chicago Public hearing meeting and trust that our remarks were in order and received in the constructive way we intended them.

One question was submitted from the floor too late after my address for answer during the allotted time. For this reason, the question and the response I would have made are given below for inclusion in the official transcript of the meeting.

QUESTION: Please expand on the regional waste treatment centers. Will they involve incineration, well injections, landfilling, etc.?

ANSWER: It is imperative that all of the centers be equipped to handle all wastes, in any form, and in any concentration level of receipt, whether it be liquid, sludge or solid. All combustionable wastes received would be disposed of in the centers' properly designed and operated incinerators; particulate and gasious substance emmissions from the incinerator stacks would be appropriately scrubbed to minimize air pollution and the ash residues finally treated for disposal in some other environmentally safe treatment-disposal component of the center. These would include facilities for hazardous-waste chemical reconstitution, impermeable polymer encapsulation, separation-recycling, and land disposal. It is envisioned that all of the liquid waste streams entering the centers would be finally treated to a harmless state totally acceptable for reuse or discharge to adjacent lands or water courses, and that solid waste disposal sites would be sealed from the environment with appropriate impermeable liners.

Deep mine storage of mineral rich solid or containerized liquid hazardous waste material for later profitable recovery could be a viable waste-processing component of those centers located adjacent to such underground facilities. Also, where geohydrologic conditions permit, properly sealed conduit wells tapping deeply buried brine aquifers naturally isolated from all regional fresh-water zones could be used for storage-retrieval of liquid wastes rich in valuable dissolved minerals. In this regard, disposal into deeply buried mines and brine aquifers should be permitted as an acceptable "treatment" method only until actual effective treatment technology and equipment has been developed. Under no conditions should deep burial disposal ever be considered as an optimum permanent treatment method.

I trust that this long-winded answer will contain enough information of what I should have said that your people can condense it to some intelligent short statement.

If we can be of further assistance in this matter, please do not hesitate to call on us.

Sincerely,

GERAGHTY & MILLER, INC.

Bill Walker

William H. Walker

WHW:tt

MR. LEHMAN: Thank you Mr. Walker. Are there any other questions?

Okay, that's apparently it, thank you very much sir.

Next I'd like to call upon Mr. Bernard Reese. Is Mr. Reese here?

Well, let's go back and see if an earlier speaker has arrived, Mr. John Baker or Mr. David Fenton from the Indiana Board of Health.

Mr. Baker or Mr. Fenton. Then let's move on then please, I'd like to call on Mr. Dennis Johnson of the Illinois EPA, Mr. Dennis Johnson.

Perhaps he has not arrived.

I'd like then to call upon -- correction, Dr. Patrick Phillips, of the Missouri Department of Health. Dr. Phillips.

DR. PATRICK PHILLIPS: Yes.

MR. LEHMAN: Dr. Phillips, would you please tell us whether you'll accept questions?

DR. PHILLIPS: Yes.

First of all let me preface what I hope to convey to you with my remarks today.

I am not an expert at least not in

hazardous waste.

MR. LEHMAN: Dr. Phillips, could you please get a little closer to the mike.

DR. PHILLIPS: Surely. I am not a chemist and I am not an engineer. I am a public health veternarian. And I like to think that my expertise is in epidemiology. I'd like to relate my personal experience.

We had in Missouri an experience that dealt with the very toxic chemical by the name of dioxin. In May and June of 1971 the material was applied to the soil and almost immediately animal life became sick and started dying.

Within two months humans were affected and at least in one instance severely -- almost fatally.

Now we investigated this with the help of the Center for Disease Control, a Federal agency, we tracked back to where the waste originated, and found that the company that was responsible for the generation of the waste had since gone out of business and there remained approximately 4600 gallons of this chemical waste that had a concentration of dioxin between 300 and 350 parts per million.

Now in itself that does not sound like much. But taken in the light that this chemical is extremely concentrated, it is a lot.

For example, dioxin is lethal, in concentrations of 10 to 50 parts per billion. We estimate that we have enough waste that if we can divide it equally we should theoretically be able to kill over 500,000 people.

Now, once we have identified the waste and the storage and the quantity we start looking for ways to dispose of it. It is a very frustrating thing because there were no guidelines, no regulations, no statutes, ordinances, laws, or anything of this nature that we could use. Now, I am not talking about using the law or the statute to beat over a company's head.

The company that now has the waste is as interested as we are in disposing of it. We don't know how. There are three main ways of degrading dioxin. And one is incineration, the second is a process called chloronalysis, and the third is a process by which the dioxin is exposed to ultraviolet radiation, and of the three avenues of disposal there is only one in this country and that is available to us, and that is incineration.

We have approached five separate companies in the United States and one of them was in western Europe, the first five that we contacted we were turned down.

The sixth that we are trying to work with now is asking in the neighborhood of a quarter of a million dollars for the disposal of this waste.

The suggestions that I have that I hope will be taken in the correct light is not that this is the way it should be done. I feel that there are two areas of concern, at least two areas of concern, that if we are going to set up guidelines and regulations, that we must include in the process and one is human health, and the second is environmental health.

Now what I would suggest is that the ultimate responsiblity of the safe disposal of hazardous wastes rests with the originator.

I envision this in this manner because I feel the person who is concerned who generates waste has the best chance of knowing -- knowing what it is, and what quantity and also the best way to get rid of it.

I feel that the concern of the people as shown by public meetings such as these have to be taken into account to see where priorities are set.

What is most important. The originating company concerned or the person I feel should draw up requirements for disposal, find a service outlet, that will do what he asks, enter into contracts, and have the job done.

Before this would actually be carried out, I propose that the plan of disposing be reviewed by some type of regulatory agency, or commission that would involve at least three members.

One being public health, the second being public safety, and transportation, and the third being environmental health.

Those are only suggestions. Those are the best we have been able to come up with at the moment, and in the meanwhile we still have 4600 gallons of waste.

MR. LEHMAN: Thank you Dr. Phillips.

Any questions?

MR. LINDSEY: You run up against the

problem which we've heard about from other people, in that the problem of not being able to dispose of something because you can't find the facility that will handle it, and in the case of dioxin I guess it's because of the extremely toxic nature of it. That nobody wants to be responsible.

Given that then, how should we or I am speaking now of generalities as a government agency, state, Federal or whoever, how should we or can we insure that the facilities for disposal are available?

How should we promote this, this sort of thing? We generally have a lack of facilities I gather from the speakers that we have heard before you. But what can we do to help them insure that adequate facilities are -- can become available?

DR. PHILLIPS: Well, the first thing that frustrated me was not the fact that facilities were not available, they are available. One of them being in western Europe. But none in the United States.

It took a long time or at least I felt it was a long time to identify these facilities, if for nothing else but as a clearing house for consultants.

I would like to see the Federal government act on this for the whole nation. It can be a repository of consultants, expert consultants, that would help with concerns of the state government, will decide what is the best way to dispose of certain hazardous wastes, and not only that but it would have the information of where it would go to find the facilities.

MR. NEWTON: A questioner on the floor asks in which pesticide was dioxin found?

DR. PHILLIPS: Well, dioxin is a by-product of the production of trichlorophenol. Trichlorophenol is a versatile compound. From it can be produced tri-cholorophenoxide acid, probably better known as 2,4,5THR. Also produced from trichlorophenol is hexachlorophene, the tritetrapentachlorophenol groups which are used a lot in wood preservatives. The company that was responsible for the generation of this concentrated substance was making hexachlorophene, not 2,4,5THR .

MR. LINDSEY: I have another question.

Question from the floor as a matter of fact, two questions here, I'll ask them one at a time.

Has the incinerator ship Vulcanus been considered?

DR. PHILLIPS: Yes, I spoke to their agent in the United States and he said that they would be interested in at least exploring the possibility of being of service to us. They asked for a sample to determine the chlorine content of the waste, so they would know how much diesel would have to be burned to keep it at a required temperature for destruction, and we sent a sample to the Amsterdam laboratory personnel and they came to pick it up and they saw dioxin written on the outside and refused it.

The official reply was that it was and I quote "too toxic".

MR. LINDSEY: One more. In your opinion should Federal funds become available to assist states in disposal of extremely toxic wastes?

Should Federal funds be made available to assist states in handling these wastes?

DR. PHILLIPS: You're asking me something I'm not sure would solve the problem. It would definitely help if we had more money, if we had a quarter of a million dollars.

(Laughter.)

I am not sure that more money is going to take care of the problem. As others before me have mentioned, we need to know more about what we are dealing with. We would be happy if there were more facilities qualified to deal with these wastes.

I don't know. I don't know if we can solve the problem or not.

I think we can help.

MR. LAZAR: I have a question from the floor Dr. Phillips.

Weren't P.C.B.'s also found in this incident?

DR. PHILLIPS: Yes. On analysis of the soil from the first arena which was the only arena we knew about for three years, until we found out we were dealing with dioxin, that we started to at least have a lead on where the investigation should be.

After this we found two other arenas and the farm that had also been exposed. P.C.B.'s were also found in rather high levels. We think they were present because of the nature of the waste oil distributing company. This man had been in business for 20 years and is still in business, and his father had the business before him for I don't know how long, and their main service was going around to the gasoline service stations in town and picking up wastes of crank case and motor oil that they would sell most of it to a chemical refining plant -- well, not a chemical refining plant but an oil refining plant for re-refining.

This sludge had settled out of this oil while it was being held and was what was used to oil the arenas.

This man also picks up chemical wastes and sells most to a chemical refinery for refining processing and purifying for reuse, and the sludge from this is mixed with the sludge from the oil and applied it to the arenas.

MR. KOVALICK: From the floor, is dioxin still produced as a by-product by any other chemical and if so how are they disposing of the wastes to your knowledge? If you know.

DR. PHILLIPS: To my knowledge I don't know. Trichlorophenol is very common in the industry as I understand it, and depending on the process that is used to form and used to produce trichlorophenol dioxin will also be formed. Probably one that is the most hazardous as far as dioxin production is concerned involves alkaline conditions at moderately high temperatures at high pressures.

And if there are other companies having a problem with dioxin I wish them luck. I also wish people in the environment in the surrounding area I wish them luck also, because they are probably having as much trouble as we are getting rid of the mess.

It just does not go away. It does not degrade on its own. It has a half life of at least 18 months in the soil, it is a very heavy tarry substance, it does not leach or move into the soil very readily, it just stays there.

If it is protected from the sunlight it does not break down very readily, it is relatively inert as far as treatment by acids or bases -- it is extremely lethal in strong dosage.

I don't know of any other companies but I would not be surprised to find that there were some.

MR. NEWTON: I have a question from the floor Dr. Phillips.

What would you suggest then for the company which does not have the financial resources for disposal of this material given the high cost of such disposal?

DR. PHILLIPS: Whoever asked that question is very perceptive. They have caught me right where I hurt.

Because the company that I am dealing with is not that big a company. And a quarter of a million dollars would probably sink them.

Even before the economic conditions of today. I don't know what to tell you. I have absolutely no opinion. I have no idea. Maybe it's good that we don't have laws that say you've got to get rid of the stuff, because it would certainly drive people out of business.

You've got me on the horns of a dilemma. I want to get rid of it and I want to get rid of it safely, but do I have the right to force a company into bankruptcy? This is what I am talking about setting priorities.

What is more important? I just can't answer your question wherever you are.

MR. LEHMAN: We have one last question Mr. Lazar?

MR. LAZAR: Yes, somebody asked from the floor, if the most -- did the most severely affected child survive the incident?

DR. PHILLIPS: Yes. The child survived the incident as far as we could tell there was no permanent damage. It was bad that the child had a hemorrhagic cystitis. Along with the other signs of migraine headache, she came down with cramps, she was placed on an artificial kidney machine for something like 2 weeks, and her condition was severe enough where they had her in intensive care for something like 6 weeks.

Her exposure was that she played in the arena and at this time she was six years old. It was like a sand box. Her mother was a stable manager and a very fastidious woman and extremely intelligent also.

And the child probably bathed every night if not twice a day, so the stuff, the material the agent was removed fairly rapidly but it still almost did the child in.

MR. LEHMAN: Thank you very much Dr. Phillips.

I'd like to call on Bernard Reese, at this time. And just to alert the next speaker, I'd like to call on Dennis Johnson.

Mr. Reese, will you accept questions after your statement?

MR. REESE: If I cannot answer the ones I choose not to.

MR. LEHMAN: Surely.

MR. BERNARD REESE: I appreciate an opportunity of being here, and my purpose for being here gentlemen is simply to document a situation that has developed in our community, of a family that had been the recipients of some contamination, so that the idea of environmental protection and that sort of thing isn't just a word, but a necessary part of our society today.

MR. LEHMAN: Mr. Reese. Could you please identify your affiliation.

MR. REESE: Yes, my name is Bernard Reese and I am an attorney admitted to practice law in the State of Illinois.

When I first became involved with this the word environmental protection was simply a word. And I read about it in the newspapers.

But I had a farm client come into the office about October of 1972 and they had an apparent water problem, and she said there was a strong odor of metal or some odor coming from a well that they were using, and the land owner adjoining their property was using the land as -- a portion of the land as a limestone pit and then a strip of land adjoining it as a dumping area for chemical barrels.

That over this period of 1972, 1973 there were several hundred barrels of chemicals that were dumped on the land. And the dumping procedure had apparently taken place for a number of years prior to that, but the odor in the water became apparent in the summer or late fall of '72.

Preliminary investigation disclosed that the barrel contained a chemical waste material from a local paint manufacturer who we believe was disposing of them in this manner.

Further investigation substantiated this fact, and litigation was commenced in the

County of Winnebago. The dumping after the litigation started primarily stopped and over a period of '73 the majority of barrels that were on the adjoining property were removed.

Although up until let's say 60 or 90 days ago there were still barrels on the adjoining land.

These barrels, many of them were split and the contents were leaking out and you could smell -- as you walked in the area you could smell the chemical odor.

The client discontinued his use of the well for drinking purposes and cooking purposes, when the odor began to become too strong, and then we began to get involved in it. To somebody who's unsophisticated in the area of technological information, in terms of water, usually you drink it but you know maybe you ought to watch out for bacteria.

But when you begin to try to discover what the problem with the water is, I discovered that it was not a simple task.

Testing of the water was quite difficult. To find appropriate facilities where you could get the kind of testing you needed.

And testing on the water still continues, but it appears pretty conclusive that the water is chemically contaminated and contains phenols, mercury, lead, zinc and other hazardous and harmful chemicals.

A new well was sunk to a depth of 320 feet in an effort to avoid the contamination and it was taken down below St. Peter's limestone. We thought and on the information we had at that time, it was felt that would avoid the continued contamination of the water supply.

This conclusion based upon testing of the new well now appears to be erroneous.

It appears that we were wrong in thinking we could get away from the leaking.

The substrata is limestone and apparently is a ready conductor and channel for what we believe is the course of the chemicals being dumped or having been dumped on the adjoining property.

The individuals, the client has since -- since the fall of '72 been forced to transport in water for drinking purposes and for cooking, and because of the inability to locate a satisfactory place to dig a well, has had to dispose of the place and prepare to move.

The medical condition of the family is such that each member of the family has experienced some sort of traumatic episode, of one kind or another.

To some members of the family it has been more acute than to others. When you begin to you know, somebody has a headache or swelling in the throat or something, that's not apparent readily, well the layman doesn't say this would be associated with the water you are using.

And if it had not been for the odor that the water began to develop the contamination of the well probably would never have been determined.

It is believed or we believe there's a causal connection between the chemicals that were dumped on the adjoining property, the contamination of the well and the physical condition that many of the members of the family now demonstrate.

I have a couple of suggestions -- as I have looked at the problem it has been my observation that most industry is really trying to make a legitimate effort to solve the problem of waste disposal.

I think -- there are a couple of things I had in mind. If anybody who is disposing of contaminant waste either a generator or whatever, was required to register with the -- let's say the county clerk's office, advise the county clerk at the county in which he is operating, where he is disposing of his waste and how, and after that registration that either the state or the Federal EPA would send him information on where that waste would be disposed of, and the economics of so disposing of it, the hazards of that particular waste, if it was disposed of improperly, methods that he shouldn't abuse and perhaps the civil and legal consequences can be handled or brought into play due to the improper disposal of that waste.

I also wish to say that I represent the Rockford Police Department and it's been my discovery that law enforcement agencies of every kind are underpaid.

I don't think we pay our policemen hardly enough money. They are always fighting for more money. In terms of this particular situation the average guy who -- let's say he's on a farm or has to do with the use of water or whatever, in this particular situation if it wasn't for the division of land pollution control and the ability to utilize some of the information that they are capable of developing through their researching and testing and enforcement field, the little fellow who does not have the funds to develop the kind of sophisticated testing that's necessary and to make the kind of proof that's necessary in a court of law, in a law enforcement situation, if it weren't for the information that the police oftentimes furnish a citizen's rights would not be protected.

If it weren't for the information and the type of assistance that the division of land pollution control could furnish a citizen, the rights of an individual simply would not be protected.

And it is not just a question of spending money but it's a question of having an agency which really is a law enforcement agency to protect the individual from attack in a much more subtle way but just as dangerous and just as detrimental as an assault on the street.

MR. LEHMAN: Thank you Mr. Reese.

We have some questions. Yes, Mr. Lazar.

MR. LAZAR: Mr. Reese, I have two questions. Could you tell us something, how far is the well from the disposal area approximately and also has any other well in that general area been affected.

That's my first question.

MR. REESE: There are two areas that were being used for dumping on the adjoining property, one which was a land strip and which is about 3/4 of a mile from the well, and the other was in a limestone pit, across the -- in sort of a northwesterly direction, probably another half mile from the strip dumping area.

The evidence that has been developed and I think maybe Mr. Johnson follows me, and he may have better information on that, if he wants to disclose it, it appears to me that there was another well in the south or easterly direction that was affected and there may be others in the area that have not as yet been documented, but the limestone -- the geological information indicates that the limestone falls in a southeasterly direction from the dumping area down across the area where the well was located and in a -- running in a southeasterly direction.

So that there is at least one other well that was contaminated, but to what extent I don't really know at the moment.

MR. LAZAR: My second question sir, is can you be more specific about the physical condition of the most severely affected member of the family?

What are the symptoms or were the symptoms and generally what sort of hardships did the family encounter as a result of this?

MR. REESE: I've got detailed notes in my file, but I can say this. That the one youngster age 14 experienced significant amounts of time away from school. Missed a lot of school. As a matter of fact he had headaches, and apparently water behind the ears, an electroencephalograph test indicated abnormalities, and some unsteadiness, in walk.

Difficulty on occasion in speech, and the other members -- the mother had swelling of the neck, and swelling of the lips. Each member of the family had, you know, different demonstrations of something physical. Of one sort or another. The oldest daughter, she seemed to be the least affected at all. She was not substantially affected other than perhaps headaches.

And it wasn't until we began to look at information out of Japan that -- you know you -- we began to realize that maybe some of the problems that they were having were associated with water.

And the other thing that you discover is that for example, a case down in Texas where there was mercury poisoning in which the mercury was concentrated in hogs that were fed -- oftentimes the level of chemical in the water is not always indicative of the effect that it can have on someone who might be using it. Particularly on a farm, where they might have cattle that are drinking that water, and the chemical will get down and get concentrated in the animal and be produced in the milk which the family uses, and could have a detrimental effect in that fashion.

MR. LEHMAN: I have another question. Mr. Kovalick please.

MR. KOVALICK: I think these are four clarifying questions from the floor.

Was the case referred to the Illinois EPA?

MR. REESE: I know the Illinois EPA

apparently did some investigation and I have -- this is another point. I'm kind of a country lawyer here, and I just don't oftentimes just know where to start. If you begin looking at -- and the client doesn't know where to start, you begin talking and you find that nobody knows really where to start.

Finally in April of '73 in an effort to -- well, the University of Wisconsin is trying to get an evaluation. We called the local EPA office in Chicago and talked to a gentleman there, and at that time they didn't have a procedure for helping or at least this gentleman told me they didn't for helping diagnose water for heavy metals.

And that again is a reason for having that division, like the division of land pollution control. That at least offers some control and gets some helpful information there.

So it was hard to discover and I am informed and believe that the EPA did have this particular property under surveilance and for a period of time and over the past number of years, apparently there ha dbeen a complaint and there had been efforts to stop the dumping.

MR. KOVALICK: I think for clarity the division of land pollution control is a division of the Illinois EPA.

MR. REESE: I believe it is.

MR. KOVALICK: So I believe it was several offices that were involved there.

Now, I have three other questions. Was the water sample sent to the Illinois Department of Public Health? For testing? Or the EPA or either?

MR. REESE: The water was sent to the Department of Health and I always thought, you know, you could take water down to your local chemist and find out what water was and I discovered it was not quite that simple.

The report we got back from the Department of Health was based on bacteria, nitrates, iron that sort of thing. But they really didn't disclose any relevant information as far as heavy metals. You have to follow a totally different approach procedure for that.

And you discover further that unless the lab is sophisticated enough to have let's say computerized controls in developing that chemical content, when you get down below certain levels you don't get the proper information.

MR. KOVALICK: Yes, thank you, and lastly was the dumping site an EPA permitted facility and would you care to name the dumping site?

MR. REESE: Well, the dumping site so far as I know was not an EPA authorized facility, and the dumping site was land adjoining the client's property owned by Mr. Tipton.

MR. LINDSEY: Mr. Reese, I have one more from the floor here. You have made the assumption that the waste drums caused the water contamination. Have you been able to prove the connection by testing whether the same chemicals exist in the waste as you found in the water?

MR. REESE: That presents an interesting evidentiary question.

We think we've been able to reach that conclusion.

MR. LEHMAN: Well, I want to thank you Mr. Reese. I believe that's all the questions.

I would next like to call on Mr. Dennis Johnson of the Illinois EPA. And while he is coming up to the microphone, Mr. Wasneck has a message here at the front table.

We have had one question addressed to the EPA panel, and I just wanted to clarify that the purpose of these meetings is not for us to expound on EPA policy, but it is your opinions which we want to elicit.

So, if you will please address your questions to the speakers, 'rather than to the panel directly and if you do have questions that come to you as a result of these meetings, we'd be happy to answer them.

And now Mr. Johnson please.

MR. DENNIS JOHNSON: I'll introduce myself, I am Dennis Johnson, Regional Supervisor for the Illinois EPA Division of Land Pollution Control.

My responsibility and also my purpose and intent for being at this meeting, is to clarify a new approach to hazardous waste control that I think should be clarified prior to some adoptions of proposed regulations for hazardous wastes generated and those hopeful to adopt regulations that are pending adoption by the pollution control board.

Let me get back to some of these functions to the pollution land control as far as the state is concerned.

My responsibility and my eight staff members under me, we all respond to the environmental protection act under the legal auspices of that act, and develop and build around pollution -- as far as land pollution control is concerned.

We build it around solid waste disposal. Now this means solid waste disposal usually on the landscape basis, and that's what my division is all about. So when you talk about landscape, you talk about some very severe limitations from the standpoint of engineering technicalities, geological considerations, and I'm not going to get too much into this, unless I have questions from the floor.

John Clark, I saw him there in the audience, did make reference to some of the functions of the divisional aspect of pollution control, as far as landfills and surveillance and enforcement of the permits required for sanitary landfill.

But just to kind of give you an overview very quickly, the solid waste permit descriptions that govern every landfill become that landfill operation's bible, it is also the bible by which surveillance and enforcement from my office is governed too.

The best sanitary landfill as far as the landscape position is concerned would be one that rests primarily and hopefully in a strong clay geology. It would be a landfill that would be protective to the environment because it does not sit on top of limestone or sandstone geological formations.

The worst landfill of course, I think, is easily recognized that if you were to have surface or subsurface within minimal numbers of feet, 20 or less, dolomite limestone formations and if you were to deposit any type of refuse on that surface the percolation of rainfall through it would tend to leach out whatever chemical compound that refuse would have.

That means that the lateral or horizontal substratum movement of potential chemically hazardous ions could move in that land- -- that limestone and geology formation.

And the possibility of groundwater or the water table being affected by chemical ion contaminants would be a realistic problem. And again that's what the Division of Land Pollution Control is all about.

To prevent substrata, groundwater contamination of any type, whether it be biological or hazardous. So to prevent illegal landfills from operating or to prevent existing landfills that are created by the Illinois EPA from taking hazardous materials when their permit descriptions and geological engineering descriptions don't warrant that they take it, we on an enforcement surveillance control basis prevent them from taking any materials that could potentially get in the groundwater aquifers.

The permit section of the division of land pollution control does a real bang up job to say the least of course, I'm prejudiced.

But they do a fantastic job on permitting and enforcement and pre-permit engineering review of potential landfill sites.

There are some very good sanitary landfills in northern Illinois, central Illinois and southern Illinois. So I'm not talking about my 22 county region at all. I'm talking about the State of Illinois as a division of land pollution.

These excellent landfills are many of them permitted by our permitting offices down in Springfield. They are capable of taking some of the most hazardous materials regardless of where it was generated. Even low threshhold radioactive waste in some certain specific landfill areas.

Industry has particular problems, and I recognize this, because I see it and industry in my region represents a fantastic gross manufacturing million dollar figure.

It exceeds just Cook County, statistically in the encyclopedia reference if you care to get out your kid's books, statistically exceeds the gross billion dollar manufacturing estimate, just Cook County of 16 states of the union combined.

Now that's staggering. And Cook County alone exceeds the conbined efforts of about 32 or 33 states in the union, in its gross manufacturing total. Now this is heavy industry. This is tool and die, metal fabrication, metal plating and chemical. The Chicago Heights area exceeds Pittsburgh in steel production.

So what statistics that I'm giving you are realistic from the standpoint of potential environmental impact. And that again is what the divisional aspect of pollution control is all about.

The landfill descriptions that I was talking about, as far as accepting hazardous wastes, would be the clay geology hydrostatically sealed landfills.

If you want to think of a clay open pit as a gigantic bathtub capable of receiving and holding deposition of every type of refuse material hazardous included, imaginable as being deposited in that type of open hole that is I'll say a sanitary landfill.

Provided the clay geology is measured peripherally and on the bottom in feet and not in inches.

Enough of that, I'll have some questions from the floor, and if you have any specific questions on landfill, but we do have a strong responsibility from the standpoint of environmental impact on surveillance of existing legally permitted landfills and that they do take the right materials.

If the landfill sits on top of sand or gravel or is an old quarry, if they get a permit at all then that permit is limited to general refuse and certainly nothing hazardous.

There are some things that I'd like to mention especially with regard to industry at this public meeting, the Division of Land Pollution Control is rather dynamic and again I'm prejudiced. We are not a reactionary body especially in hazardous control. We are thinking in terms of preventative medicine for environmental impact.

We have in the past followed complaints, hazardous type complaints on a one on one follow-up basis·For example, if we get cyanide, plating waste, heavy metal waste, on a complaint basis where it's been generated by who knows who, but it's being hauled and it's being placed in such a manner that the barrels are leaking or the barrels will be dumped in a non-permitted landfill area, we will jump with both feet on that of course, and try to direct the hazardous materials, whatever its generated source, to a safe technically permitted landfill.

I heard a comment as I walked in, just a little bit ago, that where are these safe permitted sites? Is there an abundance of them or is there a shortage of them?

I would take little ground on that

question. I feel that the Cook County geology which is the impetus of some fantastic generated materials, the Cook County geology is truly a God send.

There is an abundance of clay landfills that the Illinois EPA permits to the tune of -- when I say abundance I mean approximately one dozen, and to me that's an abundance, because that is very favorable for one county.

But the clay is here, and the clay is of safe engineering researched -- previously researched geological application to just about every conceivable hazardous waste generated and to be safely deposited.

And that is truly fortunate for the industrial giant Cook County, and we monitor these landfills.

And the operational assistance that I'd like to project to the industry, and I think you'll get a greater feeling for the projection in a minute when I tell you about some of the proposals that are coming before the pollution control board.

The operation assistance is open door policy. We across the state in all three regions have a compliance conference table that we welcome and solicit industrial or private or corporate profiteering type management landfill facilities -- I don't use profiteering in the wrong way -- to come across the compliance table with questions and answers, and to work with us in a one on one approach, to solve a problem.

Obviously the problem has to be legal deposition.

This operators assistance is certainly forthcoming and I hope any member of industry now or in the future would ring my phone up or Springfield up and start pushing along these lines.

My point of making reference to where are the landfills, they are there. I think it's one of the hazardous things in industry and one of the big responsibilities and I feel that there is a good integrity in industry already. It's been proven to me that industry is having a problem and it should contact the Illinois Division of Land Pollution Control for legally permitted and safe hazardous deposition sites.

Now I'm not saying we won't ask you to drive 50 miles, or 75 miles, or 100 miles, we are not God. We cannot put clay landfills and call them

100 per cent hazardous fills anywhere we want to. We're at the mercy of the geology, the geology of northern Illinois, My region is not truly as lucrative as -- speaking of 22 counties now -- is not truly as lucrative from the standpoint of safe short distance traveling to a safe deposit site.

Cook County is fortunate but the rest of the counties are not. For example, the Winnebago County area, which is the area from which Mr. Reese is in, and where his client is located, and is having problems, that Winnebago County area and the surrounding periphery, 7 or 8 counties, is a sand and gravel, glacial apex geological point from the standpoint of high amounts and subsurface or near or at surface deposits of dolomite limestone.

Well, that creates problems. Because limestone or sand, if you want to go play in your kid's sandbox, you know what happens when you put any kind of a liquid in sand, it goes right to the bottom, if on the bottom of that limestone or sand or gravel or whatever the porous geology is, happens to be a natural or horizontal aquifer, you can put two and two together I'm sure.

The contaminants will travel horizontally in the natural aquifer. And this is a concern that we have as a responsibility from my pollution control standpoint.

So again, industry may not like to -- appreciate this standpoint of economics and overhead, because I once myself was a representative of industry as a chemical engineer, I can see that you have to consider the fact that you have hauling expenses or you have to pay a hauler per capita or per dollar figure higher than someone else in another area, with closer landfill sites.

However it's still called one of the hazards of the business and environmental protection, and I know you realize that.

Let me make a few comments on what we're doing and if I have any questions on the past performance of the EPA or division of land pollution control, or the past illegal activities which are there, I'll be glad to answer the questions. But as far as future and near future reference, my exposure and my staff exposure and the other regions' exposure to industry, I think it will be along these guidelines.

September 1975, House Bill 2101 was

passed by the Illinois State Legislature, and this brought hazardous waste directly to the responsibility and totally the responsibility of the Division of Land Pollution Control.

Now that amendment to the Environmental Protection Act defines hazardous wastes as any refuse with inherent properties which make such refuse difficult or dangerous to manage, by normal means, included but not limitted to chemicals, explosives, pathological wastes or wastes likely to cause fires.

This addendum called House Bill 2101 to the Environmental Protection Act has really two responsible mandates, and I'll give you my interpretations and the agency's interpretations of those mandates.

Legal responsibility is such now with the passage of that bill that private industry can no longer store or deposit generated hazardous materials on private property. Specifically that private and/or industrial landfills from the past now have to meet engineering and permit descriptions of the Illinois EPA Division of Land Pollution Control.

There is an alternative to this,

rather than go through the expense of considering putting in your own backyard safe hazardous landfill site, which you wouldn't be able to do if you had clay anyway.

All right, the alternative is that said hazardous generated materials must be hauled to a legal technical landfill site permitted for safe hazardous deposition. And these landfills are available, and again, if there is a question of driving and a hauling basis, or paying a hauler to drive to one of these safe permitted landfills, that certainly is a risk of the business, and a consideration that industry is going to have to make, for environmental protection.

MR. LEHMAN: Excuse me Mr. Johnson, we are running a little short of time, if you could -- if you could finish up please.

MR. JOHNSON: Yes. Co-responsibility for safe hazardous deposition also falls upon the independent and corporate hauling companies. And I think this is the proposed legislation that will be needed.

Final draft preparations for liquid and hazardous waste hauling regulations have been finalized and will be presented to the Illinois Pollution Control Board for recommended adoption in early '76.

These upcoming regulations prescribe procedures to be followed in connection with the issuance of permits to liquid and hazardous waste haulers. And provides for inspection and numbering of vehicles and tanks.

The adoption of these regulations will constitute a three way responsibility. That three way responsibility is -- will exist between the generator, hauler and the landfill operator.

It will be based on bill of ladings and record receipts and on hazardous materials transfering from generator to hauler to landfill.

The violations of these regulations will constitute pollution control board actions, and also revocation of said permit.

That to me is a direct response to House Bill 2101, it's also a direct response to the agency the Division of Land Pollution Control specifically, to past hazardous complaints and the severity of those complaints.

Okay, I have talked enough, I'll

let someone ask me some questions if that's the case.

MR. LEHMAN: Thank you Mr. Johnson. We have some questions.

Mr. Kovalick.

MR. KOVALICK: Mr. Johnson, Mr. Kolberg this morning from the State of Wisconsin commented on that state's philosophy and minimizing the amount of waste that is headed to the land by quoting it correctly, for treatment and other concepts. And I was wondering if you would like to comment -- if I understand what you are saying, is that different from Illinois' philosophy?

MR. JOHNSON: I certainly as a representative of an Illinois agency can't contend or contest anything from the division of Illinois resources or any other philosophy.

I can base my comments on research records from other states and clay geology landfill definitions which have been determined inherently and geologically, that clay landfills and -- they are very specific are environmentally safe.

For example, regardless of what type of landfill technically permitted, clay or a more general refuse landfill that sits more of earthen type materials, regardless of the landfill, there are engineering descriptions that require a landfill operator to sink monitoring wells and to monitor any horizontal traveling of leaching contaminants.

If that would ever exist

from the standpoint of analytic evaluation of those monitoring wells, then that particular landfill would have consideration of closure.

MR. KOVALICK: I have a question from the audience. What happens when you run out of landfills?

MR. JOHNSON: Well, hopefully resource recovery engineering -- and I am a chemical engineer, and I see many many gains in this area. Now some of the larger landfills in Cook County have projected volumetric life that goes past the year -- into the future.

The independent management staff is doing a very good job and following up with regulations, and after the year 2000 or it may be shortly thereafter, it's hard to say. If you start running out of some of these clay deposit landfill areas, what next.

I would think from what I see already

both from the standpoint of private enterprise and Federal funding efforts, that resource recovery engineering is going to take the bulk of the problem or the developing problem and deal with it and the minimal materials that are hazardous will be dry weight sludges, and --

MR. LEHMAN: We have another question.

MR. NEWTON: Mr. Johnson, a question from the floor.

Does the Illinois EPA require positive identification of hazardous materials for their properties before disposal?

MR. JOHNSON: Certainly. The type of chemical clarification for landfills are required on the basis of a supplemental permit. And many supplemental permits have been turned down for landfills because they find evidence of what chemical composition is, it's evaluative of the permit section that materials in that particular landfill represents an acquifer hazard.

And it's redirected maybe 100 miles to a different area. There are fortunately areas that can take some very hazardous materials.

MR. LEHMAN: I have another question, Mr.

Lazar.

MR. LAZAR: Yes. From the audience.

Mr. Johnson, there's a series of questions on the monitoring of sites that you mentioned. Does this include monitoring of all sites or just hazardous waste sites?

MR. JOHNSON: Yes, okay. First of all the Division of Land Pollution Control files or agency files are public now. Anyone can check and verify that all operating sites have under the permit descriptions that have been legally enforced since when those permit descriptions became valid with the Pollution Control Board. Some of these permits, older permits, were initiated prior to pollution control board adoption of the regulations.

But those sites are being phased out. And I can get into that specifically but I don't want to disappoint the questioner.

What I am saying is that all operating sites since adoption of the rules raised for monitoring the wells, all operating sites and new sites do have monitoring wells, and they are being surveyed.

The surveillance is of two types, the landfill manager or management, whoever it may be it requires getting well analysis and these are more or less and not disputing industry or management but they are more or less cross checked with our own laboratory analysis annually, and if we get into a problem there are considerations for closure.

And there have been some considerations in the past few years to the pollution control board for action.

MR. LAZAR: After a site is closed Mr. Johnson, how is the -- who is paying for the analysis after that?

MR. JOHNSON: When anyone goes to a closure on a sanitary landfill, that particular ownership, even if a deed is to be transferred, it has to be stipulated in the deed that for 36 months thereafter the monitoring program is to be carried on at the expense of the previous owner, or if that responsibility is transfered by deed to the new owner.

And this is according to our rules and regulations.

MR. LAZAR: And who is paying for that chemical analysis, is it the state or is it --

MR. JOHNSON: Our own monitoring surveillance that is a state funded effort.

MR. KLEPITSCH: I have another question.

This is in the form of a clarification, that asks are you saying most of your comments are landfill oriented, that landfill effluent dumping will be approved by your agency and the chemical waste will not be approved.

MR. JOHNSON: Not at all. I'm saying at the present time resource recovery engineering is not sophisticated or even economically attractive enough to industry to get it off the ground and I know industry and so would I would like to have seen it. But at the present time, until economic recovery becomes more attractive in its efficiency of recovery, then we will continue to very severely monitor landfill approaches to all refuse and hazardous wastes.

I might add one final comment. The Illinois EPA in the southern region of land pollution control has had success in establishing a waste exchange conference, or waste exchange commission in the St. Louis area, where many of you are aware of what the indications are there. Industry can go on record in the confidential placement of materials they have, and in others they may recycle it and together that may be projected release.

MR. KLEPITSCH: This question clarification I don't think was directed towards resource recovery as much as for treatment of the chemical and resource facilities.

MR. JOHNSON: All right, there are available to industry other methods of ultimate disposal. You might say it's a shifting of responsibility on a fee basis, and for example, there are independent companies some in Kansas City that carry waste out of northern Illinois areas certainly in the near Indiana area, there are chemical companies on a private and independent basis that incinerate sludges in bulk -- they handle sludges in bulk.

And ultimate disposal of the final product which is the concentrated sludge, is then shifted and responsibility to an independent company, and I think it's recognizable that if a company is based in another state, the Division of Land Pollution Control for Illinois will lose its enforcement responsibilities.

However, we are combining efforts with EPA and division of natural resources and in other states to make them aware of considerations across the state lines.

MR. LEHMAN: All right. We have some more questions.

Mr. Kovalick.

MR. KOVALICK: This is from the floor. Is it possible to dispose of P.C.B.'s in any Illinois landfills and what if the P.C.B.'s are from another state?

MR. JOHNSON: There is one particular landfill south of Sheffield and I believe it's approximately 100 miles directly south of Rockford, and this is called the nuclear engineering landfill and I believe if my knowledge is accurate and I'm sure it is, if I remember right the file is not in front of me, but I do know they are extracting hazardous -- accepting hazardous wastes because the clay geology of that particular area is such that it is certainly a conceivable place to put it.

They have a separate area which has been permitted by the Illinois EPA land pollution control section for low threshhold radioactive wastes also.

So you can rest assured that the geology in clay and -- it is utilized for those types of depositions.

Now specifically to the answer, if P.C.B.'s are being deposited in that field, I am not going to go on record and say yes, but I'll say that without the file in front of me, I am reasonably sure that there are P.C.B.'s coming from Minnesota that are deposited in that area.

MR. LINDSEY: You mentioned your recommended clay landfills as being bathtubs capable of handling all wastes.

MR. JOHNSON: I'm not saying that all clay sites have this.

MR. LINDSEY: Well, some of them.

But in a wet environment rainfall in excess of evaporation bathtubs will fill up, and do you require leachate treatment and what happens to leachate when this builds up?

MR. JOHNSON: I use the word crudely, bathtub for layman exposure. The engineering concepts if you have or anyone in the audience has a real feel for landfill procedures, at the end of every day's operation, there is the fill face is not left open but it has to be closed with six inches of cover. This does give a runoff gradient to any percolation of precipitation going through.

And that's why the consideration is there, and it's part of the permit.

If a particular landfill or the operators of that fill do not put six inches of daily covering material on their open fill face, they'll have a real problem with our agency.

And we rectify that problem immediately. It's a legal description in their permit to do so. And I know I'm saying more about that than I should, but the question that you raise as far as a bathtub I don't want to give you the impression that we are having a standing cesspool of water and leaching conditions, whatever leachate is generated out of the bottom of the fill and there are exceptions to this, engineering exceptions, and permit exceptions, but whatever leachate is generated many times it's pumped right back into the fill and there's a very good chemical reason for that.

The exchange reaction conditions are such that by placing potentially initially hazardous materials in organic refuse they will tend to neutralize one another in solution.

If you have an alkaline base in

one and an organic acid base in the other they will reach a blending effect of neutralization, and that's great.

That's part of the intention. Now, whatever material goes , directly to the bottom and collects on the hydrostatically sealed body because it's running through impervious clay, there are many engineering considerations depending upon the type of material that's been allowed to go in there and we require engineering considerations of that specific area of fill to recirculate the leachate back into the fill facing continually neutralizing and percolating through the fill face.

MR. LEHMAN: I thank you Mr. Johnson. Your statement has precipitated a large number of questions, and unfortunately we are already running 15 minutes behind time, and in the interests of the people who are scheduled to speak after the lunch break, I think we should stop the questions. Stop the question period now and we will submit these additional questions that remain to you and hope that you will respond in writing for the record if you will please do so.

MR. JOHNSON: That will be fine.

MR. LEHMAN: At this time I would like to give the audience some idea of the way we think we are going this afternoon.

We have had a large number of people who have indicated the desire to speak this afternoon, and yet I think we will be able to finish the meeting today, without question. And probably without going into an evening session.

So those of you that have travel plans if you want to worry about them -- I think we'll probably be able to finish before the dinner hour today.

At this time I'd like to adjourn the meeting for one hour and reconvene at 1:35. Thank you.

(At which time a lunch break was called.)

MR. LEHMAN: All right, now would you please take your seats ladies and gentlemen, so we could get started.

I'd like to reopen the meeting and to call the first person, Mr. Dennis Bridge of Standard Oil of Indiana. Mr. Bridge would you please take the podium.

MR. DENNIS BRIDGE: Mr. Chairman, members of the panel, ladies and gentlemen, my name is Dennis Bridge. I appear today in behalf of the Manufacturing Chemists Association, as Chairman of the Solid Waste Management Committee.

MCA is a non-profit trade association having 186 United States company members representing more than 90 per cent of the production capacity of basic industrial chemicals within this country.

I am a chemical engineer with eight years of experience related to the safe disposal of hazardous waste materials.

MCA shares EPA concern that there is a need for guidance to insure proper management of hazardous wastes. This concern is evidenced by the fact that MCA has developed three guides on subjects related to landfill disposal of solid wastes.

Many of the topics discussed herein are expanded upon in these guides. Copies are included with this statement for your consideration.

We have chosen to reply in narrative form to the many questions which the Environmental Protection Agency has proposed, rather than on a question by question basis, to minimize repetitive commentary.

There is a great difference of opinion as to how a hazardous waste should be defined. The difference exists because the terms hazardous substances and hazardous materials can easily be and frequently are used in an inaccurate manner. This point can be illustrated by the following example.

A small, sealed and properly identified bottle of potassium cyanide in a chemical laboratory poses a minimal hazard to man or his environment. However, if the contents of the bottle were to be empited into a drinking water well, they immediately become extremely hazardous.

Hazard is a function of not only a substance's inherent toxicity but also the quantity and mode of encounter as well.

The adjective hazardous cannot be used with any degree of accuracy or precision relative to a material, substance or waste unless some meaningful indication is given of the circumstances under which it applies.

MCA recommends the following definition for hazardous waste which addresses the disposal aspect of hazardous waste management.

"The term hazardous waste means any waste or combination of wastes which, when disposed of in sufficient quantities in or on the land, pose a substantial present or predictable potential hazard to human health or to beneficial living organisms."

This definition of hazardous waste is broad, and more specific criteria are required for regulatory purposes. There are hazardous features of materials which must be properly considered in the handling, containerization and transporting of such materials, whether or not destined as a waste.

The general criteria for evaluating the possible adverse impact of waste materials include:

The quantity disposed of to the site, the concentration as disposed, the concentration anticipated in the surrounding environment, the toxicity of the material, site characteristics.

Among the latter are proximity of ground and surface waters, soild percolation, barrier characteristics, and leachate attentuation.

Because of the complex interactions of these factors, we do not feel that predetermination of disposal techniques is practical or reasonable. Final determination of a technically feasible and economically sound disposal technique must be made on a case by case basis.

In fact, predetermination could be counterproductive in that it would restrict development of new technology and eliminate use of viable alternatives appropriate to specific geographic areas or to available equipment.

There are of course hazardous features materials which must be properly considered in the handling, containerization and transporting of such materials, whether or not destined as a waste.

We recommend that authority over

the packaging, transportation and storage of hazardous waste continue to be vested in the United States Department of Transportation.

And that the definition of hazardous substances used by this agency should apply as equally to waste materials as it does to the finished products.

Therefore, no additional regulations or criteria are needed in these areas.

With respect to analytical techniques and sampling, a wide variety of standard methods is available to identify the physical, chemical and biological characteristics of a waste.

Because these wastes can be in the form of solids, liquids, sludges, tars, and what have you, sampling techniques will vary depending on the physical state of the waste in order to assure a representative sample of the waste is obtained.

The responsibilities for safe and environmentally acceptable hazardous waste management are shared by the generator, transporter, disposer of the waste, as well as the public sector as represented by Federal, state and local agencies. Among the several responsibilities of the generator of hazardous wastes are:

First, the generator should adequately describe the waste so that the transporter and treater/disposer are aware of those properties which are important for safe transportation and disposal.

Second, the generator must package and label the waste in a safe and legal manner and provide recommendations for safe handling and spill control.

Third, the generator must insure that both transporter and treater/disposer have valid legal sanctions to handle the waste.

Finally, the generator, as well as the transporter and treater/disposer, should maintain records of all waste disposed of, including type and amount.

The transporter must comply with all Federal, state and local regulations for handling and transporting hazardous materials safely to the designated treater/disposer.

The treater/disposer is responsible for the safe and legal disposition of wastes accepted for disposal, taking into account the pertinent characteristics of the waste.

Records of the types and amounts of wastes in inventory and the results of control and monitoring tests must be maintained. Monitoring and record keeping should be concerned only with preserving air and water quality and public safety.

MCA recommends that the responsibility for the waste should be associated with physical possession of the waste, so that the generator should not be held liable for negligence by the transporter and/or disposer of the waste.

We emphasize that the generator should be free to decide whether to treat or dispose of wastes himself, or to utilize a privately or a publicly operated system, providing of course that all operations are environmentally adequate and satisfy governmental regulations.

Published cost data on the various processes and techniques for treating and disposing of hazardous materials are limited. This is unfortunate because such data would be valuable in establishing ultimate disposal regulations for hazardous materials.

Such data would also be of assistance

to the waste generator in determining an optimal waste handling system.

In view of this inadequacy, it is imperative that sufficient flexibility be incorporated into any legislation or regulatory proposal to permit evaluation of alternative and environmentally acceptable disposal methods.

Environmentally sound management of hazardous waste treatment, storage and disposal activities is comparable and equivalent in its requirements to those for any well managed industrial facility producing similar materials.

Existing regulations already applicable to packaging, containerization, fire protection, employee training, transportation, incident reporting, and what have you are in existence and would also apply to disposal operations.

Labeling and placarding of waste shipments should be to the degree required by the Code of Federal Regulations, Titles 46 and 49. This is an effective and accepted system for transporting of hazardous wastes.

It is the generator's responsibility to furnish necessary information pertaining to the particular waste so that the disposer may handle the hazardous waste in an acceptable manner.

We thank you for the opportunity to present this statement, and we assure you of our readiness to answer any questions or furnish any further information that the Environmental Protection Agency may desire.

TECHNICAL GUIDE

# SW-1

# A Guide for Landfill Disposal of Solid Waste

Adopted 1974

MCA MANUFACTURING CHEMISTS ASSOCIATION
1825 CONNECTICUT AVENUE, N W WASHINGTON, D C. 20009

# TECHNICAL GUIDE SW-1

## A GUIDE FOR LANDFILL DISPOSAL OF SOLID WASTE

Landfill usually is one of the more viable alternatives for the ultimate disposal of unusable residual wastes incident to chemical manufacturing. The responsibilities of industry to assure compliance with regulations to protect and enhance the quality of the environment are becoming more definitive and performance requirements more restrictive. In the disposal of waste materials resulting from chemical manufacturing operations by the landfill method, whether carried out by the waste generator or by his contractor, it is essential that the basic obligations of safe handling and proper ultimate disposal are met in a satisfactory manner. It is intended that this guide, prepared as an activity of the Solid Wastes Management Committee of the Manufacturing Chemists Association, will assist in fulfilling these responsibilities.

## INTRODUCTION

A landfill, when properly designed and operated, is a well-controlled method for disposing of solid wastes. It involves deposition of the wastes in a controlled manner into a prepared portion of a carefully selected site followed by spreading and covering, or blending, with soil.

This guide has been prepared to provide a reference for identifying matters that should be taken into account when considering landfilling chemical wastes. It is intended to be used in conjunction with existing federal, state and local regulations to provide counsel for proper landfilling of chemical wastes whether they be disposed of separately, or in conjunction with municipal-type refuse. In effecting adequate and safe disposal of a chemical waste in either case, basic considerations are the various characteristics of the waste and the landfill location, design and operation.

The use of landfill for liquid, semi-solid or solid chemical waste either alone or in conjunction with municipal and industrial refuse is a method of ultimate disposal which can be practiced safely. The landfill disposal of chemical waste from industry, particularly when practiced in a joint or cooperative facility for community solid waste, often offers the most economical disposal method as well as the method of least environmental stress Certain precautions in waste acceptance practices and in landfill location and operation must be taken to minimize adverse effects upon the environment. Some chemical wastes constitute a potential water pollution problem because these wastes may leach through the landfill into groundwater with subsequent detrimental effects on groundwater quality.

In addition to the possibility of water pollution, there are other safety hazards associated with landfills of some chemical wastes. Internal gas generation and highly reactive and flammable materials charged to landfills can result in fires and explosions, especially when exposed to sources of ignition such as bulldozing equipment A landfill fire also constitutes an air pollution problem. Odor problems can arise when chemical wastes are not pretreated and handled properly.

Before deciding to landfill a particular waste, consideration should be given to all alternative methods of disposal. Both economics and hazard to the environment must be considered. In some cases a more costly method may be justified in view of the potential hazard of one less costly.

## WASTE CHARACTERISTICS

Several criteria should be employed in evaluating the feasibility of landfilling a particular chemical waste. These include degradability, leaching characteristics, toxicity, radioactivity, odor potential, flammability, and reactivity.

A. **Degradability**—Landfill is particularly suitable for disposal of inert materials or for substances which can be converted into harmless compounds within the fill by buffering, filtration, precipitation, microbial action, adsorption or ion-exchange. Some polymers are inert. Those which have degradation products which may be toxic to microbes present in the fill require special care.

1. Many aliphatic hydrocarbons decompose in the soil. Examples are gasoline, tars and some rubber compounds. Unsaturated branched-chain compounds of high molecular weight are generally less susceptible to degradation than their saturated, unbranched, low molecular weight analogs.

2. Aromatic materials are generally more resistant to microbial and chemical degradation in the soil. Carbon in aromatic forms constitutes a substantial portion of the stable organic fractions in soils, however, it is known that the aromatic ring can be cleaved by some soil organisms. Once cleaved, resulting straight chain hydrocarbons are more readily degraded and oxidized to carbon dioxide and water

3. Biocides may be degraded in a landfill if no toxic molecular fragments or metallic compounds are produced which would curtail the biologic activity of a standard waste water treatment system.

4. The stability of pesticides and halogenated or phosphorylated compounds is usually a function of soil texture, humus content, temperature, moisture, and pH If a leachate is produced from the fill, these compounds should not be placed in landfill until, using systems closely comparable to the fill itself, studies indicate that they can be safely degraded to provide a leachate which is not toxic or which can be treated by a standard waste treatment technique.

B. **Leaching Characteristics**—A collection system may be required for landfills where leaching is a threat. The components of the leachate may not have been completely degraded and might prove detrimental to groundwater supplies in the area beneath and adjacent to the landfill. A collection system might be provided when the leachate has high COD, BOD, solids, and other characteristics which respond to treatment before discharge into the receiving water.

C. **Toxicity**—Chemical wastes, when placed in a landfill, should not result in conditions toxic to the microbes involved in the breakdown of the various materials in the landfill. Heavy metals in soluble form known to be toxic to animal and microbial organisms may require conversion to an insoluble form before landfill disposal, or isolation such as provided by impervious barriers. Some chemical wastes can be toxic to operating personnel, and compounds such as cyanides must not be placed where acidic conditions are possible.

D. **Radioactivity**—It is not advisable to place radioactive waste in a landfill, especially gamma and beta emitters with long half-lives. Appropriate AEC and state regulations must be followed in disposing of radioactive materials.

E **Odor Potential**—Materials relatively nonbiodegradable and malodorous, such as some acrylates and mercaptans, should be placed in landfill with care. Odor can be minimized with proper pretreatment, handling and blending of many odorous wastes.

F. **Flammability**—Pyrophoric materials may be dumped in an isolated portion of the land fill only after careful technical preparations have been taken to prohibit contact with air at the site.

G **Reactivity**—Materials which tend to react violently under certain conditions can be placed in a landfill if care is taken to prevent those conditions. Examples are monomers or peroxides.

# LANDFILL DESIGN AND OPERATION—GENERAL CRITERIA

## A. INTRODUCTION

1. Assuming that the waste is acceptable for landfill, the design of the fill should assure that no significant adverse environmental circumstance will arise. Major factors to be considered are infiltration and percolation, gas production and emission, leaching, groundwater travel, runoff, emissions from transportation and waste insertion activities, and —when required—leachate collection and handling systems.

2. Basic mechanisms which result in contamination of groundwater are direct horizontal leaching of waste by groundwater, vertical leaching by percolating water, transfer by diffusion and convection of gases produced during decomposition. These mechanisms may combine at random and work together, and each may separately have an effect upon water quality. The retention or spread of any resultant contaminant is determined by the particular weather, geologic, and hydrologic conditions at the landfill site.

3. Active chemical wastes can be rendered harmless in a landfill through buffering, filtration, microbial action, adsorption, and ion-exchange To facilitate these mechanisms, adequate retention and contact time between chemical waste, soil, and any other solid wastes is necessary. Grain size and unsaturated depth of the fill help determine retention time. Adsorptive capacity of the solid waste and soil influences the contaminant contact time and also represents a treatment mechanism in itself. Greater unsaturated depth serves to increase the adsorptive capacity of the fill system by bringing infiltrative water into contact with a greater mass of waste and soil, also affecting biological treatment. The potential for reaeration of the active biological zone at the fill surface, once infiltration has ceased, also is influenced by the unsaturated depth. Adequate draining of the unsaturated zone and of the biologically active zone at the surface is necessary to ensure an optimal retention time for biological treatment and to avoid restricting reaeration of the active zone.

   Draining of the unsaturated zone and of the surface bioactive zone can be obtained on a dynamic basis in leaky landfills Further enhancement of the biological reaction can be obtained by leachate recycle in the same systems when leachate collection is required. Biological activity may diminish in cold weather. Its adverse effects can be overcome by achieving biological maturity in the system prior to the onset of the cold season.

## B. DESIGN REQUIREMENTS

### 1. Topographical Maps of Proposed Fill and Adjacent Area

(a) Topographic information should include at least the following:

(1) Borrow pit areas.

(2) Typical cross-sections of lifts, dimensions and elevations of the base lifts.

(3) Grades required for proper drainage of lifts.

(4) Location of public and private water supplies, wells, springs, streams, swamps or other bodies of water within one mile of the proposed landfill property lines.

(5) Location of all homes, industrial buildings, roads and other applicable details within three-fourths (¾) mile of the disposal site.

(6) Wind patterns and velocities

(7) Scale should not be greater than 1 inch equals 200 feet and contour intervals should not be greater than 5 feet.

(b) Certain factors may serve to limit normal landfill operations, and information pertaining to these factors should be included as follows:

(1) Location of underground and surface mines within approximately one-fourth (¼) mile of the proposed landfill site property lines and maps showing the extent of deep mine workings, elevation of the mine pool and location of mine peel discharges.

(2) Location of gas and oil wells.

(3) Location of high-tension power line rights-of-way.

(4) Location of fuel transmission pipeline rights-of-way

### 2 Soil Geological Characteristics

(a) A report on the soils, geologic and groundwater characteristics of the proposed site should be based on a sound geological investigation

(b) A sufficient number of borings or wells should be drilled to determine the soil geology and groundwater conditions. These may be supplemented by past boring data as well as excavations where appropriate.

(1) Borings or wells should be drilled five (5) feet into the groundwater or bedrock or twenty (20) feet below the base of the proposed landfill, whichever is shallower. One (1) boring or well should be drilled near the point of highest elevation.

(2) A minimum of one (1) groundwater quality monitoring well should be drilled in each dominant direction of groundwater movement in order to check the effect of operations on original groundwater quality

### 3. Characteristics of Cover Material

(a) Cover material should be suitable soil or other material which shall have medium to moderately coarse texture and should be of such character that it compacts well, does not crack excessively when dry and is relatively free of decomposable materials and large objects.

(b) Where cover material is limited in quantity or is not available on the site, design and operational plans must include a description of source of cover material, indicating such things as soil types, volumes to be used, transport methods and contract arrangements

4 **Prevention of Groundwater Pollution**

(a) To minimize risk of groundwater pollution from landfill leachate, several factors including waste quantity and characteristics, local hydrology and geology, and local environmental assimilative capacity should be considered

(1) General good practice in the prevention of groundwater pollution involves

(i) Diversion of surface runoff from fill;

(ii) Sloping fill surface and planting durable ground cover to drain away runoff without erosion;

(iii) Using the most impervious convenient cover

(b) If studies indicate that landfill leachate may still be a problem, the following should be considered:

(1) Elimination of production of leachate. In sufficiently dry areas, waste can be buried above the saturated zone.

(2) Migration of leachate under acceptable conditions is usually practiced in humid areas. The hydrogeologic environment for acceptable migration of leachates ranges from relatively impermeable strata, such as clays and some glacial tills, to more permeable strata, such as gravels and rocks The quality of the receiving water body and the nature of the strata will determine the travel time and length of path required for acceptability.

(3) Migration and Recovery of Leachate

(i) This depends on a groundwater flow system to funnel leachate to a point where it can be collected in a reservoir on or below the surface when attenuation during travel is not sufficient to render the leachate harmless

(ii) If flow lines do not converge naturally, they can be made to do so by creating an artificial discharge zone using ditches, tile drains, or pumping wells.

(iii) Collected leachate should be treated prior to discharge.

(4) Retention and Recovery of Leachate

(i) This design should be used when there is indication that leachate will not be rendered harmless by the fill and when no other means exist to handle leachate.

(ii) A tile drainage system should be installed to collect the leachate.

(iii) The fill should have the equivalent of a clay seal.

(iv) Leachate should be treated prior to discharge

5 **Prevention of Surface Water Pollution**

(a) To avoid risk of surface water contamination from the fill, the site should be designed and operated to manage surface water runoff and erosion. Surface runoff should be periodically monitored, and if found to be contaminated, the following procedures should be followed:

(1) Rainwater runoff from the fill mass should pass into a contaminated catch water basin

(2) The catch basin should be constructed to prevent leaching of materials. Compacted clay construction may be used or a lining may be required.

(3) Runoff should subsequently be treated before discharge.

6. **Gas Venting**

(a) Gas can accumulate at high points in cell-type landfills where large pockets of organics lodge. Vents should be located at such points in each cell to prevent significant accumulation.

(b) When soil or solid waste are blended in approximately equal volumes with chemical waste, vents may not be required if there are no cells and gas is emitted uniformly and in low concentration over the entire fill face.

7. **Access Roads**

(a) Access roads to the entrance of the landfill should be surfaced with such materials as asphalt, gravel or cinders and should be provided with a base capable of withstanding anticipated load limits. Prevention of dusting is often required.

(b) An all-weather access road negotiable by loaded collection vehicles should be provided from the entrance gate of the landfill to the unloading area.

(c) Signs indicating traffic flow and hours of operation should be provided.

## C. FILL OPERATION

1. **Waste Pretreatment**

(a) If the physical, chemical or toxicological features of a waste are such that hazards are imposed on transportation personnel, the surrounding community, or the landfill operators, pretreatment should be given to eliminate this hazard. If such treatment is not possible, alternate disposal methods should be sought. For example:

(1) Catalysts should be added to organic monomer semi-solids at production unit or fill site to minimize leaching potential and maximize blendability.

(2) Acid or caustic sludges neutralized and slurried to maximize blendability and minimize reactivity.

(3) Malodorous materials neutralized where they occur.

2. **Unloading Chemical Wastes**

(a) Chemical waste loads should not be allowed to enter the fill area until reviewed at the waste source and pretreated, if necessary. It is recommended that the operation be systematized by requiring that a "landfill ticket" accompany each load of chemical waste which describes the material, applicable landfill procedure, personnel protection requirements, special instructions, waste source, quantity and date.

(b) Unloading areas should be specified and restricted to within a reasonable distance from the working face so as to permit collection vehicles to unload promptly.

(c) An attendant should direct vehicles to the unloading area or clearly marked signs should be located prominently along the landfill road up to the unloading area.

(d) Supervision should be continuously available to coordinate the unloading activities.

3. **Waste Blending**

(a) Chemical wastes should be blended with appropriate volumes of soil or refuse, and compacted to produce stable earth.

(b) All large foreign objects which will not provide much contact surface area and which may result in the introduction of an air pocket to the fill should be removed prior to blending.

(c) Six inches of cover should be added daily for safety and environmental protection.

(d) Stockpiling both soil and refuse for cold weather use is advisable.

4. **Size of Working Area**

The size of the active fill area should be confined to insure that blended waste can be spread, compacted and covered daily.

5 **Equipment**

Equipment should be sufficient for the on-site pretreatment, size reduction, blending, spreading, compacting, and covering operations.

6. **Fire and Safety protection**

(a) Fire protection and fire-fighting facilities adequate to insure the safety of employees and provisions to deal with accidental burning of blended wastes within the landfill should be provided.

(b) Emergency first-aid equipment for adequate treatment of injuries should be provided.

(c) Fences should be provided to enclose the landfill to discourage non-authorized people from entering the fill.

(d) Signs indicating nature of the landfill and specific hazardous areas should be provided

(e) A telephone or equivalent type of communication should be available at the fill site.

(f) 24-hour surveillance over the fill should be maintained with appropriate security.

7. **Operational Records**

These should consist of a written log maintained by the landfill operator including the following information:

(a) Types and quantities of chemical waste received;

(b) The portion or area of the landfill used;

(c) Special provisions made for hazardous waste disposal;

(d) Any deviation from the operating plans and specifications.

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The following references offer additional material which may be helpful in landfill planning and management:

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9. Ballentine, R K, S R Reznek, and C W Hall, Subsurface Pollution Problems in the United States, U S. Environmental Protection Agency, Office of Water Programs, Technical Studies Report· TS-00-72-02, May, 1972, 24 p.

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TECHNICAL GUIDE

# SW-2

# A Guide for Contract Disposal of Solid Waste

Adopted 1974

MANUFACTURING CHEMISTS ASSOCIATION
1825 CONNECTICUT AVENUE, N. W. WASHINGTON, D. C 20009

# SOLID WASTES MANAGEMENT GUIDE **SW-2**

## RECOMMENDED PROCEDURES
## CONTRACT DISPOSAL OF WASTE MATERIALS

The Industry's responsibility to comply with regulations to protect and enhance the quality of the environment progressively achieves clearer definition while performance requirements are becoming more exacting. Where disposal of waste materials from chemical manufacturing operations is to be carried out by a contractor, it is essential that the responsibility be assigned to a dependable, competent, and experienced operator to assure that basic obligations of safe handling and proper ultimate disposal are performed in a mutually satisfactory manner. This guide, prepared as an activity of the Solid Wastes Management Committee of the Manufacturing Chemists Association, is intended to assist in fulfilling these responsibilities.

Because of the many legal considerations involved, however, matters concerning contract disposal of waste materials should be discussed with one's own legal counsel.

## INTRODUCTION

Contract disposal of waste materials assigns responsibility for ultimate disposal to a second party, a contractor assuming performance obligations for a fee. The contractor must be competent, responsible, and dependable. Both contractor and generator must understand fully the obligations of each and the potential liabilities involved.

This guide contains suggestions to assist managers of chemical manufacturing plants regarding contract disposal practices which will:

- Effect safe and economic ultimate disposal of unusable waste residuals,
- Fulfill social as well as regulator obligations,

  and
- Minimize adverse community attitudes and potential legal liability.

## WASTE CHARACTERIZATION

First consideration in the disposal of waste materials should be given to the careful and complete definition of the waste and technical assessment of the alternative methods of disposal which may be employed. Although the contractor may be well qualified in materials handling and disposal methodology, the generator of the waste material will be more familiar with the specific characteristics of the materials and applicable handling and disposal practices Full disclosure by the generator and complete understanding by the contractor are vital elements in mutually satisfactory contract disposal.

Before assessing applicable and acceptable disposal methods, the basic physical, chemical, thermal, biochemical, and reactivity properties of the waste must be established. In most cases the generator will conduct the necessary characterization studies and advise the contractor, but sometimes the contractor may be qualified to conduct such studies.

Applicable materials handling methods can be determined from knowledge of physical state and unique handling characteristics A list of terms and their meanings may be helpful to mutual understanding of waste characteristics·

**Physical State**

Solids ........ Dry material in powder, granular, pelletized, or bulk form.

Liquids or Slurries .............. Materials suitable for pumping.

Gases ........ Materials in a gaseous state under ambient conditions.

Semi-solids........... Wet solids, but capable of being handled as solid.

Containerized ...... Materials which must be handled in a container, such as a steel drum, cardboard box, etc.

The "Waste Characterization Check List" in the Appendix suggests detailed information to be established for the assessment of alternative methods of disposal.

## CONTRACTOR SELECTION CONSIDERATIONS

Pre-evaluation and assessment requires legal, operating, and technical input from the contractor with assured performance the major factor in contractor selection. At the same time, potential contractors must be made fully aware of the materials to be handled and of the performance expected A contractor who will take waste with a minimum of information may not be able to provide long-term safe and liability-free disposal Even passage of title to the waste involved to some party other than the generator prior to its ultimate disposal does not absolve the generator from responsibility for its disposal

In selecting a contractor one should always consider experience, stability, and reputation The generator must also determine the contractor's capability to handle and transport the waste materials and his ability to employ the acceptable disposal method with respect to the materials involved. The contractor must have a complete understanding of related law and regulations and provide assurance that he can comply fully.

Sometimes the contractor will provide only transport services and not operate the disposal facility. Where this situation exists, a second contractor or a subcontractor may be involved whose capability also must be assessed by the waste generator.

Each contract disposal party, the hauler and the disposal facility operator should have the financial capability to perform and should provide the necessary liability insurance coverage on his operations.

Any party accepting waste material for transport and disposal must have the necessary authority to operate and possess valid permits for conducting such operations.

The generator should determine whether the contractor under consideration can exercise the required control over materials and disposal facilities during the life of the contract Matters involving waste materials segregation, maintenance of records and respective obligations as well as generator responsibilities for pretreatment and pick-up should be resolved before contracts are finalized.

## *GENERATOR — CONTRACTOR RELATIONSHIPS*

Variations in the nature of the waste materials may not be significant from load to load, requiring only cursory inspection and occasional sampling and routine confirming analysis as adequate for control. If a change in characteristics is critical to proper handling and disposal, representative sampling and complete analysis may be necessary on a load-by-load or day-by-day basis. Mixed loads of waste materials present special problems for the generator and the contractor to mutually recognize and cooperatively resolve Inadequately characterized waste materials can result in serious problems for both parties. Normally, the contractor cannot be responsible for identifying the wastes generated, and the generator does not have control of the waste handling and disposal practices of the contractor The integrity of both parties must be maintained

Monitoring contractor performance is essential to assure safe handling and disposal and to satisfy social, and regulatory obligations of both the generator and contractor. Arrangements to observe periodically his materials handling equipment and methods, and the ultimate disposal facilities should be established at the time the contractual arrangement is developed. Follow-up on the status of authority to transport and permits to operate should be routine. It is important that the contractor's activities remain in compliance with all applicable law, regulations and permit conditions; and that the generator be fully aware of changing requirements and the contractor's ability to continue to operate in compliance

Monitoring is particularly important when more restrictive regulations are being promulgated; when contract termination is approaching; in cases where permit authority is transferred to another party, or when title to materials does not pass from the generator.

# APPENDIX

## WASTE CHARACTERIZATION CHECK LIST

**I. Basic Physical State (Check one)**

1) Solid
   (a) Granular
   (b) Particle size
2) Liquid & Slurry,
3) Gas;
4) Sludge;
5) Tar,
6) Containerized;

**II. Physical and Chemical Characteristics**

1) Solidification range _____°F to _____°F
2) Density or specific gravity . . . _____(Suitable units)
3) Moisture . . _____% by weight
4) Freezing point . . . . . _____°F
5) Boiling point . . . . _____°F
6) Thixotropic . . . . . Yes___ No___
7) Stability
   a) Decomposes anerobically .. Yes___ No___
   b) Dries readily (dewatered) Yes___ No___
   c) Sets up or hardens, irreversibly .. Yes___ No___
8) Heat Value . . . . . . . . _____B.t.u /lb.

**III. Flow Properties**

1) Viscosity . . . . . . . . (Suitable units)
2) Settles . . . . Yes___ No___
3) Pumpable . . Yes___ No___
4) Separates into phases .. Yes___ No___
5) Compressibility . .. Yes___ No___

**IV. Storage Practices**

1) Heated . . Yes___ No___
2) Agitated . . . Yes___ No___
3) Gas-blanketed . Yes___ No___
4) Water-blanketed . . . Yes___ No___

**V. Flammability**

1) Flash point . . . . . . . . _____°F
2) Auto-ignition . . . . . . Yes___ No___
3) Self-supporting .. Yes___ No___
4) Reactive . . . . . . Yes___ No___

**VI. General Chemical Form**

1) Organic . . . . . Yes___ No___
2) Inorganic .. Yes___ No___
3) Halogenated . Yes___ No___
4) Alkaline . Yes___ No___
5) Acidic . . . . . . Yes___ No___
6) Radioactive . . . . . . Yes___ No___
7) Noncombustibles and Metallic Compounds .. Yes___ No___
8) Ash _____% by weight
   _____fusion temperature

**VII. Chemical Elements**

1) Carbon ______
2) Hydrogen ______
3) Nitrogen ______
4) Oxygen ______
5) Sulfur ______
6) Halogens ______
7) Significant amounts of heavy metals ______

**VIII. Toxicity**

1) Skin irritant Yes___ No___
2) Eye irritant Yes___ No___
3) Sensitizer Yes___ No___
4) Inhalation hazard Yes___ No___
5) Ingestion hazard Yes___ No___
6) Skin adsorption Yes___ No___

**IX. Environmental Pollution Potential**

1) Air
   a) Odor Yes___ No___
   b) Particulate matter Yes___ No___
   c) Photochemical reactivity Yes___ No___
   d) Vaporizes Yes___ No___
2) Water
   a) Biodegradable Yes___ No___
   b) Ground water leaching Yes___ No___
   c) Surface water runoff Yes___ No___
   d) Soluble Yes___ No___
3) Heavy metals present Yes___ No___

**X. Explosiveness**

1) Explosive limits
   a) Vapor
      From _____% LEL to _____% UEL
   b) Dust ______ox/ft³
2) Strong oxidant Yes___ No___
3) Shock-sensitive Yes___ No___
4) Exothermic reaction Yes___ No___

**XI. Miscellaneous**

1) Volume for disposal
2) Frequency of disposal
3) Containerized
   a) Size of container
4) Special handling
   a) Label ______
   b) Transporting ______
   c) Solidifies while transported ______
   d) Disposal site ______

TECHNICAL GUIDE

# SW-3

# A Guide for Incineration of Chemical Plant Wastes

Adopted 1974

MCA MANUFACTURING CHEMISTS ASSOCIATION
1825 CONNECTICUT AVENUE, N. W. WASHINGTON, D. C. 20009

# TECHNICAL GUIDE **SW-3**

## A GUIDE FOR INCINERATION OF CHEMICAL PLANT WASTES

The increasing restrictiveness of both national and local regulations governing solid waste disposal has made it essential for producers of chemical products to:

1. Select equipment and processes for the incineration of certain chemical wastes that will assure compliance with all government regulations.
2. Provide guides for safe handling and proper disposal of their products.

Prepared by the MCA Solid Wastes Management Committee this paper is intended as a general guide in the selection, design and operation of incinerating and needed auxiliary equipment to aid manufacturers in fulfilling environmental responsibilities. The guide cannot obviate any real need for professional assistance.

## INTRODUCTION

Incineration is one controlled combustion process used in the ultimate disposal of unusable organic wastes resulting from chemical manufacture. Residues of these wastes, which become less toxic, less hazardous and greatly reduced in volume as a result of incineration, must usually be disposed of in a landfill. When handled in this way, the residues have a minimum impact on the environment. Pyrolysis, which is thermal decomposition in an essentially oxygen-free environment, breaks down organic wastes into by-products having further use or value; consequently pyrolysis is not an ultimate disposal process and is not considered in this discussion.

It is essential to select carefully equipment and processes for the incineration of chemical wastes to ensure that the basic obligations of safe handling and proper ultimate disposal are met in a satisfactory manner. In addition to fulfilling social obligations, an effective system should satisfy regulatory needs with minimum adverse community reaction.

Beginning with the essentials for characterizing waste for preliminary determinations on the feasibility and manner of its incineration, this guide suggests available choices of laboratory needs and equipment for establishing feasibility on a pilot scale and for controlling subsequent operation. Choice of the appropriate incinerating equipment must be made from a broad range of equipment commercially available but often built to specification. The descriptions herein indicate their variety and some of their capabilities. Featured also is a selection of highly specialized air pollution control equipment often required as auxiliary to incineration. No attempt is made in this guide to cope with residues left over after incineration, most of which should be appropriate for landfill disposal.

## I. WASTE CHARACTERIZATION

### A. WASTE DESIGNATION

Waste designation is a preliminary grouping of similar waste materials according to their physical and chemical properties to facilitate their transportation, handling, blending, storage and disposal.

Waste designation has application to both design and operation of an incineration facility. Designation may occur in rather broad generic terms, such as spent caustic, water-treatment sludge, or scrap PVC. Since it is imperative that all parties concerned with generation and disposal of wastes thoroughly understand, each designation must be made simple and fully descriptive.

Each chemical plant should develop a list of clearly defined wastes for designation. This list can be updated from time to time as needed, but alterations should be made formally and with the knowledge of all concerned. Once the list has been established it becomes the responsibility of the supplier of the waste material to see that each container of waste material is properly identified before incineration. *No material should be accepted for incineration which has not been designated or which has a designation that does not appear on the approved listing*

Generally, the designation and the definitions on the designation list should suffice, but on occasion the operator may need additional information.

## B. PHYSICAL PROPERTIES

1. **State—**

To further define the handling characteristics of the material one must know with precision in what state it will be received as, for example.

| | |
|---|---|
| a. Solids | Dry material in powder, granular, pelletized, or bulk form. |
| b. Liquids or slurries | Materials suitable for pumping. |
| c. Gases | Materials in a gaseous state at ambient conditions |
| d Semi-solids | Wet solids capable of being handled as solids. |
| e. Containerized | Materials which must be handled in a container, such as a steel drum, cardboard box, etc |

2. **Density and/or Specific Gravity—as received.**

3. **Viscosity—At an agreed upon temperature and by a specific method.**

4. **Solids, % by volume and weight.**

5. **Particle Size.**

6. **Flash point, °F.**

7. **Moisture, % by weight.**

Indicate if present as a second phase and to what extent.

8. **Melting point or melting point range, °F.**

## C. CHEMICAL PROPERTIES

The listing of all chemical properties pertinent to an incineration process potentially could be extensive Since laboratory analyses can be costly and time consuming, careful selection of the wastes and parameters for analysis is essential. Full utilization should be made of available information in determining those analyses that are needed to describe fully the chemical properties of the materials in question. Some of the more common parameters are listed below.

1 **Gross Heat of Combustion, B.t.u./lb. on an "as received" basis.**

2 **Ash, ... % by weight**

Ash characteristics such as fusion point and composition should be determined if the quantity of waste is significant.

3. **Ultimate analysis**

This analysis may be calculated in whole or in part through knowledge of the chemical composition of the waste

| | |
|---|---|
| a Carbon<br>b Hydrogen<br>c Nitrogen<br>d. Oxygen | Needed for flue gas composition calculation |
| e. Sulfur<br>f. Halogens | Needed to determine air pollutants. May determine the need for secondary equipment such as scrubbers, in addition to determining corrosivity |

4. **Acidity or alkalinity**

5. **Noncombustibles and metallic compounds**

A complete scan of metals present is desirable due to the variety of responses that can be obtained in an incineration process, such as:

a. Particulates of submicron diameter from volatile salts and oxides (Sodium, Phosphorus, etc )

b. Low ash fusion temperature (Sodium, Iron, etc.)

c Refractory attack (Sodium, Lead, Vanadium, etc.)

d Toxic products in effluents (Mercury, Arsenic, etc.)

6. **Exposure hazards**
   a. Vapor exposure
   b. Liquid contact
   c. Suspended dust

7. **Chemical reactivity—Particularly pertinent where wastes may be blended**
   a. With water
   b. With other organics
   c. Polymerization potential

8. **Special characteristics or hazards**
   a. Fuming
   b. Odor
   c. Thermal stability
   d. Pyrophoric properties
   e. Shock sensitivity
   f. Chemical stability

# II. LABORATORY AND BENCH SCALE EQUIPMENT

## A. LABORATORY REQUIREMENTS FOR ANALYSES OF CHEMICAL WASTES

Analytical data should be made available for all wastes to be incinerated. The physical and chemical properties and the combustion characteristics of each chemical waste or general classification of wastes, should be determined before incineration. Only after such analysis can successful waste disposal be carried out safely and without violation of air or water pollution regulations as set forth by state and federal agencies.

A minimum but complete laboratory facility would require a working area, including office facilities, of about 2,400 sq. ft Provision must be made for air, water, gas, and electricity, preferably both AC and DC The laboratory furniture must include benches, sinks, fume hood, shelving, glassware racks and a refrigerator. Good lighting and air-conditioning are also important.

## B. LABORATORY EQUIPMENT FOR CHEMICAL WASTES ANALYSES NEEDED FOR CHARACTERIZATION

Identification of laboratory equipment needed for analyses of chemical wastes follows. Specific requirements depend on the types of wastes to be processed and the type of incinerator. If the equipment for sophisticated analytical methods is not available in house, the analyses can be performed economically by commercial analytical laboratories.

1. **Typical laboratory equipment to determine physical properties.**
   a. Specific gravity balance—specific gravity of liquids.
   b. Brookfield viscosimeter—viscosity measurement of liquids and sludges.
   c. Imhoff cones and centrifuge with graduated tubes—measurement of percent solids by volume.
   d. Sieving machine for screen analysis (to 100 micron) and HIAC particle counter (100-5 micron)—particle size measurement.
   e. Cleveland open cup flash point tester—flash and fire point determinations.
   f. Oven and balances—percent solids and moisture by weight.
   g Gas chromatograph—mass spectrometry and infrared apparatus to identify organic substances which may be toxic.
   h. Differential thermal analyzer—explosion characteristics and fusion temperature.
   i. Juno meter or equivalent—sensitive to alpha, beta and gamma rays for radioactivity.

2. **Laboratory equipment to determine chemical properties.**
   a. Muffle furnace, oven, balances—for percent ash by weight.
   b. Orsat, x-ray techniques for flue gas analyses to provide data for excess air calculations.
   c. pH meter and automatic titrator—acidity and alkalinity measurement.
   d. Emission spectrograph for concentration and presence of metals.

e. Atomic absorption spectrograph for concentration of metals.

f. Optical microscope for particulate characterization down to the sub-micron size. Electron microscope may be required for some sub-micron determinations.

3. **Laboratory equipment to determine combustion properties.**

a. Calorimeter for heating value and combustibility.

b. Orsat (previously listed) for $CO_2$, CO, $O_2$, $H_2$ and $N_2$ analysis.

c. Flue gas analyzer (previously listed) for analysis at various excess air rates.

d. Mass spectrometer (previously listed) for hazardous products of combustion

C. **BENCH SCALE EQUIPMENT**

Reliable bench scale chemical incineration equipment is generally unavailable. The present practice appears to follow the line of waste characterization, physical, chemical and combustibility analysis followed by a test burn in pilot or plant scale equipment.

D. **CHEMICAL WASTES "TEST BURN"**

Following the physical/chemical/combustion analysis, it is extremely important that a "test burn" be run on a particular waste or type of waste to review the combustion products, flue gas analysis, emission particulate size, excess air requirements, and flammability rate. These "test burns" are most valid when conducted in plant scale equipment of the type proposed for the incineration of the particular chemical waste or wastes in question.

# III. INCINERATION EQUIPMENT

A. Incineration is often the most desirable method of treating the waste or by-products of a chemical process as this method has a minimum impact upon the environment. The incinerators available for this service are generally more specialized than those used in municipal or general refuse service. Different types of chemical plant refuse, such as combustible types of packaging materials, plastic film and foam, polymers, and fibers may be handled in a municipal type incineration operation under certain circumstances Various parameters, such as environmental impact, degree of halogenation, gross weight and physical form must be discussed in detail with the municipal authorities before any material is sent for disposal. Many chemical plant wastes, however, fall into the category of hazardous materials and require handling, incineration, and gas cleaning equipment specifically suited to the materials to be handled.

The following is a list of incinerator types and and factors which are important in their selection and performance. The outline is general as each specific application should be considered individually taking into account unique design and engineering problems. Incinerators can be classified into certain categories:

AA. **INCINERATOR TYPES**

1. **Fixed bed incinerators**

a. Open pit burning or incineration (unacceptable under many air pollution codes).

b. Closed chamber burning.

i. Single chamber.

ii. Multiple chambers.

c. Tray furnace incinerators.

2. **Moving bed incinerators**

a. Rotary tube or kiln.

b. Fluid bed.

c. Moving grate.

d. Rotary hearth.

e. Rotating rabble arms.

AB. **CAPACITY OF CHEMICAL INCINERATORS**

The capacity and ability of the chemical incinerators to handle specific chemical wastes will depend upon the following factors:

1. **Size of unit selected, B.t.u./hr. input**

a. Turndown ratio (maximum to minimum operating range).

b. Operating temperatures.

c. Retention time.

d. Physical size of charge.

2. **Physical form of feed**
   a. Liquid
      i. viscosity.
      ii. temperature.
   b. Solids
      i. powdered or granular.
      ii. bulk.
   c. Semi-solids.
   d. Gases.

3. **Method of feeding to combustion zone**
   a. Batch
      i. open charging.
      ii. air lock feeders
   b. Continuous.

4 **Combustion properties of materials being incinerated**
   a. Heat value, B.t.u./lb. as processed
   b. Rate of combustion.
   c. Combustion air requirements.
   d. Supplemental fuel requirement.
   e. Chemical stability and/or shock sensitivity.

B. Several types of incinerators which appear to have the greatest application in industrial wastes are described in the following section. The listing is not intended to be comprehensive; it is merely representative of the major types available.

1. **Solid Stationary Hearth (Solids Incineration)**
   a. *Uses and Advantages*
      i. Low capital.
      ii. Potential of tight air control with an airlock feeder.
      iii. Can be designed to include liquid incineration.
   b. *Limitations and Disadvantages*
      i. No turbulence, mixing or aeration.
      ii. Slow burning rates.
      iii. Batch operation.
      iv. Manual ash removal.
      v. Does not lend itself to good air pollution control.

Since refuse, charged onto a solid hearth, tends to accumulate in a pile and burn only on the surface, complete combustion is difficult to achieve. To assure complete combustion, industrial solid wastes normally require constant agitation to allow oxygen to reach all areas. Manual agitation is likely to be tedious and may be unsafe.

Ash removal from the solid stationary hearth is usually a hand batch operation This is often unsafe and disrupts any attempt toward smooth operation of either the combustion operation or pollution control

The combustion chamber must be properly sized to allow flame space for complete combustion, refractory protection, and adequate temperature control over the desired feed range Proper design of the air pollution control system, fuel controls, and air controls can improve the operating turndown ratio

2. **Solid Hearth (Rotary Hearth or Rotating Rabble Arms)**

Principles and applications of both the solid rotary hearth with fixed rabble arms and the fixed circular hearth with rotating rabble arms are very similar.

   a. *Uses and Advantages*
      i. Continuous ash discharge.
      ii. Capable of incinerating waste solids independently or liquids and solids in combination.
      iii. Widest practical turn down ratio. (Maximum to minimum operating range )
      iv. Incinerating materials will not fall through hearth.
      v. Adaptable for use with a gas scrubbing system.
   b. *Limitations and Disadvantages*
      i Rabble arms or plows are susceptible to damage.
      ii. Limited turbulence and air contact.
      iii. Partly combusted materials may flow out ash discharge.

iv. Solid wastes fed at intervals. An air lock system should be used to improve combustion characteristics and control.

v. Arched, self-supported multiple hearths of refractories are vulnerable to abrupt temperature variations with resultant downtime and cost increases

While incinerating solids, the rotary hearth can incinerate essentially any liquid waste capable of being fed to a stationary liquid tar burner. The combustion chamber must be properly sized to permit complete combustion, minimize flame impingement on refractories, and provide adequate temperature control over the desired feed range. Liquid burners are normally positioned to aid combustion of solid wastes. An adequate supply of solids on the hearth is needed for flame impingement protection. Protection of the rabble arms must also be considered

No air for combustion or turbulence passes up through the bottom hearth. All air must be supplied from above or through the rabble arm plows Even with the use of rabble arms, turbulence and air contact is limited The burning rate may range from 8 to 15 pounds per square foot per hour depending on the solids being incinerated.

Rabble arms are normally air cooled to protect them from heat damage and help supply some of the combustion air requirements Rabble arms require continuous maintenance and need periodic repair or replacement. The solid refuse must, therefore, be free of large heavy items such as metal drums or metal rings, which would damage the rabble arms

Rotary hearths are commonly used to incinerate sludges and granular material These materials will not fall through the hearth as they would through a grating If the heated solids melt some material may flow through the center discharge before it is completely incinerated.

The stationary hearth with rotating rabble arms may be built with multiple hearths to provide more capacity, residence time, and complete combustion An advantage of the rotating hearth with a ram feed is that this device will allow solids to move away from the feed area and partly burn before contacting the rabble arms. Stationary rabble arms can be of simpler, stronger design, thus, the cost, time, and frequency of maintenance are reduced.

In some specialized applications, such as tire destruction, the rotary hearth is used without rabble arms.

3. **Grate Hearth**

a. *Uses and Advantages*

i. Provides under fire air to aid combustion.

ii. Allows ash removal through grating

iii. Can be designed to forward solids through the incineration system.

iv Does not require extensive waste preparation, i.e. shredding.

b. *Limitations and Disadvantages*

i. Limited turbulence for air contact.

ii. Solids may fall through grating before complete burn out.

iii Plastics or melt phase materials may damage grates.

Traveling or reciprocating grates work well with raw municipal refuse. However, many industrial wastes tend to fall through the open gratings. Plastics and other industrial wastes which form a melt phase tend to flow through and around the grating. This can jam the grate drive mechanism or cause high temperature damage as the wastes burn directly on the grates

In this equipment, solid wastes are not tumbled violently and may burn only on the surface With many industrial solids, complete combustion may not be achieved

The high temperatures and abrasive action on the moving grate increase maintenance costs. Drive mechanisms and grates require periodic repair or replacement.

4. **Rotary Kiln**

a. *Uses and Advantages*

i. Will incinerate a wide variety of liquid and solid wastes.

ii Capable of receiving liquids and solids independently or in combination.

iii. Not hampered by materials passing through a melt phase

iv. Feed capability for drums and bulk containers.

v. Wide flexibility in feed mechanism design.

vi. Provides high turbulence and air exposure of solid wastes.

vii. Long inventory time for slow burning refuse.

viii. Continuous ash discharge.

ix. No moving parts within the kiln.

x. Adaptable for use with a wet gas scrubbing system.

b. *Limitations and Disadvantages*

i. High capital cost installation for low feed rates.

ii. Cannot utilize suspended brick in kiln.

iii. Operating care necessary to prevent refractory damage.

iv. Airborne particles may be carried out of kiln before complete combustion.

v. Spherical or cylindrical items may roll through kiln before complete combustion.

vi. Kiln incinerators frequently require excess air intake to operate due to air leakage into the kiln via the kiln end seals and feed chute, which lowers fuel efficiency.

vii. Drying or ignition grates, if used prior to the rotary kiln, can cause problems with plastics melt plugging grates and grate mechanisms.

The rotary kiln provides the design flexibility for incineration of a wide variety of liquid and solid industrial wastes. Any burnable liquid capable of being atomized by steam or air through a burner nozzle can be incinerated concurrently with a wide range of industrial solids. Heavy tars may be fed as solid waste in packs or metal drums. The kiln can be designed to receive 55-gallon drums, or a feed mechanism can be designed to empty the drum and retain it. It is also capable of handling pallets, plastics, filter cakes, and other solid chemicals passing through a liquid phase before combustion.

The rotary kiln provides a maximum amount of turbulence, agitation, and surface air contact to achieve complete burnout. Complete combustion of slow burning refuse is aided by a relatively long inventory time in the combustion chamber. Ash discharge is continuous. Roll through of spherical or cylindrical items would normally be prevented by the other solid refuse being incinerated. Normal kiln operation would not be expected to incinerate such items as metal drums.

However, a metal drum may be melted or deformed, depending primarily upon its contents and the ash conveyor system must be designed to remove such items.

Since the drive mechanism is outside the kiln, maintenance is low. There are no internal moving parts such as rabble arms, grates, or plows.

Care must be exercised in determining kiln size to provide for adequate accommodation of solid wastes and maximize refractory life. As the kiln size decreases, the unit becomes increasingly sensitive to excessive heat release and temperature control becomes more difficult.

The rotary kiln is a high capital installation and would not be considered practical for very low feed rates. Practical sizes are limited. At a minimum, sufficient capacity must be provided to accommodate the feed packages such as drums or packs and prevent flame impingement on the refractory when liquid wastes are incinerated. The maximum size is determined by turndown problems, operating costs, maintenance of a proper combustion temperature, and construction-fabrication costs. Turndown, the ratio of maximum to minimum thermal capability, represents a problem due to leakage of air through the system.

Since the rotary motion of the kiln precludes the use of suspended brick, the refractory is more susceptible to thermal shock damage. For this reason, continuous operation should be maintained as much as possible. Rebricking of the hottest part of the kiln can be anticipated on roughly an annual basis. Therefore, it is often advisable to maintain an inventory of kiln refractory and refractory for multiple hearth furnaces in protected storage.

Airborne particles may be carried out of the kiln before complete combustion. A high-temperature secondary combustion chamber with intimate flame contact is normally required for complete burn-out. The fuel for the secondary combustion chamber should be dependable high quality waste liquid or commercial fuel.

5. **Fluid Bed**

a. *Uses and Advantages*

i. Capable of incinerating a moderate range of liquid and solid wastes.

ii. Rapid heat transfer from gas to solid.

iii. High combustion rate. High turbulence and air exposure.

iv. Low excess air requirement.

v. Large heat sink to smooth out fluctuations in feed rate or fuel value.

b. *Limitations and Disadvantages*

i. Requires fluid bed preparation and maintenance.

ii. Feed selection must avoid bed damage.

iii. May require special operating procedures to avoid bed damage.

iv. Incineration temperatures limited to a maximum of about 1500°F.

Fluid bed incinerators may be designed to expose wastes to a hot fluid bed several feet deep with high turbulence and good air contact for rapid complete combustion Burn out may be accomplished with as low as 20 percent excess air, which will provide operating economy because of low power requirements, less air to heat and flue gas to clean.

Fluid bed incineration appears most advantageous when the bed can be formed as a natural product of the refuse being incinerated, especially if the refuse has a high ash content; otherwise the bed must be frequently replaced. Low ash, highly volatile compounds such as wet coffee grounds appear to have good incineration application.

Fluid bed particles may be temperature and composition sensitive. Eutectic mixtures may be formed which will destroy the bed fluidization. Some beds may be very susceptible to caking during shutdown.

6. **Stationary Liquid Waste Burner**

a. *Uses and Advantages*

i. Capable of incinerating a wide range of liquid wastes.

ii. May use suspended brick.

iii. No continuous ash removal system required other than air pollution controls.

b. *Limitations and Disadvantages*

i. Must be able to atomize tars or liquids through a burner nozzle except for certain limited applications

ii. Heat content of liquids must maintain adequate temperatures or a supplemental fuel must be provided.

iii Must provide for complete combustion and prevent flame impingement on refractory.

A wide range of industrial liquid wastes may be incinerated provided the heating value is sufficient to maintain temperature for complete combustion. When a low-heat-value liquid is incinerated, it must be blended with a liquid of higher heat value or auxiliary fuel will be required. The tar must be atomized through a burner nozzle by air, steam, or mechanical means. However, mechanical atomization is normally avoided because of the high pressure requirement and the wide range of liquid viscosities.

Since there are no moving sections, suspended, air-tempered brick may be utilized. This may contribute to longer life and lower maintenance.

The ash is essentially all gas-borne particles. Ash will normally be removed by an appropriate air pollution control system. Because a certain amount of particulate will drop out within the incinerator, occasional shutdown and cleanout is necessary. Depending on the tar burned, cleanout may be required at about six-month intervals.

# IV. AIR POLLUTION CONTROL EQUIPMENT

A. The pollution control equipment used in conjunction with the various basic types of chemical incinerators, or one of their many variations, can be classified by type. Again, specific selection is dependent upon individual requirements and represents a unique design and engineering problem.

The four major factors in the selection of control equipment are particulate loading and size distribution, volume and temperature of gas to be handled, solubility of flue gas contaminants in water or scrubbing fluid, and emission specifications established by the regulatory agencies.

Much of the air pollution control equipment available is effective for removing only large particulate matter; that is, particles greater than several microns in diameter. Emissions from chemical waste incineration are almost exclusively in the submicron size range, many smaller than 0.1 microns

Control of such emissions, to meet air pollution codes, requires the use of high efficiency collection devices. The various types of available pollution control equipment are listed by criteria of particle size capture ability.

AA. **AIR POLLUTION CONTROL EQUIPMENT**

1. **Afterburners**
   a. Flue gas combustibles
      i. Carbon particulates.
      ii. Organic particulates.
   b. Flue gas deodorizing
      i. Mercaptans.
      ii Odors from low temperature exit gases following a low energy water scrubber.
2. **Low efficiency collection, greater than 10-20 microns size range.**
   a. Mechanical cyclones, inertial separators.
   b. Low pressure drop wet scrubbers.
      i. Impingement baffles.
      ii. Spray chambers.
      iii. Packed bed.
      iv. Sieve tray.
3. **High efficiency collection from 5 microns to less than 0.1 microns size range.**
   a. Electrostatic precipitators
      i. Dry type.
         aa. No capability for removing acid gas from halogenated wastes in single stage form.
      ii. Wet types.
         aa. Use in moderately corrosive service with alkaline flushing water
         ab. Requires corrosion resistant material of construction.
         ac. Requires pollution control of scrubber blowdown or discharge
   b. High energy venturi scrubbers
      i. Removes water soluble acid gases.
      ii. Can be fabricated of corrosion resistant materials.
      iii Particulate removal efficiency, particle size can be varied to suit from 0 1 to 5 microns depending inversely upon energy input (pressure drops of 60″—10″ water gauge.)
      iv. Most commonly used high efficiency air pollution control system on incinerators.
      v. Requires pollution control of scrubber blowdown or discharge.
   c. Fabric filters
      i. High particulate collection efficiency.
      ii. Low temperatures required, 300-400°F maximum.
      iii. Ineffective on gaseous pollutants.
      iv. Requires dry inlet gas to filter.
      v. Sensitive to corrosive environments.

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MR. LEHMAN: Thank you Mr. Bridge. Are there any questions?

Perhaps for the benefit of the audience those of you who were not here this morning, we accept questions from the audience, all you have to do is raise your hand and one of our staff will provide you with a 3 by 5 card upon which you can raise your question.

But before we go into questions I have an urgent message for Dean Gray. That will be up at the front of the desk.

Now, Mr. Kovalick.

MR. KOVALICK: Mr. Bridge, could I refer to the closing part of your statement where you mentioned the placarding or labeling of waste shipments which I recall are Title 46 and 49 and part of the Department of Transportation regulations, so you're saying that labeling and placarding of containers and that all are sufficient within the context of DOT.

I am wondering how you compare that statement with your other one, that generators should adequately describe the waste so that the treater/disposers are aware of the properties. At least our understanding of DOT regs, and we had some comments in Newark, that it's not sufficient information on the label, that is a label that just says corrosive or a label that just says flammable--it's not enough to meet the needs of the treater or the disposer of the waste.

And you are talking about the person who has to transport it.

MR. BRIDGE: Yes, there's a difference there, and I'll refer you to our MCA guide on waste disposal, which covers the subject very adequately. Because we are really concerned about the medium in which you are trying to relay that information.

MR. KOVALICK: Would you submit that to us please?

MR. BRIDGE: Yes, I have already submitted it.

MR. KOVALICK: Oh, it's one of these three things, all right.

Thank you.

Now the other question I have had to do with referring to Mr. Eby's comments this morning, and you seem to be advocating the same type of system. That is the generator is very responsible at the beginning of the cycle, and that the transporter is responsible and is well licensed, in his work, and the treater is also licensed or at least controlled in their work.

I still don't understand how waste is permitted from not going to one of the proper places and going to an improper place, as you seem to be saying with the current regulatory approaches as sufficient. What is to prevent waste from a responsible manufacturer, to make it different from perhaps less than a responsible transporter, and ending up at less than a responsible disposal site?

MR. BRIDGE: I think there is a bit of misunderstanding of my remarks. We are saying as far as the generation or transportation and handling of these types of wastes are conserved, we were worried about the actual physical type of transportation, and we feel there are sufficient regulations.

Now as far as the ultimate disposal of the material, MCA does share some concern but there are some areas here that do need attention. How this can be accomplished -- there are probably several ways with the permit system.

The permit system is one way that has been mentioned to accomplish this thing, but in the past the MCA position on this was we wanted an actual disposal site permit.

MR. KOVALICK: Perhaps I'm not making my point well enough. What is to prevent the waste from not reaching a licensed permit disposal site, or reaching the kind of farmer's land you heard about this morning?

An unregulated site like that. If you have some suggestions to prevent that, that's what I'm interested in.

MR. BRIDGE: I don't know that I can answer that question.

As you well know, waste can be transferred to a very reputable individual but for one reason or another it might not reach the desired destination.

MR. LEHMAN: Are there any other questions? Mr. Lazar.

MR. LAZAR: Mr. Bridge, your MCA's recommended definition of hazardous waste I see is restricted to land disposal. Wouldn't you say though that incineration of a toxic waste like dioxin as we heard before could also cause a problem and therefore should also be called hazardous as a waste which could be disposed of by other means.

MR. BRIDGE: Sir, I think that your comment takes us back to the MCA position as far as hazardous waste is concerned. Not only in the characteristics and material of the waste itself, but we are concerned primarily with the ultimate disposal.

We would be concerned with the residues of the operation, and their disposal to the land.

MR. LAZAR: But you would not call a waste hazardous, I mean before it becomes a residue, if it is a waste which is destined for an incinerator, that you would not define as hazardous waste?

MR. BRIDGE: I would not define it -- this gets us back into semantics. And this goes across a wide band of the environment. I would term that waste as hazardous as any type of waste you might consider for incineration, landfill or what have you.

That waste remains potentially hazardous and hopefully going into the incineration process it will lose the characteristics that make it potentially hazardous. And you have essentially an inert residue to fill.

MR. LEHMAN: Do you have any other questions? Evidently not. Thank you very much Mr. Bridge.

Next I would like to call Mr. Pat Born, Minnesota Pollution Control Agency. Mr. Born.

MR. PAT BORN: Thank you Mr. Lehman.

My name is Patrick Born, I'm with the solid waste division of the Minnesota Pollution Control Agency.

We like the Illinois Environmental Protection Agency are the principal state environmental advocate.

Over the course of the past several years, the Minnesota Pollution Control Agency in coordination with the County units of government has been developing a program to manage the state's hazardous wastes.

The question with which we are confronted is not whether a hazardous waste problem exists but rather how best to manage the problem that we know exists.

As technology and government regulatory programs are implemented the removal of pollution from the air and water discharges will increase at an accelerated rate. One result is that the pollutants will become concentrated in solid or semi-solid form.

Disposal of these residues is adding a new dimension to the management of industrial hazardous wastes.

Perhaps the most important question which is being asked of us today is how best can we manage this nation's hazardous wastes. We in Minnesota have enabling legislation to manage the identification, labeling, classification, storage, transportation, treatment and disposal of hazardous wastes.

Federal legislation and control is needed also. The best combination being the establishment of Federal standards with the states acting as the implementing body.

We in Minnesota feel Federal standards

should be prepared to address the following concerns.

Number one, development of national identification and classification standards to uniformly determine what constitutes a hazardous waste.

Number two, governmental incentives to encourage private industry to expand, improve and construct new hazardous waste processing facilities.

Number three, the government -- development of a national standard for the transportation of hazardous wastes.

And number four, development of national directives for state implementation of hazardous waste control programs which will monitor hazardous waste from a point of generation to the point of final processing and disposal.

Staff of the Minnesota Pollution Control Agency offer the following recommendations on these concerns.

Number one, development of national identification and classification standards to uniformly determine what constitutes a hazardous waste.

The United States Environmental Protection Agency should develop a national identification standard for hazardous waste materials. This standard should be in the form of a decision model as opposed to a list of hazardous waste materials.

The advantages of a decision model standard are the following. (A) administrative procedures are less burdensome, (B) a decision model allows flexibility to address new wastes, (C) a decision model is more defensible on a rational basis, and (D) recognizes that no wastes are alike.

A Federal standardized decision model would confront the problem of establishing defensible threshhold limits and reviewing wastes as complex mixtures of chemicals. Any standard should allow individual states to develop more restrictive standards to address the unique conditions in their respective states.

There may also be a need for the U.S. Environmental Protection Agency to address performance standards which must be met by various chemical treatment or disposal methods.

Number two, governmental incentives

to encourage private industry to expand, improve and construct new hazardous waste processing facilities.

A variety of methods to dispose of hazardous wastes are available. Recovery or reclamation of valuable components of the waste should be the disposal method first assessed.

Not all hazardous wastes are compatible with recycling methods however. A secondary method of disposal is incineration, and is one for which there is considerable need for further study.

The final method of disposal to be considered is that of land disposal. Land disposal of hazardous wastes should be conceptualized as long term storage with zero discharge to the surrounding environment.

And hazardous wastes which are land disposed may prove to be valuable future resources.

There are not enough existing facilities to treat or dispose of hazardous wastes. For those existing facilities relatively few are in full compliance with all pollution control standards.

It is essential that the Federal government in its review of hazardous waste management programs identify methods of helping the existing hazardous waste industry to expand and improve its facilities.

The following problems for private industry in the area of hazardous waste seem to be most prevalent.

Number one, high capital costs with relatively low rates of return being realized.

(B) difficulty in obtaining financing.

(C) high interest rates.

(D) inequitable treatment of secondary materials industry.

(E) lack of proven technology in field operations.

(F) lack of effective control programs to direct hazardous wastes to suitable processing disposal facilities, which results in a high risk to the private disposal firms.

Number three, development of a national standard for the transportation of hazardous waste. A concern which is rapidly becoming serious is the interstate transport of hazardous wastes.

The Minnesota program requires a Minnesota generator to provide documentation to our agency that the state in which the waste is to be disposed has approved the acceptance of the waste by a state licensing facility.

The fact that interstate shipment of a waste is continuing to occur points out the need for interstate coordination and Federal involvement.

Number four, development of national directives for state implementation of hazardous wastes control programs which monitor hazardous waste from a point of generation to the point of final processing.

The program must monitor the flow of wastes from the generator to proper disposal. The existence of hazardous waste disposal facilities does not insure proper hazardous waste management.

Without an effective control program economics clearly favor the midnight dumper.

A strong regulatory program is needed to insure the use of proper treatment and disposal facilities. The monitoring program in Minnesota will require reporting of wastes transactions between the generators, the transporters and the facilities handling the waste.

The monitoring program will require

a large amount of data processing, and subsequently financial support will be provided by licensing fees.

Existing Minnesota legislation places responsibility on the generator to provide for proper hazardous waste management. At the same time this legislation provides regulatory control of the storage, transportation, and treatment or disposal to insure that these processes are done in an environmentally acceptable manner.

The economic responsibility for environmental repair and clean up must be accepted by the generator, the transporter, the facility, or any combination of these individuals.

In obtaining a license from the county, the generator will be required to present documentation which indicates that its management practices are environmentally acceptable.

There is a need for a national uniformity of labeling and shipping papers for hazardous wastes. The existing Federal Department of Transportation Regulations present a workable labeling system. We would expect the labels to be modified to reflect the information needed by all parties involved with the handling of the waste.

In the area of labeling, one advantage is that the shipping departments of most industrial firms are already well versed with DOT regulations.

In conclusion, state and Federal agencies cannot look at the task of drafting control regulations without recognizing that other programs and elements must be implemented concurrently.

Among those elements most important are development of consistent nationwide standards of hazardous waste identification and classification. Establishment of incentives to encourage the expansion, improvement and construction of new hazardous waste processes, and disposal facilities.

Incentives could take the form of risk sharing by government, technical assistance and tax incentives, establishment of standards for interstate transportation of hazardous waste, and directives for establishment and implementation of state control programs, the purpose of which is to insure that the wastes are directed in a safe manner to acceptable disposal facilities.

Hazardous waste management is a national problem which must be addressed on a national basis. It needs a great deal of research and development to provide the best available technology for treatment and disposal.

It needs a strong regulatory program to make it work properly on both a national and state basis.

I appreciate the opportunity to be able to speak with you, and I will now entertain any questions that you may have.

MR. LEHMAN: Thank you Mr. Born. Are there any questions?

Mr. Kovalick.

MR. KOVALICK: I want to go back in your statement if I remember correctly, you made reference to the suggestion that there be national identification systems as suggested by the Federal government, and then the states would elaborate upon that system.

You made the point that I'm interested in, is that it would be possible for states to adopt more restrictive -- let's use those words -- than Federal standards and I would -- wonder if you would care to comment. I would seek that particular approach if Minnesota would to find and define hazardous waste as more loosely or more stringently than Wisconsin. Would you care to comment on that Mr. Born?

Would it be either more restrictive or less restrictive? As opposed to making it only that standard?

MR. BORN: Certainly the disparity that exists between states conceivably could contribute to a net waste flow between either state. My remarks were directed towards the need for establishing flexibility. And a definition or a classification and we realize that disparity undoubtedly will exist, due to the potential for enforcement at varying degrees.

And I think enforcement at varying degrees will probably be a greater factor than a difference of a technical leverage.

MR. KOVALICK: I have one other question. With regard to the system as I understand it contemplates managing the waste and knowing of its whereabouts from generation to storage and disposal, and Mr. Eby this morning from Monsanto commented on the huge paperwork burden that he could foresee under such a system.

I think of the charts that would have to be turned in to develop a system such as this and can you comment on the mounds of paper that you would receive or not be receiving?

MR. BORN: It certainly would be a burden. And to control the paperwork problem we are now investigating the possibility for electronic data processing of that material, in a centralized location to be the -- to be the centralized data collection point, utilizing a central piece of hardware or pieces of hardware. We do recognize that it will be great and we do recognize that to do it the way we requested it and require to do it, it's going to require computer processing and maybe that is the only way I can answer that question sir.

MR. LINDSEY: I have a question here from the floor. Why do you believe a decision model would be more effective than waste designation that defines variables.

MR. BORN: I believe my discussion of the decision model as opposed to a list that would be created, the experience of the State of California in this area, people with whom we have talked to in

California have indicated to us that a list -- I think this is the difference here -- that the list approach requires that you develop some kind of a decision model anyway, and that any time you want to revise that list I think you will have to go through a very long and involved hearing -- clearing process probably. And it will be very administratively time consuming and expensive to the state, and very burdensome.

The decision model approach to us is a more flexible means of accomplishing a definition than any other means that we have come up with, provided one can construct that decision model in a defensible rational basis. New information is always being put out on the toxicity and the hazardousness of various materials, and scientific evidence changes either for or against certain materials that we come in contact with.

If a material is put on a list or not put on a list and you have to at some time in the future have to either include or exclude it you are going to have to go through a very more involved process and we believe that the decision model will streamline the definition process involved in determining what is and what is not a hazardous waste.

MR. NEWTON: Mr. Born, earlier speakers have stated their belief that existing DOT controls were adequate, then in apparently contrast with this you have called for national standards for the transportation of hazardous wastes.

Could you be more precise in what you had in mind?

Or tell us about the inadequacies as you see them of DOT controls?

MR. BORN: I think what is meant by the inadequacies of the existing transportation system, is that the information that is required on the DOT labeling system is probably not sufficient for determining what's in the container.

And not sufficient from a point of the transporter himself in case he encounters a leakage or a spill problem, and probably not sufficient to determine for the disposer or the processer how to deal with that waste when it gets to this facility.

Perhaps the problem is not in regulating the labeling system.

MR. LINDSEY: Yes, I have a question from the floor. You stated that landfill should be considered long term storage. Should they be considered a sink instead? Why storage rather than disposal? That's what the question is really.

MR. BORN: In Minnesota we don't have the geological conditions that exist elsewhere in the United States, which are nice to have for a natural barrier to -- for movement of hazardous chemicals in the land.

As the potential exists for ground-water contamination is pointed out by Mr. Walker this morning. Our definition of disposal is really not leaving it there for perpetuity but storing it there for a long period of time if necessary, until the technology or the economics exist which is favorable for recovery.

I guess I'm not sure what is meant by a sink. Just leaving it there -- without any concern for future reclamation.

I think we believe that should be a part of any land disposal facility for hazardous wastes.

MR. NEWTON: Question from the floor.

Could you clarify the meaning of government providing incentives and how this fits with charging fees to support state monitoring costs?

MR. BORN: The incentives that I was speaking about were for the processing and disposal facilities.

The fees were with regard to generators. In Minnesota our mandated program charges county units of government with licensing generators of hazardous wastes.

And, to offset the administrative costs of carrying out and administering this licensing program of generators, it has been decided by the elected officials that they can charge fees to recoup their costs.

Perhaps there was a misunderstanding. If whoever asked that question would like to talk to me about it further, I'd be glad to clarify it, it seems to me there was a misunderstanding between the governmental incentives and the requirement of licensing fees.

MR. LEHMAN: We have n o other questions. Thank you very much Mr. Born.

MR. BORN: Thank you.

MR. LEHMAN: Mr. William Kitazaki of the Oconomowoc Electroplating Company.

Will you accept questions sir?

MR. KITAZAKI: Yes.

My name is William Kitazaki and I represent Oconomowoc Electroplating Company of Madison, Wisconsin.

Part of my purpose here, the general consensus with our company, that is, our group in the company, is the amount of toxic and hazardous waste material is far greater than what we suspected.

On February 13, 1963 a public hearing was held in the City Hall of Watertown, Wisconsin, from which an order was issued on January 31, 1964 by the committee of water pollution and state board of health.

The order was as follows:

"That the Oconomowoc Electroplating Company of Ashippun, complete construction of adequate industrial waste treatment facilities in accordance with approved plans not later than December 31, 1965."

Since then we have been actively attempting to treat our effluents through implementation of various systems. To date our total investment in pollution control equipment amounts to $470,300.

We were one of thirty-three companies and towns that were issued orders to provide adequate waste treatment facilities.

We know of one town for certain that has not stopped one ounce of pollution from going into its streams. I don't know what the other thirty-two have done, or thirty-one have done, and we'll research that in order to find out.

We recognize that our pollution control system is not 100 per cent effective but when we started to set up our system the available technology was rather slim, and in our opinion, remains rather meager today.

This fact did not and has not stopped us from trying to accomplish a goal of stopping pollution.

When we started our duty of stopping pollution we assumed that all electroplaters and other polluters were being served notification of the same restrictions and compliance dates.

We find to our surprise that other platers have different standards and different compliance dates. We find this rather odd in as much as pollution is a problem of accumulative effect on the environment and it makes no difference whether it be in a stream, lake or ocean.

And I think Jacque Costeau would bear that one out.

If P.O.T.W.'s are the cure all for our pollution problems then surely they must all be in compliance one hundred per cent of the time with far tighter standards than we have due to the dilution factor.

Strangely enough if a P.O.T.W. can be of some assistance in reducing pollution we have been specifically excluded from going through a proposed sewage system in our town.

This study was made by Robinson and Association of Brookfield, Wisconsin. It is difficult for us to imagine a P.O.T.W. operating 100 per cent of the time in compliance with tighter effluent standards unless the sewage system is totally unaffected by rainfall or other water run off.

We feel that it is the duty of each individual industry to pretreat their waste waters under the same guidelines as we are under.

We have been placed in a very non-competitive position due to our investments in pollution control when other platers have been able to use their moneys on new or more efficient production equipment. It appears that many of the squawkers against effluent standards have yet to lift a finger or invest a penny in a pollution control system.

Of course, if we were going into the Milwaukee sewage system we probably wouldn't say a word for fear that someone would notice we were dumping virtually raw effluent into the sewage system.

We do have definite ideas on effluent standards and well we should for we have at least attempted to meet the current standards. How does one argue with guidelines when they have had no experience in trying to meet them?

To give an idea of what some of the consequences are should we be forced to close our operations because of the costly investment of pollution control equipment, it would cost a total of about $1,100,000 in unemployment, loss of income, and we provide -- we're in a small community, and we provide gainful employment to these people.

At our current rate of sludge generation we estimate a total, although it's small, of 329,000 pounds a year. The latest costs for hauling sludge to a licensed site is ten to eleven and one half cents per gallon or a cost to us of approximately $3,800 a year.

This is a very minimum figure. There is only one licensed site in the State of Wisconsin of which we are aware and that is Waste Management of Wisconsin, Inc. in Menomonee Falls.

It becomes very obvious to us that the end solution for plating sludge is not to bury it but to find useful applications. Our educational institutions could certainly play a large part in getting closer to solutions if grants were available.

The reason why we feel that we are only looking at a part of the problem is that 10 million tons per year figure came from what is being generated currently. I would have to guess that there is a lot of soft solids that are going into lakes and streams, going through municipal systems where they have no regulations on solids, much less whether they're hazardous or not, certainly if what we see from a table in a publication of

Industrial Finisher's Magazine, which notes the only pretreatment required of people dumping into the sewer system in Milwaukee are one of pH and temperature.

Any time there is a rainfall I have to believe that raw sewage goes out into the lake. It's not as easy to see out there but nonetheless it's there.

And I believe the goal of the EPA is to stop a problem of pollution and protect our environment.

There are articles on trace elements where they have not found that they were particularly bad if they are spread over the land. And I refer to an article by M. B. Kirkham who is a plant physiologist at Advanced Waste Treatment Research Laboratory, EPA Cincinnati, which you have.

This kind of research I think is what we need in order to get us out of some of our dilemmas. I recognize that our particular wastes are different than anyone else's wastes.

But I think as we come up with some more of these answers the greater chance we have of not worrying about the landfill sites or the problems of polluting underground waters or getting some realistically way of using these things or maybe they have to be stored for a period of time, until we do come up with the research necessary.

It comes to mind that if Wisconsin ---- if we're correct in the research we have done in finding who is a licensed toxic and hazardous material dumping site, it seems very strange that with only one site there hasn't been more and more of a clamor for where do we dump this stuff.

If the sewer system of Milwaukee is just taking their stuff to a sanitary landfill they're accepting all pollutants from the electroplaters in the area, and they're dumping that same material into a sanitary landfill where as our material has to go to a toxic and hazardous material licensed site.

Something seems a little wrong and certainly if we are controling our toxic and hazardous materials and hauling them to licensed sites, I would think that we'd have a whole lot more than what we have in the State of Wisconsin.

Thank you for your attention, are there any questions?

MR. LEHMAN: Thank you Mr. Kitazaki.

We have a question. Mr. Lindsey.

MR. LINDSEY: You mentioned that you seek the end solution for plating sludges as not being variable, but finding some useful results.

I would like to find out as best I could what is the reason you'd advocate to find this out, is it expecting there is going to be some damage from the waste, or secondly do you feel that the prospects for finding some useful application for these things in a cost effective manner are imminent?

Could you comment on that?

MR. KITAZAKI: I guess I didn't get the first part of your question.

MR. LINDSEY: Let me rephrase it a little bit.

You say in your statement it becomes very obvious to us that the end solution for plating sludge is not to bury it but to find useful applications. I would like to know on what you base this conclusion or why you say that.

Is it because of costs, is it because of potential damage? You say as a result of the sludge being buried.

MR. KITAZAKI: I would say that was a gross inability of the use of the English language on my part. The only reason I said that is I don't feel there is necessarily a solution. I would think that that was the one that we had tested first regardless of the cost, so that we eliminate the problem and that it be put to use in saving other resources.

But whether or not the researchers are at hand, and the only thing I have to refer to is just one article where they have attempted it -- incidentally the only thing where they saw trace particle elements coming up into the plant was in the leaf as opposed to the fruit itself, whether it be corn or apples, which is interesting because I'm sure it's a problem if that amount of a trace metal is in there, that would reduce it for silage or something if that was for animals, which I don't know, and I don't know if there is an answer to that.

And the second part of your question?

MR. LINDSEY: You answered that.

MR. KITAZAKI: Thank you.

MR. LEHMAN: Are there any other questions?

MR. KOVALICK: I have one more thought if I could.

If I understood the point you were making correctly, I think that I heard you say that a number of your competitors and others are being permitted to use waste water plants to take industrial wastes which are then treated and then there will be sludge just as the kind of sludge that you would have, in your treatment, are you saying that there are ways in which that sludge is handled or the lack of restrictions, that the way that sludge is handled differs significantly from the requirements placed on you?

Is that what you said?

MR. KITAZAKI: That's what I said, essentially. I have to assume I don't know too much about the sewer system, whether they do or do not treat it. I mean if they don't treat it somebody will have to worry about it in Lake Michigan, eventually.

But if they do treat it as they are supposed to treat it, assuming that they have, assuming that they have chlorination, sulfonation, and so forth, and this takes care of cyanides and chromiums and if they are taking the sludge that they gain from that into a sanitary landfill, I can't see how that landfill isn't going to be a problem if it's true, that that sludge that we generate which is the same they would arrive at is in fact toxic and hazardous.

And I think there needs to be some help in there, whether or not in fact it is. I know it's not an answer you'll get tomorrow, but it certainly will assist in learning what we do put in in helping dispose of a toxic landfill.

MR. LEHMAN: Are there any other questions? Thank you Mr. Kitazaki.

I'd like next to call on Mr. Sidney Blatt, representing the Columbus Steel Drum Company of Columbus, Ohio.

MR. SIDNEY BLATT: I am Sidney Blatt of the Columbus Steel Drum Company, Columbus, Ohio, and also I have with me Donald Rutman, of Industrial Steel Container Company of St. Paul, Minnesota, and we are together submitting this statement as Central Region members of the National Barrel and Drum Association.

If there are any questions that will be asked at the end of this statement, why Mr. Rutman will be up here with me and he will help me and answer questions.

As members of the Central Region

of the National Barrel and Drum Association, we are adding additional information to buttress the statements submitted by our Association at your hearing in Newark, New Jersey, on December 2, of this week.

As member companies we feel that the thrust of these hearings regarding our industry should be as follows:

Number one, eliminate the problem of toxic and pesticide waste material left in steel drums.

Two, establish the best methods of environmentally safe disposal of the drums and their contents.

In our Newark report the emphasis was on agricultural pesticides and how these empty containers could be handled. There are regulations in the State of California, and you can note that in your Appendix B, of the Newark Statement, which detail the handling of these empty containers.

In the industrial areas of our country, our industry would have the ability to handle drums which have contained toxic materials and would be willing to meet certain criteria for the segregating and reconditioning of these drums in a manner similar to that being done in California with pesticide drums.

As an industry, we are today reconditioning many drums that could possibly be considered toxic and are handling them in a safe manner.

The emphasis should be on what happens to the drums and their residue material after they are discarded by the emptier. There could be considerable savings in materials if the user or emptying facility would agree to completely empty and flush, if possible, all materials in the drums not utilized in the manufacturing process.

Our experience has shown that the amount of material left in drums, and not used, is a waste factor in our economy that runs into tens of millions of pounds of material per year.

Instead of being part of a finished product, this excess material is taken away to landfills or disposed of in any manner that is available. If this problem of completely emptying drums before they are received by the reconditioner could be enforced, then the problem of waste disposal would be considerably less in regard to toxic materials.

As mentioned in the Newark statement, we have companies geographically situated throughout the United States with the technical know-how, the experienced manpower, and the reconditioning facilities to put back into service those drums which contained toxic materials, thus eliminating one of the problems in solid waste disposal.

Drums with toxic substances, after being completely emptied and flushed by the user company, could be put in segregated areas at the user facility and picked up by reconditioners' trucks in a prescribed manner and reconditioned according to certain basic criteria that could be set forth by the Hazardous Waste Management Division.

As an industry we are deeply concerned about toxic materials left in drums and would be willing to help develop workable solutions to overcoming this problem.

MR. LEHMAN: Thank you Mr. Blatt, are there any questions?

MR. LINDSEY: Mr. Blatt, apparently this material that's left in the drums causes your companies quite a bit of problem. How do you handle that problem? What happens -- if it comes in with a couple of pints of materials, how do you handle that problem?

MR. RUTMAN: My name is Donald Rutman. Industrial Steel Container Company, St. Paul, Minnesota.

Presently we are handling the drums through sophisticated reconditioning processes. We completely remove the previous content of the drum and flush the drum chemically through a caustic solution, remove any dents in the drum and completely clean the drum so it is acceptable for reuse once again.

We are once again working very close to finishing and engineering a completely closed loop system, water clarification as well as chemical clarification, for our industry.

A number of our private companies are working on this as well as our association. So this problem of what to do with the small amount of residues that remain in the drum will shortly be solved.

MR. LINDSEY: Would it be possible once

you have formulated this for us to obtain a copy of it in some way?

MR. RUTMAN: Yes, but I think the main area of concern here is not after the reconditioning, but actually the reconditioner is not a reclaiming or a waste disposal company. They are reconditioners of steel drums. The important thing is to educate the generator to completely empty out the container, so that we could probably clean them and have him reuse the drum again.

MR. KOVALICK: Perhaps you can comment to this audience and for our benefit also on whether you feel that it's an education program that will sufficiently meet your need.

In other words, do you feel that there are sufficient numbers of people informed about why they ought to rinse these drums because they'll be met with a residue and disposal problem and will that be sufficient for them to do it or are you recommending something else?

MR. RUTMAN: I think the educational process is certainly one step in eliminating the solid waste problem that we have. If we then show the generator that oftentimes the residues that he sends us is virgin material, and we are not only having a waste problem, he cannot only use the material on his own end product, but he'll save himself money. But I want to emphasize that I think that steel drum reconditioners are very logical gathering points or concentration points for the use of steel drums.

In other words, the dirty steel drums, because as Mr. Blatt indicated, our companies are situated throughout the United States in all of the industrial and heavily populated areas.

So, we are at this moment set up to handle the cleaning of the used or dirty steel drums.

MR. LEHMAN: I have another question. We have some more questions here.

MR. LINDSEY: I have a question here from the floor.

Are reconditioned drums restricted to the same service as they were originally used for?

MR. RUTMAN: No. The steel drum now is a universal container. The differences come in the gauge of the drum and as you gentlemen know, there are certain hazardous products that must be contained in a particular type of gauge of drum, but it is not restricted to the same type of product in the same drum.

Because after the drum has gone through a sophisticated reconditioning process, it is clean on the inside so that there is no material remaining in the drum.

MR. LEHMAN: I have a question, but I'll add to it another question from the floor, which is related.

Could you indicate for the record approximately the range, I assume you buy these huge drums or perhaps you don't, but would you indicate whether you buy the drums from generators or not?

And if -- the second part, if a drum contains a toxic residue or a residue which is difficult for you to handle, do your member companies charge a penalty or surcharge to the seller of that drum?

MR. RUTMAN: The first part of the question is do we buy the drum. It depends on the market area and the particular condition it's in.

Some of its customers have used that

drum maybe 8 or 10 times, because of the reconditioning process. It becomes a service issue where the customer owns the drum.

In other areas, depending upon product it will be on a buy and sell type of basis so again my answer is it depends on the market area.

MR. LEHMAN: How about the second part of the question?

What if it has any difficult material in it, does it -- is there any surcharge?

MR. RUTMAN: I don't believe it depends on the difficulty of the type of material to be removed. It depends on how much material is in the drum, because again we are reconditioning some steel drums. We are not disposers of hazardous wastes; we are reconditioners of steel drums.

Some companies do charge for disposal of the product because they are charged for disposal of the product, and other companies return the product back to the generator.

MR. LINDSEY: There's another question here from the floor.

I think I understand it. Until the problem of what is in the waste to be treated is defined how is it possible for a drum reconditioning company to expect to obtain a guarantee from a company that is furnishing them with waste treatment equipment?

Maybe I can paraphrase this question a little bit.

If you don't know or you have no way of knowing what -- the way wastes are to be treated, how can you obtain a guarantee from the company providing waste treatment equipment?

MR. BLATT: I don't think we're really trying to guarantee -- I don't think we're really trying to get a guarantee on someone -- on waste treatment equipment.

I think the thing that we are really trying to say here is this. We have two methods of reconditioning. One Don mentioned about flushing and cleaning out the drums, as a tight head drum. We also have facilities which was asked many times earlier about burning and incineration, we can burn out any type of drums -- we can burn out any type of material that's in the drums and they'll just leave a residue ash.

I think what we're really saying is

this, that certain materials are toxic. We don't always know what is in the drums that we are receiving.

So unless our experience teaches us that there are certain products in a drum that we better not handle, we will refuse to take those drums.

If drums have excess material regardless of what is in them, we again in many cases refuse those drums because we are dealing with the safety of our employees, and asking them not to handle any drum and for example, from a different weight standpoint, that he really couldn't handle.

We do have the facilities but I think what we are saying in our statement here today, is this, that if there could be some way that those materials which we think somewhere down the pike you or some other agency will be saying is toxic, that the generator company or -- shall have a certain method of emptying the drum, flushing it and then stacking it off to the side so we'll know what it is. And we will be able to handle it.

MR. LAZAR: Yes, fibre drums and steel drums are often used for hazardous materials, but when empty they often contain non-hazardous materials -- I mean hazardous materials, how can this be corrected?

MR. BLATT: What we're saying is this. That it's been proved to date, particularly with pesticides in drums, rather than other toxic materials that we are eliminating through the burning process any material that is left in the drum.

Now if someone wanted to get in there microscopically, it's hard to say what they might do, because I haven't been involved in that testing process.

But in most cases or in every case we know in every case what goes in those drums, that it is chemically clean, and this is what we are saying.

That if pesticide drums which I think are the ones that are at this point being regulated, particularly by the State of California, are handled in a certain prescribed method, then that is in the information you have. There have been other materials that have been designated toxic, and we understand there will be more later on as evaluations are made of those products.

Does this answer your question in

terms of what you just asked?

MR. LAZAR: Yes.

MR. LEHMAN: Any more questions -- thank you very much gentlemen.

MR. BLATT: Thank you.

MR. LEHMAN: Next I'd like to call upon Mr. Phillip Lindall of the City of Des Plaines.

In that case I'd like to call upon Mr. Frisbie of Chemagro Mobay Chemical.

MR. LEE FRISBIE: I will accept questions. And my statement is intended as a preliminary statement, and therefore will be brief and general, and I wanted to attend the meeting and get some better ideas as to how to make specific comments to some of these questions.

My name is Lee Frisbie, I am the manager of Environmental Protection for Chemagro Mobay Chemical Corporation, located in Kansas City, Missouri.

Chemagro produces pesticides, along with other agricultural products, and generates some waste materials that require special precautions for disposal.

Since the subject of hazardous

materials has been a popular one recently, Chemagro wants to participate in meetings like this to help maintain a scientific perspective and avoid emotional overreaction. Hazardous wastes can be handled safely and properly with current disposal techniques.

The first consideration should be to minimize the amount of hazardous wastes generated. In chemical processing, this means extraction and other techniques to recover and recycle material.

Chemagro has been practicing these recovery techniques for many years. In some cases, the waste materials can be broken down to harmless substances by additional processing. The main source of hazardous wastes at Chemagro is a stiuation where mixing of several components has occurred and separation is not feasible.

In addressing the subject of hazardous wastes, definition is extremely important. To be classified as hazardous, a waste should be either toxic, explosive, or highly corrosive. I will comment primarily on toxic wastes.

For toxicity the most useful test is determination of the mammalian toxicity, LD50 values. These values can be obtained orally using rats, and dermally using rabbits. Material with an oral LD50 less than 50 milligrams per kilogram body weight, or a dermal LD50 less than 200 miligrams per kilogram should be considered toxic.

As concerns responsibility and liability, the generator of a hazardous waste should be responsible for it until he has delivered it to a disposal concern.

This could take place at the generator's location or the disposal concern's location. We much prefer to use disposal firms with their own trucks. In this way, title passes when they leave Chemagro premises, and they are responsible from that point on.

They have experienced personnel who can take care of any problems with the load during transit. After the generator has checked to be sure the disposal firm has the proper state disposal permit and liability insurance for the transportation, the generator should be free of responsibility.

The only exception would be in a case where the generator includes in the shipment material not covered by the agreement, and if this material caused damage during transit or disposal.

Analytical work, the analysis of waste materials can be difficult and expensive, particularly if individual component values are desired.

Then I would say that for many wastes the characteristics of toxicity and pH are relatively easy to determine and, combined with the chemical family knowledge, should allow good characterization of many wastes. In case of reasonable doubt, the higher hazard classification should be used.

As I mentioned Chemagro will submit some more detailed comments in writing, appropriate to things learned during this meeting.

And in dosing Chemagro has a policy of careful selection of disposal firms. This means visiting the proposed disposal site, and checking for proper environmental concern within the disposal firm, permits, ground water protection, restricted public access, a do it right attitude, and technical competence.

This policy has served us well over the years.

Thank you.

MR. LEHMAN: Thank you Mr. Frisbie. You have some question Mr. Lazar?

MR. LAZAR: Mr. Frisbie, in your remarks you stated that a useful test for determining toxicity is the LD50 toxicity test. Of course, this was -- this is for acute toxicity. That's .relatively large doses within a short period of time.

What sort of tests would you suggest to determine whether a substance or base is toxic over a long period of time using very small dosages?

MR. FRISBIE: I don't believe I'd be able to comment on that at this time, and that's not really within my area, and I'd prefer not to deal with that. I am not a toxicologist.

MR. LAZAR: However, do you see a problem with this rather than acute toxicity when it comes through -- to disposal of the waste?

MR. FRISBIE: Well, I would say that if we take the position I suggested, we're not positive of what the situation is, we should take a more conservative approach, and we should use a more conservative side to make sure we take the best care.

MR. LAZAR: Now, toxicity of course is what we're worried about, but we're worried about carcinogenicity and this matters quite a bit also. Wouldn't that complicate -- testing for carcinogenicity, we know very little of what a compound can do over a period of time.

MR. FRISBIE: Yes, I'll agree that's quite a complicated area.

MR. KOVALICK: Some comments earlier made about the wastes, is it your view that whatever toxicity test might be applied that it should be the responsibility of the generator?

MR. FRISBIE: I believe that this is the way I would look at it. If we generally -- waste materials that are generated are continuous or specific incidents and in that type of situation. we either analyze the waste or consider them toxic without analysis, where the analysis would be too complicated. And we would go ahead and consider them as toxic. And then treat them as such.

MR. LINDSEY: Mr. Frisbie, I have a question from the floor.

And I guess it results partially from the last speaker, in this area, the question is can .Chem Agro add a policy of accepting empty containers for reuse as opposed to requiring disposal?

In other words, do you use new containers all the time or do you use others?

MR. FRISBIE: We use new containers, and again I'm not familiar with DOT specs, but I believe they are single trip situations.

So we do not accept containers back from other sources unless we have shipped the material there in our drums and it was our material, then we take the drums back.

MR. LEHMAN: Another question Mr. Frisbie. You indicate that Chemagro has a policy of careful selection of disposal firms, and there are a number of parameters that you go through and the implication of this policy would seem to be that you are prepared to pay a higher price for the service than might otherwise be required.

And first of all, I'd like for you to comment on that point.

MR. FRISBIE: Yes, we would pay a higher price if someone has a site that we consider is not appropriate or that's closer or whatever, we don't feel that's a proper situation, we will pay a higher price and send it farther to the person that we feel is -- we feel and believe is proper to handle it.

MR. LEHMAN: And the second is, in reviewing the policy the actual cost to your corporation or what have you, have you seen any problem of your company being involved with being competitive with other companies that might not use this policy?

MR. FRISBIE: No, I have not seen this in any of our situations. We are a fairly specialized chemical situation and we are not producing the same materials that other companies produce.

Our materials are patented materials, so we have a little bit of a different situation.

MR. LEHMAN: I see, thank you. Are there any other questions?

Evidently not, thank you very much Mr. Frisbie.

I'd next like to call upon Mr. David Dennis of the Michigan Department of Natural Resources if he's here. Mr. Dennis.

Is Mr. Dennis in the audience? Well, he may have stepped out. We'll have to come back to him.

All right. Next I'd like to call upon Dr. Frank Richards, Pollution and Environmental Problems.

DR. FRANK RICHARDS: I will take questions. I am representing Pollution Environmental Problems or PEP, an environmental action organization about 10 or 15 miles from here.

MR. LEHMAN: Excuse me Mr. Richards, could you get a little closer to the mike.

DR. RICHARDS: I am Frank Richards, and I'll repeat myself. I am representing PEP an environmental organization based about 10 or 15 miles northwest of here.

We are pleased to be able to give our views representing hazardous wastes.

May I first compliment EPA on its environmental information factsheet which accompanied the announcement of this meeting. I really pray that the aims and priorities expressed therein will in fact be carried out.

In particular, I liked the emphasis on reducing the generation of wastes, on recycling of the wastes generated, and I'm looking forward to a recycling type of economy and culture, with man in harmony with his environment rather than making it continually worse.

I believe that the majority of people in the United States are becoming at least somewhat concerned about these hazardous wastes with which they are familiar, such as pollution wastes in the air and so on, aerosols, and so on. And at least vaguely uneasy about the possible consequences of mankind's other interventions in the environment.

But people still need to be told about the infinitely greater costs in environmental and health damage which will arise if dangerous materials continue to be discarded irresponsibly.

So I think that the EPA's leadership in these matters is very timely. It's refreshing to see a government agency actually ahead of the public without being forced to get into things like recycling of materials.

Please keep up this good work. I for one will gladly help in any way I can.

I want to first make two specific suggestions which arise out of my own experience as a Ph.D. student and postdoctorate in university physics laboratories, and then discuss two other topics for about one minute each.

First suggestion, both at the University of Chicago and at Purdue University, there were no designated waste disposal experts in my department, or I assume in the whole university. Purdue did have an expert on mercury disposal and/or recycling, because large dollar amounts of mercury were being used.

My suggestion then is for each laboratory to designate an expert on waste disposal, to whom any laboratory worker could go for advice and help, encouraging responsible disposal by making it easy, or as easy as possible.

Naturally, the resident expert should be provided with an EPA issued handbook appropriate to that laboratory. I could give a few obvious or common sense guidelines to be included in such a handbook for toxic metals, which is my main area of experience.

I worked with about 15 or 20 pounds of this substance during my time at Purdue.

As an example, this would be relevant to discussion time, topic 3 which is in my statement, because toxic pure metals are -- or all pure metals are limited and we will run out of metals, eventually -- and by the same token they are expensive now already, they obviously should be recycled and reused.

And this appropriate guideline might state that preferably they be recycled by returning them to the original supplier together with a written history and estimated impurity content, depending on how they were used, so that the supplier could quickly and cheaply decide which bin to throw them into.

In general the handbook should answer the question what alternatives are available for disposing of that material.

The second question, similarly, I'd suggest that each city with a sewage or garbage disposal center designate one of these as a hazardous waste information center where any citizen could -- whether he owns a manufacturing plant or whatever, -- could read an appropriate EPA issued handbook and hopefully learn what he wanted to know.

Someone who worked there might even learn enough after a few years to give helpful advice.

I believe such a service would be "effective for soliciting citizen acceptance of hazardous waste management facilities." And this is discussion topic 14.

The city taxes needed for this service would be well spent, that is in the extra time that city employees I believe, just for improved public relations and the gradual buildup of a better informed citizenry.

The topic of who should bear the costs of environmentally safe disposal of wastes is very dear to my heart. I strongly encourage Congress to make the user of it to pay not only the initial disposal costs, but also the ultimate costs for storage and monitoring, in advance.

That is some sort of an endowment if necessary. In line with the Toxic Substance Bill, S.766, the burden of proof should be on the marketer, before he markets the product, to show that it's non-toxic or to put the cost into the product.

All products should be priced at their full social cost, to help limit the demand for particularly dangerous products.

That has to be very close if you're

going to allow effective choices between products, and therefore really cutting down on the use of dangerous materials.

In answer to an earlier question, I would say no, no Federal funds should be provided to help stage -- states with especially toxic wastes. I want the full cost put into the product.

I would like pricing of social costs so high as to make recycling or recovery attractive right now and I can't emphasize that too strongly. You could say we are 20 years ahead of our time in worrying about recycling materials and probably we won't get really going on it for another 20 years until we actually have to.

The same as with energy and the cost of fuels right now, where we are actually forced to, to get going on it.

But I would like to put those costs right now in there, and I'll go further and say that the raw materials should be treated as public capital, such as the metal in the ground and so on. Instead of as free or worthless. Right now when you pay for metal you pay for getting it out of the ground, and you pay nothing at all for the metal itself when it's sitting in the ground.

This capital cost should be included in the full social cost. That payment should go to the citizens, as a common inheritance.

I recommend Chapter 1 of the book, Small Is Beautiful, by E. F. Schumacher, for its rational discussion of this whole topic, and pages 18-19 concerning toxic wastes generally.

The final topic I want to discuss is the topic of radioactive wastes. No one neither scientist nor politician can guarantee that radioactive wastes can be successfully isolated from man's environment for a half million years.

This fact is implicit when nuclear physicists say -- and I'm a physicist myself -- when they say that the long term problem is "the biggest difficulty because it is the one that I cannot evaluate. I do know that it is possible to store something for 300 years so that it doesn't come back to haunt you."

In fact no one can guarantee the above for 300 years either, by the same token. Although the risks can be kept down considerably by trying to assure that man himself does not intrude into the waste storage areas. At the minimum, this requires some kind of continual surveillance and monitoring and sufficient defenses against malicious intruders.

As a hopefully logical and careful scientist I feel that we must openly, carefully, and unemotionally consider all conceivable possibilities. In particular, I would like enough further research such as well designed experiments on radioactivity in our food chains or as they come up to us through our food chains, to absolutely rule out any possibility that our radioactive waste might wipe out mankind at some time in the future.

The crucial question is, can we be absolutely certain that even the maximum amount of fission products, somehow put in contact with man's environment and concentrated by his food chains, absolutely cannot wipe him out at some time in the future.

On the assumption that the American people would not accept any risk of causing a wipeout in the future, it seems only logical to me to definitely answer the above question before committing future generations to continual surveillance of large amounts of nuclear wastes, and the burden it will create for them. If the public would accept some slight risk of a wipeout, then the above question is not as important as I take it to be.

Would EPA like to poll the public concerning the risk of wipeout which they would accept?

I make that suggestion. Even if my assumption about public opinion is wrong, the nuclear industry should still be required to pay, and pass on to their customers, the full social costs of their product.

This includes the costs of much much further research on waste storage and an endowment sufficient to provide for all future waste storage monitoring and security measures.

Under discussion topic 2 , if I'm right about public opinion that they will not accept any risk of wiping out mankind in the future, then I recommend obviously no -- or practically no nuclear waste degenerated until the crucial question can be answered, whether or not we can be sure that mankind will not be wiped out.

I would clarify though that I'm not against nuclear energy if it can pay its own way without possible wipeout of mankind.

I would make an additional obvious suggestion, that's not in my written statement, that the EPA's recycling and reuse efforts on hazardous wastes should be tied in with materials recycling in general, and other agencies. And I would like to see identification of products, let's say anything that has a sufficiently toxic material in it. That you could take it, or a particular character that could be written on there, with some chemical in it that can be easily identified, if a particular character were good for ten, or if you had ten particular characters, you put three characters on there and identify them, and I think this might be feasible sometime in the future.

It's an idea that I think is good.

MR. LEHMAN: Thank you Dr. Richards. Mr. Kovalick.

MR. KOVALICK: You mentioned laboratory waste disposal problems. Could you comment what has happened to it now?

Where are they going?

DR. RICHARDS: Typically they get thrown in the wastebasket, and to the best of my knowledge -- I was very interested to hear Mr. Bruns statement to the waste management assistance this morning. What he does is burn it. He answered my question as to where they go. They burn them.

MR. LINDSEY: You indicate here in your statement --

DR. RICHARDS: I want to add more on that. I have thought about those 15 pounds of material which I was not done with, and I left them with the suggestion that they be sent to the original supplier. With information how they were to be used. But I don't think --

MR. LINDSEY: You state in your statement here that all products should be priced at their full social cost. And I think you indicated that you thought it should be done right now.

Are we able to in your opinion determine what the full social costs are in all, such things as what might happen in the long term future and things of that nature?

In other words, can we determine that cost now?

DR. RICHARDS: I think anyone not fully aware of that question would say no. But for instance in pricing oil which is a natural resource that is in the ground now, oil, coal and gas, all of those should be priced high enough so that a usable source then -- which is solar energy will become competitive immediately.

And particularly the fully reusable ones like solar energy should become competitive immediately, and the price should be so high that solar energy will be a most attractive thing to heat your house with right now in the City of Chicago.

You need insulation which keeps down the heat loss, at about one-third, and solar heat could fully heat your house right now here in Chicago.

MR. LEHMAN: Do we have any other questions? Excuse me. Al, there's a gentleman here -- pick up his question. In the meantime, --

MR. LINDSEY: Could our economy manage those additional losses right at the moment?

DR. RICHARDS: I take it that you mean management costs without cutting down on our standard of living.

MR. LINDSEY: Significantly I mean.

DR. RICHARDS: Well, probably naturally you just don't do it overnight, and I think we could cut down our consumption by about a factor of two and cut down our energy consumption by a factor of one-half without hurting our quality products. This is done in Europe now of course, and your gross national product would not drop very much apparently, it requires a different kind of culture though to sort of kick the habit we've been living with.

MR. NEWTON: Yes, I have a question here from the floor. Do you feel that energy conservation or raw material conservation and waste recovery are all part of the same social problem and should be considered by EPA in their setting of regulations?

DR. RICHARDS: Well, yes, clearly they are all part of the environmental problem, and in a sense should be at least considered.

MR. LEHMAN: Yes, Mr. Lazar.

MR. LAZAR: Dr. Richards, could you please elaborate a little bit more on what you are proposing namely this hazardous waste information center.

What sort of information would you like to see the EPA handle, and what would this accomplish?

Would the individual citizens throughout the country throw less hazardous wastes into their garbage cans? So most hazardous wastes would be reduced by that? I don't quite understand what you mean, what types of information -- whether it be toxicological information or just general warnings -- what types of general waste should not be discarded lightly, what do you mean?

DR. RICHARDS: I was going to have you -- put yourself in the shoes of the average citizen. He might wonder now should I throw this -- we'll I've got some paint left over here, what should I do with it?

Is it going to hurt anybody if I just throw it into the garbage can. Or should I flush it down the toilet? Or what?

Now from my own experience if it's handled by the laboratory and the expert comes in and looks in the book about it, that book should say what is the level -- what is the level of allowable cadmium in the air, and where does it come from? Give me some idea -- if I have air at that level, how much harm will it do or what, because my own feeling that I better stay below that because I don't know what that effect would be or what it would be good for, and it should also be translated into everyday language that I could use. Such as if I had a surface area, on the other side of this room, it would have to be extremely large, that would be on the order of -- and you have no turnover of air in that room, that cadmium would generate the level that is allowed in the air.

MR. LEHMAN: There have been a number of questions submitted concerning the general topic of energy, and to Dr. Richards I feel as a Chairman I will exercise my prerogative and say that those questions are really not terribly relevant to the discussion here, and I would ask the people who have phrased those questions to contact Dr. Richards directly.

DR. RICHARDS: That will be fine.

MR. LEHMAN: Also, I wish to point out that also the aspect of radioactive waste wasn't discussed here, and while it is a very important issue I would like to make it clear, both to the speaker and to the audience that the Environmental Protection Agency's mandate in radioactive waste disposal is somewhat limited and the primary responsibility for that rests with ERDA.

Now, ladies and gentlemen, we are close to the time when you will take a break and I don't think we have adequate time to have another speaker before the break, so I will adjourn -- not adjourn but recess.

We'll take now a 15 minute break and I'd like you to reconvene at 3:35.

Thank you.

(At which time a 15 minute coffee break was had.)

MR. LEHMAN: Ladies and gentlemen, would you please take your seats so we can get started again.

I would like to call the meeting to order please.

I would like to call now please, Mr. Don Brown of the State of Ohio.

MR. DONALD BROWN: Good afternoon, my name is Don Brown of the Ohio EPA. I'm with the Hazardous Waste Division in the administration part of it.

My comments today will be extremely brief, however I think that policy statements are most important to Ohio.

Ohio EPA strongly urges the Administrator of the U.S. EPA, the Administrator of the Office of Management and Budget and our Ohio Congressmen to oppose categorically any cut in state programs.

We are informed of such cuts in the fiscal year '77 and they could amount to an excess of 35 percent in state's grants.

Many initial hazardous wastes and energy recovery, solid waste enforcement and management programs would be in line for severe paralleling cuts.

Service to our state's citizens and industry would be curtailed beyond our current inadequate levels of funding. Ohio however wishes to commend the efforts of the fact finding commission, this board is on today, and we recognize both Federal and state efforts must be intensified during the next fiscal year.

It is now apparent that many states are developing hazardous waste regulations of various descriptions. Some are developing decision models, others adopting pre-existing hazardous material shipping or handling statutes.

Prompt U.S. EPA action is needed now to develop continuity of the States law development, paralleling the Federal program. We do have a few brief statements of support of the Federal policy as we understand it today.

One, recognize that hazardous waste treatment centers could pick up a great deal of the volume of hazardous wastes that are going into the land, and the nation today, but only if states themselves adopt a policy of stringent enforcement within landfills themselves.

Two, we would wish to see development grants similar to the Minnesota grant, only on a larger scale which would incorporate energy recovery, material recovery within them as well.

We agree that the movement of waste interstate will need to be maintained to allow a viable base for such hazardous treatment centers. The fact of the matter is the marketing centers are all often 100 to 150 miles, and often across most state borders.

We would tend to support several statements mentioned today, criteria for the design modeling kind of legislation which would allow flexibility of both management and enforcement in the state as well as some flexibility in the initial enactment of the industry's efforts in compliance.

Along this line I will be announcing we'll be having a public hearing in Ohio in January on our proposed solid waste and hazardous waste regulations. We anticipate an early March promulgation.

Point Number Five, is we feel that the Federal government will be in a good position to provide a clearing house function to allow industry as well as the states to know what other companies are in the business of handling various hazardous wastes, in the various restraints they do under permit today.

We also support the concept that the generators best will know their products and should be able to develop toxicity data necessary and further supply that information, and gain the confidence of the states and governments responsible.

With the states' meager staffs and some states have three people, and others have 30 in a region, we feel that extensive training is needed and further manpower grants are in order.

We would like to caution U.S. EPA development of these regulations, and caution them as to the element of time, and to build into the system some one or two years of compliance schedules so that the industry can prepare financially so that the alternatives can begin to develop.

We find in Ohio for example we are lacking many incinerators, many wet chemistry recycling centers, and very few solvent and oil recovery firms. We feel the alternatives must be viable or in line with the time that our landfills are cut off.

We are in Ohio doing what we feel is one of the largest surveys in the nation on hazardous wastes. We are surveying 50,200 industries after extensive negotiation with the Ohio Manufacturing Associations, as well as with the Laboratory Council, and we feel at this time legwork is most important in defining where, if, and in what amounts there is a problem. And what the name of it is, and where it is at.

We also need to know the mobility factors and as they ultimately are being handled in our state, and my last point is we are most happy to report that we will be able to supply the U.S. EPA with 18 categorical studies in March or April of this next year, in hopes that it will be of some benefit in determining national policy.

I'll entertain questions at this point.

MR. LEHMAN: Thank you Mr. Brown. Any questions for Mr. Brown?

Mr. Kovalick.

MR. KOVALICK: Perhaps for the benefit of the record, and the audience and myself, you can talk about the proposed regulations you are considering and whether they parallel perhaps the Minnesota experience which speaks of waste control from generation to storage, treatment, disposal and through the various forms and so forth, or I guess it's the traditional approach of upgrading the facilities in that circuit, and I guess trusting that the waste will flow in the appropriate spots.

MR. BROWN: To that extent we'll be having a public hearing in January. We have not yet had one in Ohio; we have had consultation hearings, but we do feel that there is a lot of merit in the California system, particularly that of classifying either class 1 sites of existing landfills as can best be handled.

There must be continued use of these sites and parallel development of hazardous waste treatment centers.

We also -- there was another point brought up earlier about the shipping requirements, and we felt that the U.S. requirements should be utilized to a great extent, and possibly with a slight amount of modification and could provide a great deal of continuity because these powers currently are required to comply with that.

And, perhaps it is not necessary for us to use that system and we find it to be of great use in Ohio.

MR. LEHMAN: What is the date of the hearing in Ohio, and the location?

MR. BROWN: We will be having a hearing and this is just tentative, the announcements will be in the major papers in Ohio shortly, I do think the first two weeks in January, and that period there. And most likely in the state office tower, which is in Columbus, Ohio.

MR. LEHMAN: Any other questions? Yes I see one. Just a minute Mr. Brown. I have another question.

It's a question from the audience. You suggested building in a time element of one or two years for compliance. Would you liberalize this to possibly two or three years as equipment delivery is sometimes six months or more.

MR. BROWN: Equipment delivery in what aspect?

MR. LEHMAN: Well, I assume the question is addressed to the long lead time of delivery of equipment for treatment or disposal facilities.

MR. BROWN: What we envision is that we would like to see a hazardous waste treatment regional center developed in a period of time before making extensive capital outlays. We believe this is a division that the manufacturers endorse because they are running short on space. And also have the capital to do this. And they might at this point in time support regionalization treatment.

MR. LEHMAN: Can the concept of regionalization -- in your statement, well, what is your state's position with regard to handling waste from out of state? Within a regional system?

MR. BROWN: We feel that the state borders should not be held as a wall or a barrier, in the migration of hazardous waste to the extent that the state could handle the existing treatment centers, or permitted centers because the fact of the matter is the marketing centers are very often widely spread across borders.

We have currently that practice going

on in Ohio and it seems to me to be viable for existing centers.

MR. KOVALICK: Your statement reminds me of Mr. Walker's comments this morning, in one of his comments he was suggesting possibly a franchise system in order to guarantee enough business for regional centers. Is that what's contemplated in Ohio?

Whether it's publically or privately operated but some kind of an exclusive system?

MR. BROWN: No, I don't believe a franchise or exclusive system is being contemplated; we want to allow the market to develop on its own merits.

MR. LEHMAN: Are there any other questions? Thank you very much Mr. Brown. Next I would like to call Mr. Gary Wright of the Illinois Department of Public Health.

MR. WRIGHT: Mr. Chairman, members of the panel and ladies and gentlemen, my name is Gary Wright.

MR. LEHMAN: Excuse me Mr. Wright, please get in closer to the microphone.

MR. WRIGHT: My name is Gary Wright, I am here today representing the Illinois Department of Public Health to discuss the Department's involvement in the transportation and disposal of radioactive wastes in Illinois.

Although as the Chairman indicated radioactive wastes are not an issue at this meeting, we feel there are parallels to be drawn in my presentation here today. Virtually all operations that produce or utilize nuclear materials generate radioactive waste. Protecting the public health and safety requires that radioactive waste be isolated from humans for the time they may pose a health hazard.

Radioactive wastes are generally classified as high level wastes or low level wastes. High level wastes under existing regulations are transferred to the custody of the U.S. Nuclear Regulatory Commission, for storage or disposal at U.S. repositories.

Low level commercially generated radioactive wastes are generally disposed of according to the type of radionuclides contained in the waste, and the physical status of the waste.

Liquid and gaseous wastes are usually treated, diluted or held for radioactive decay and then released to the environment. Solid wastes, sludges, and solidified liquids are disposed of by burial.

There are currently six licensed commercial low level radioactive waste burial grounds in the United States., one of which is located near Sheffield, Illinois.

Because of the necessity for perpetual care, all commercial disposal sites are required to be located on Federal or state owned land. The Sheffield site is owned by the State of Illinois.

In 1963 the General Assembly of the State of Illinois enacted the radioactive waste act, which provides for the acquisition by the state of land for the purpose of disposing of radioactive wastes in a manner consistent with the public health and safety.

The act also stipulates that the operation of any and all sites required for the concentration and storage of radioactive wastes shall be under the direct supervision of the Department of Public Health, and shall be in accordance with regulations promulgated and enforced by the Department to protect public health and safety.

In 1965 the Illinois Department of Public Health with the assistance of the Illinois Geological Survey, established criteria for radioactive waste burial sites in Illinois.

The criteria set forth state requirements for topographical, hydrological and geological features of the site. As well as population density surrounding the site and the transportation facilities to the site.

In addition, various operating procedure requirements are set forth in the criteria. In 1966 the State of Illinois acquired a 20 acre disposal site near the town of Sheffield.

Operation of the site began in August of 1967 and to date some 1.8 million cubic feet of waste have been accepted for burial at the site.

Burial operations at the site are carried out by contractors who are licensed both by the United States Nuclear Regulatory Commission and the Illinois Department of Public Health.

Responsibility for perpetual care of the site once operations cease rests with the State of Illinois.

Over the years the Department has maintained comprehensive programs of inspection and surveillance at the Sheffield site.

Quarterly health and safety inspections are performed by the Department in order to insure the health and safety of operating personnel. And in order to insure -- inspect burial procedures.

The environmental surveillance program monitors air, water and soil to insure that no radioactive materials are migrated from the site.

On November 26, 1975 the Department adopted by reference U.S. Department of Transportation regulations, CFR Title 49, covering the packaging and transportation of radioactive materials including waste materials.

Department regulations now cover both interstate and intrastate transportation of radioactive wastes in transit to the Sheffield waste disposal site, as well as other radioactive material transporters.

Enforcement of these regulations will be carried out principally by the Department of Law Enforcement and the State Health Department. The primary philosophy involved in the burial of hazardous wastes is the isolation and containment of those wastes.

In 1974 U.S.G.S. report prepared at the request of the EPA listed several characteristics for evaluating any radioactive wastes and disposal sites and suitability for preventing migration of wastes.

Those characteristics specify that the site should be generally devoid of surface water, erosion and weathering should not be at a rate which can significantly alter the land surface over the next few hundred years, the hydrology must be such that flow from the disposal site does not lead to areas which provide potential pathways to man, such as fractured bedrock, public waterways and aquifers used for water supplies.

The hydrogeologic conditions must be simple enough for reliable residence time predictions to be made. The predicted residence time of radionuclides must be on the order of several hundred years, the natural water table should be below the disposal site by at least several meters, and large water table fluctuations should be unlikely.

The characteristics of the Sheffield site are in general in good agreement with these U.S. geological survey guidelines.

MR. LEHMAN: Thank you Mr. Wright, I have a question or two, perhaps we could get to some of these items.

You indicated that there is a quarterly surveillance and monitoring program at the Scheffield site.

MR. WRIGHT: Correct.

MR. LEHMAN: Who does this monitoring, who pays for it?

MR. WRIGHT: The State of Illinois does monitoring also the contractor does monitoring of the site. The state's program, eventual care for the site will be provided for through the -- by a fund which at the present time is 5 cents per cubic foot of waste at the site.

And this money is given to the state by a contractor who presently is in the process of renegotiating.

We never had that particular assessment but at the present time the firm does take care of the monitoring that's done by the state.

MR. LEHMAN: Another question. Do non-radioactive wastes including perhaps non-radioactive hazardous wastes go into the Sheffield site or is it exclusively for radioactive wastes?

MR. WRIGHT: The purpose of it is exclusively for radioactive. There is chemical waste adjacent to the radioactive site.

MR. LEHMAN: So that they are co-located but separate.

MR. KOVALICK: You were suggesting that you might take some examples from the radiation field in terms of industrial waste, and cited the fact that all of the sites to which low level wastes are taken are on publicly owned land. And is it your view being what you heard here today, or your experience in radioactive waste that that should be the approach for all hazardous industrial wastes?

MR. WRIGHT: It seems that it could be the solution. I am not that familiar with all of the ramifications, but for wastes which present a hazard over a long term, I see that this is one way of insuring that perpetual care will be maintained for that particular site.

Of course it's one of the few things that hopefully is perpetual.

MR. LEHMAN: Question from the audience. What percentage of waste dumped in Sheffield is generated by public versus private sources?

MR. WRIGHT: That's difficult to answer. Much of the waste that comes to Sheffield is generated by other publicly owned institutions, the number that sticks in my mind I think the nuclear power field generates some 60 per cent; of the remaining 40 percent, how much of that is actually there I really couldn't say.

MR. LEHMAN: Is the 5 cents per cubic foot charge which you mentioned for perpetual care fee, is that a separate charge exclusively for the State of Illinois?

MR. WRIGHT: It is included in the price which is regulated by the State of Illinois.

It's the total price of care.

MR. LEHMAN: What is the total charge then to the customer?

MR. WRIGHT: It was recently revised but I believe it is $1.35 per cubic foot, but I would have to check on that, it may have been recently changed and I'm not sure.

MR. NEWTON: Mr. Wright, I have a question from the floor and before that for the sake of the record, could I ask you to distinguish please between the term low level radioactive which you used a couple of times, from high level radioactivity?

MR. WRIGHT: Well, in our particular case we have one -- at the present time we limit the waste that goes into the Sheffield site to one curie per cubic foot and anything below that is acceptable at the site as long as it's acceptable in solid form.

MR. NEWTON: Thank you. The question from the floor -- has the State Department of Public Health found any violations on the regulations which warrant an enforcement action by litigation?

MR. WRIGHT: With respect to what feature, actual burial or burial procedures exceeding the limits?

MR. NEWTON: I would take it at any -- any litigation?

MR. WRIGHT: To my knowledge, there has been no litigation involved in the Sheffield site.

Although there have been some modifications and some citations.

MR. LINDSEY: Question from the floor. If the Sheffield site becomes filled, will the State take steps to acquire another site and license the same as was provided for by the 1966 act?

MR. WRIGHT: The law still exists under which the present site was acquired; it's hard to say under the present circumstances whether or not an additional site would in fact be required.

MR. LINDSEY: Did you say how long the site that's presently there, how long you expect it to last?

MR. WRIGHT: There are a couple of things taking place at the present time that increase the present capacity of the site. One of which is an acquisition of additional land surrounding the present site, and another is a method by which utilization of the original 20 acres will be improved. If both of these actions will in fact take place I believe the Sheffield site will -- the capacity this will provide will allow us to go approximately to the year 1990.

MR. LEHMAN: All right, there's a question, Mr. Klepitsch.

MR. KLEPITSCH: This is actually a series of three.

I believe the solids were -- how are liquid toxics handled, I believe you indicated only solids are handled.

MR. WRIGHT: It's up to the generator of the waste to solidify.

MR. KLEPITSCH: Or how are they covered? How are such wastes covered every d ay?

MR. WRIGHT: The waste when it is accepted of course is packaged, it's not open. And for the most part it's in 55 gallon drums.

I don't believe there's a requirement at the present time for daily burial of all waste. In fact, there's a provision for storage for limited times.

MR. KLEPITSCH: It goes on and asks are they mixed with any other materials and lastly are they classified or kept separate or are all materials mixed together?

MR. WRIGHT: They are mixed. Of course, one of the processes for certification is of course -- please repeat part of that question.

MR. KLEPITSCH: I think you just answered it.

MR. LEHMAN: Are there any other questions? Evidently not.

Next I'd like to call Mr. David Russell of the IMC Chemical Groups.

MR. DAVID RUSSELL: My name is David Russell and I am a consultant and one of our plants happens to be a manufacturer of primary explosives.

I would like to start out just very briefly by defining according to a book that has been submitted into evidence is a publication -- No. 3 of the Institute of Makes of Explosives, it's the suggested code of regulations, and I'll read from that for a moment, as far as what the definition of an explosive is.

Explosives -- any chemical compound mixture or device, the common purpose of which is to function by explosion.

The term includes but is not limited to dynamite and other high explosives, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detinating cords, and igniters.

It goes on -- the definition goes

on extensively to define a few more things.

The client manufactures a very diverse group of products including pentarachlor, tetranitrate, nitroglycerine, nitrostarch or treated flower dynamite, and many forms of ammonia and nitrates, nitrocarbonitrates, and forms of nitrocellulose.

All of these have fundamentally several things in common. One of which is they decompose in an extremely violent or explosive manner.

Generally I think the other common characteristic is that they have what is referred to as a very high burn rate. We are talking about products which decompose at a rate of between 10,000 -- I should say in excess of 10,000 and in some cases several hundred thousand, three, and four and five hundred thousand feet per second.

These compounds should not in any way be confined. This gives us a very interesting problem as far as waste disposal is concerned, we butted up against several regulatory agencies in this fashion.

In some states we have been in contact with the DER or Environmental Protection Agency and they advised us to burn this, in an incinerator. Well, this violates every principle of safety that we feel is fundamental to the explosive industry. We do not want to confine this in any way, shape or form. If it's going to blow, it's going to blow and we don't want any confinement or anything else flying around other than the debris that happens to be associated with the particular compound being disposed of.

Other states have an absolute prohibition on burning. They advise burying the wastes. I'm sorry -- some states don't allow burying, they allow burning.

In one state recently we ran into regulatory situations where one division in the air pollution side was saying kindly dispose of your wastes by burning -- I'm sorry, by burying. The other land pollution division was saying dispose of your wastes by burning them.

With a conflict like this we aren't left with much choice.

It's not an easy subject. It's a very complex subject and there are many many types of explosives, incindiaries, and other devices.

In general I think the position that we would like to be put forward by members of the IME, or Institute of Makers of Explosives, is that they feel that the best disposal for explosive and explosive contaminated wastes is open burning, unconfined burning.

Generally these wastes have small quantities and are at extremely remote locations, primarily due to safety considerations, but there are other considerations as well.

Much of the waste can be waste product explosives, waste dynamite, and other products, but there is also a substantial quantity of contaminated waste paper.

This is not a quality controlled product. This is a waste product. There are several problems associated with the disposal of this. Burial is not the final solution. It requires a dedicated land facility, and there are materials which you must put into this facility that are not amenable to volume production. For example, I don't know of anyone in the explosives industry who would even go so far as to suggest using the compactor.

The results could be most disturbing.

(Laughter.)

And I think the final problem is that it poses one of an even greater liability, a landfill site although it's well run, and all that, where does the liability really quit? We try and cover up in our own plants all of the waste products daily. But who is to say that the hunter or the trespasser is not going to come along -- across that stick of product which is going to be misused.

And frankly it worries me. As I think we should be worried. We feel that open burning or burning in some type of approved device as yet unspecified, and as we understand it there may be devices like this which are under development, but at this point these devices are not available.

Open burning is by far at present the best solution available for disposal of this particular type of waste.

I'll entertain questions now.

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January 12, 1976

IN REPLY REFER TO

U.S. Environmental Protection Agency
Office of Hazardous Wastes Management
(AN 465)
Washington, D.C. 20460

Attention: Mr. John Lehman

Gentlemen:

I would like to amend my remarks presented on December 1, 1975 at the O'Hare-Kennedy Holiday Inn in Chicago.

I have recently became aware of a publication #21 of the Institute of Makers of Explosives. This subject deals directly with the destruction of waste explosives. I would like to submit this publication for consideration and would like to have it submitted into evidence in lieu of publication #3 of the IME, as it deals directly with the subject of destruction of explosives wastes.

If you have further questions on this subject, please let us know.

Very truly yours,

David L. Russell

David L. Russell, P.E.
Environmental Engineering
IMC CHEMICAL GROUP

DLR/pc

Encl-IME Pub #21

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# HOW TO DESTROY EXPLOSIVES



January, 1970

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It is often necessary to destroy commercial explosives and blasting agents. These explosives may be fresh material from containers which have been broken during transportation, usable material for which there is no further need on a job, or they may consist of material which has deteriorated or which has become unfit for use through some sort of damage. Deteriorated or damaged explosives may be more hazardous than those in good condition and, hence, require special care in handling and disposal.

Deterioration of explosives may occur after prolonged storage, particularly under conditions of high moisture and high temperature. Explosive stocks should always be rotated in the magazine so that older material is used first.

**EXPERT ASSISTANCE IS POSITIVELY RECOMMENDED IN DESTROYING EXPLOSIVES. THE INSTITUTE OF MAKERS OF EXPLOSIVES HAVE AGREED TO SUPPLY ASSISTANCE IN DESTROYING COMMERCIAL EXPLOSIVES TO FIRE DEPARTMENTS, LAW ENFORCEMENT AGENCIES, INSPECTION AND REGULATORY BODIES, AS WELL AS TO USERS OF EXPLOSIVES. IF THE MANUFACTURER IS KNOWN, SEEK HIS ASSISTANCE. IF THE MANUFACTURER IS UNKNOWN, A MEMBER COMPANY OF THE INSTITUTE OF MAKERS OF EXPLOSIVES WILL SUPPLY THE ASSISTANCE REQUIRED. A LIST OF MEMBER COMPANIES APPEARS OPPOSITE.**

Disposal of bombs or ordnance items should be referred to appropriate military or police authorities.

**WARNING** — A preferred method of destroying dynamite, primers, boosters, slurry explosive, and detonating cord is by burning. It must be assumed that there is always a possibility of an explosion when any of these materials is being burned. Consequently, it is important that a place be chosen for burning which is far enough away from any dwelling, railroad, highway, or other place where people may assemble, to eliminate the possibility of injury to persons, or damage to property, should an explosion occur.

Every precaution must be taken when destroying explosives or blasting supplies to make certain that only one type is destroyed at a time. Dynamite, primers, black powder, detonating cord, and safety fuse must be examined carefully to make certain that no detonators of any kind are included. Any attempt to burn these materials when caps of any description are included will almost certainly result in an explosion.

The American Table of Distances, prepared by the Institute of Makers of Explosives, specifies the quantity of explosives that may be stored safely at various distances from inhabited buildings, passenger railways, and public highways. The 2 to 100 pound portion of the American Table of Distances (as revised and approved June 5, 1964) dealing with the separation of unbarricaded explosives storage buildings from inhabited buildings is given below:

| Explosives (Pounds) | Distances (Feet) | Explosives (Pounds) | Distances (Feet) |
|---|---|---|---|
| 2 - 5 | 140 | 30 - 40 | 280 |
| 5 - 10 | 180 | 40 - 50 | 300 |
| 10 - 20 | 220 | 50 - 75 | 340 |
| 20 - 30 | 250 | 75 - 100 | 380 |

Explosives should be burned at distances *not less* than those specified in the table for the quantity involved. These *minimum* distances will protect persons against everything but the missile hazard; to guard against missiles, they must stand behind and under suitable cover in case missiles develop. The *minimum* distances will also protect the buildings against major structural damage. Obviously, if it is practicable to do so, the burning should be carried out at distances so great that there is *no* chance of either missile injury or minor damage to buildings. No burning should be done near magazines.

**DYNAMITE** — When properly stored and cared for, dynamite will remain in good condition for long periods, in many instances for years, but it will deteriorate rapidly if improperly treated. Dynamite which shows obvious signs of deterioration, such as hardness, discoloration, excessive softness, or leakiness, should be destroyed. If the leakiness has proceeded to the extent of saturating the sawdust in the bottoms of the shipping cartons, or of staining the cartons, the dynamite should not be touched except by a representative of an explosives manufacturer, members of a U.S. Army Ordnance Explosives Disposal Team, or under the direct supervision of a representative of the U.S. Bureau of Mines or a state or local agency designated to handle such explosives. In addition, dynamite may become unfit for use through some damage, such as wetting, and should be destroyed.

Small amounts of dynamite can be destroyed by exploding them in a safe place, but this is not usually practical where larger quantities are involved. The most satisfactory method of destroying dynamite is by burning, which can be done safely providing certain precautions are taken. It is advisable to limit the amount of dynamite burned at any one time to not more than 100 pounds, and local conditions may make it necessary to reduce this quantity materially.

When burning large quantities of explosives, it is often necessary to burn more than one pile at a time. This is safe provided that: (1) the distance from any dwelling, railroad, highway, etc., is *not less* than that specified in the above table, (2) any persons involved are also at the *minimum* safe distance as specified in the table, and are under suitable cover in case of missiles, before the first pile starts to burn, and (3) the piles are separated far enough so that there is no chance of propagation. Propagation can be avoided by spacing the piles *at least* 25 feet apart. This distance covers all quantities up to 100 pounds.

Situations occasionally arise in which the quantity of explosives to be destroyed is so large that it would be impractical to limit the amount to be burned at one time to 100 pounds. In such cases, consult an explosives manufacturer before proceeding.

Dynamite should never be burned in shipping cartons or deep piles. Wooden shipping cartons should be opened with wooden mallets and wedges, using special care in this operation if there are any signs of leakiness. The cartridges should be removed, slit, and spread over the ground, preferably with a mat of loose paper or excelsior underneath them. In no case should the layer of dynamite exceed two or three inches in thickness. Some dynamites are difficult to ignite, hence it is necessary to have combustible fuel beneath the cartridges. If the dynamite is wet, it is advisable to pour a substantial quantity of kerosene or diesel fuel oil over it. The pile should be ignited by a small pilot fire of paper, wood shavings, or other kindling material arranged so that the fire will have to burn several feet before it reaches any explosive material. This will allow the operator ample time to reach a place of safety before there is any possibility of an explosion. It is also recommended that the kindling be arranged so that it can be ignited on the downwind end. After lighting the pilot fire, all persons should retire immediately to a safe place until the dynamite has completely burned. *Minimum* distances are noted above.

When repeated burning is required, a *new space* should be selected for each lot, as it is not safe to place dynamite on the hot ground of the preceding burning. No one should approach the burning site until he is absolutely sure all burning action is completed. Remote examination with binoculars or other such means is recommended. As soon as all dynamite has been destroyed, the ground where the material was burned should be plowed. The residue from burning dynamite contains salts which may be eaten by livestock and other animals with serious results.

Should magazine floors become stained with nitroglycerin, they should be scrubbed well with a mop, using a solution made by dissolving 1 pound of sodium sulfide (60% commercial) in 1½ quarts of water and then adding 3½ quarts of denatured alcohol and 1 quart acetone. The solution should be used freely to decompose the stain thoroughly. If the magazine floor is covered with any material impervious to liquid, this portion of the floor should be thoroughly swept with dry sawdust to absorb the nitroglycerin and the sweepings taken to a safe distance from the magazine and destroyed *in the same manner as dynamite.* The solution of nitroglycerin remover should never be added to standing liquid or unabsorbed nitroglycerin because of the heat of reaction resulting when mixed with large quantities of nitroglycerin. Following treatment, a final scrubbing with water and detergent is recommended.

**EXPLOSIVES BOXES AND PACKING MATERIALS** — All empty explosives boxes, box liners, sawdust, empty bags and cartridges should be carefully collected and destroyed. This is in part because they constitute a potential hazard, and in part because livestock and other animals may eat the paper products with possibly fatal results.

Burning is also the most satisfactory means for destroying such boxes and packing materials. An explosion may take place during the burning, however, either because a little loose explosive is still present or because the materials have absorbed some of the liquid explosive. Thus the burning must be carried out in the open, and in a location such that neither injury nor damage will result in the event of an explosion. All persons involved should proceed to a safe place, at least 100 feet away, immediately after the fire is started.

Waste materials accumulated in loading a shot should preferably be burned after the shot has been made. If they are burned before the shot, the burning should never be carried out either (1) in the shot area, or (2) before the holes have been stemmed.

**PRIMERS AND BOOSTERS** — Primers and boosters may also be destroyed by burning. The primers or boosters should be removed from their cases or cartons, spread on kindling material in a single layer, and burned with the same procedure and precautions as dynamite. Primers and boosters should be checked before burning is started to assure that no detonators are present.

**WATER SLURRIES** — Slurry or water-gel explosives and blasting agents may be destroyed by burning. Some of these materials are difficult to ignite and a generous supply of kindling or the use of fuel oil or kerosene may be required. The technique and safety precautions indicated for dynamite should be used.

**DETONATING CORD** — The preferred method of destroying detonating cord is by burning. It should not be burned on the "spool," or encased in or wrapped with any material that is not part and parcel of the cord by virtue of its design and manufacture. It should be strung out in parallel lines one-half inch or more apart on top of paper or dry straw.

**BLACK POWDER** — This is best destroyed by pouring the powder into a large quantity of water. Pellet powder should be removed from its wrapper to insure quick destruction. Destruction results from the dissolving of oxidizing salts (sodium or potassium nitrate).

**ANFO** — Ammonium nitrate/fuel oil (ANFO) mixtures may also be destroyed by immersing in water or by burning. Water pollution from both ammonium nitrate and oil must be considered. If burning is employed, the technique and precautions for burning dynamite apply. Considerable fuel is required to provide sufficient heat to effect decomposition during burning.

**DETONATORS** — Blasting caps, electric blasting caps, delay electric blasting caps, non-electric delay blasting caps and delay connectors which have so deteriorated from age or improper storage that they are unfit for use should be destroyed. These devices should also be destroyed if they have ever been under water, as for example, during a flood, regardless of whether they have been subsequently dried out. In some cases the shells of caps which have been wet and then dried will show signs of corrosion. Such caps may be dangerous to handle, and it is recommended that they not be disturbed until a representative of the manufacturer has had an opportunity to pass on them.

The method most generally used for destroying detonators is to explode them with dynamite or a primer under some confinement as described below. Detonators should not be thown into small lakes or bodies of water, such as rivers, creeks, ponds, wells, or water-filled abandoned quarries.

**BLASTING CAPS** — If possible it is advisable to explode ordinary (fuse) blasting caps in the original containers. Otherwise they should be placed in a small box or bag. A hole should be dug in the ground, preferably in dry sand, at least a foot deep. The container is placed in the bottom of the hole and primed with at least one-half pound of dynamite and a good electric blasting cap or ordinary cap and fuse. The caps and the primed cartridge should be carefully covered with paper and then dry sand or fine dirt and fired from a safe distance. It is recommended that never more than 100 caps be fired at one time and that the ground around the shots be thoroughly examined after the shot to make certain that no unexploded caps remain. The same hole should not be used for successive shots unless the entire inside surface of the hole feels cool to the touch.

**ELECTRIC BLASTING CAPS OR DELAY ELECTRIC BLASTING CAPS** — To destroy electric blasting caps or delay electric blasting caps, it is necessary first to cut the wires off about one inch from the top of the cap, preferably with a pair of tin snips. No attempt should be made to cut wires from more than one cap at a time. Not more than 100 caps should be placed in a box or paper bag, primed with about one-half pound of dynamite and a good electric blasting cap, buried under paper and sand or dirt, and exploded as described above. It is desirable, especially in the case of delay electric blasting caps, to bundle them together so that the business ends are close together and in close contact with the primer. Of course, the same precautions mentioned in the preceding paragraph should be observed.

**NON-ELECTRIC DELAY BLASTING CAPS** — Non-electric delay blasting caps should be destroyed by cutting the miniaturized detonating cord off from as close to the top of the delay-cap assembly as possible. The miniaturized detonating cord should be destroyed by burning in the same manner as recommended for detonating cord. The delay-cap assemblies should then be destroyed in the same manner as described for delay electric blasting caps.

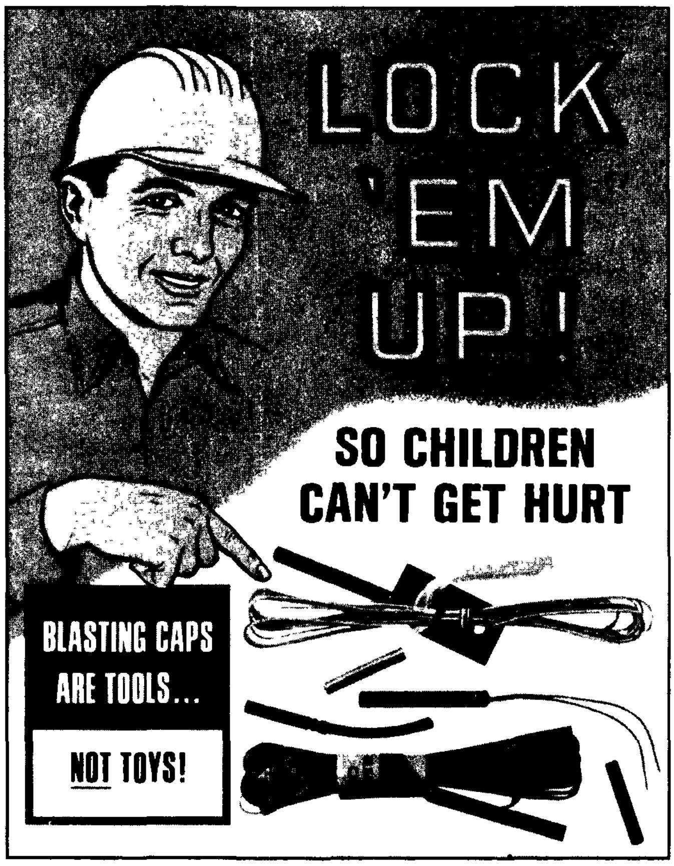
**DELAY CONNECTORS** — Delay connectors may be difficult to initiate in quantity by the above methods. Disposal should be referred to the manufacturer.

**ELECTRIC SQUIBS AND DELAY ELECTRIC SQUIBS** — These devices should be destroyed by the same procedure as that used for electric blasting caps.

**SAFETY FUSE** — This material may be disposed of very satisfactorily by burning in a bonfire.

**ALL OTHER MATERIALS** — The destruction of explosives and blasting supplies not included above should be referred to the manufacturer.

**ALTERNATE METHODS** — Manufacturers are familiar with and frequently employ means of destroying explosives and blasting supplies other than by the methods above described, and such other methods may be employed, but only under the direction of the manufacturer.



MR. LEHMAN: Thank you Mr. Russell. Any questions?

MR. LAZAR: Can you tell us please as

far as you know how does the military dispose of these let's say excess ammunition and explosives?

MR. RUSSELL: To the best of my knowledge, there are some facilities available for military explosives. I understand and I was talking with one your own representatives who tells me that the military burns old Polaris Missiles in open burning.

MR. LAZAR: What sites, do you know the locations?

MR. RUSSELL: I understand these are out in the southwest somewhere.

But I do not pretend to be an expert in knowing exactly what the military does in the burning of their armaments.

MR. LINDSEY: I have a question from the floor.

Do you move explosives from one state to another for disposal?

MR. RUSSELL: Yes, we do. Or you said for disposal, well, no. We do not.

We do not move explosives. Partially because this is a non-quality controlled product. On-site disposal is the best practical alternative at this time. You get into transportation regulations that I wouldn't even want to touch with a ten foot pole.

MR. KOVALICK: When you describe the number of frustrations you have in trying to get good advice on what to do, with these explosives, I was not left with the conclusion of what you do tell your clients -- are they burying them or are they burning them or storing them? I guess those were the three options.

MR. RUSSELL: Yes, to all three.

(Laughter.)

MR. LINDSEY: Do you know of any work which is being done anywhere to -- I guess the word is to demilitarize these things by chemical treatment techniques or something like that.

MR. RUSSELL: Well, offhand no I don't. I would imagine that there is for example I know there are procedures generally used throughout the explosive industry to decontaminate explosive plants when they are finally cleaned up so we presume they can move out of them and be safe, but we're talking about from this standpoint, much of the problem is not so much of disposing of the stick of dynamite or the half ton of nitro carbonitrates, the problem from a safety standpoint, is the disposal of the contaminated waste papers.

I'll put it to you somewhat in this manner -- given an explosives plant would you want to accept the responsibility of taking their waste paper regardless of their assurances that there was no explosives in it? I wouldn't.

I think it is fundamentally that simple. We've got a product here if you'll excuse the vernacular, that can go boom. And a resultant liability with potential loss of life and limb, and I don't feel -- I think that the IME is right in saying that the best disposal of this is open burning.

I might cite a case that I am not totally familiar with, but I have some general knowledge of, and if someone would like to correct me or has better knowledge of it, I would appreciate it, and I would be happy to stand corrected on this.

To the best of my knowledge, there is an explosives plant in the State of Illinois that has a waste incinerator. Now this plant manufactures a type of pyrotechnic or incindiary. Now, we're talking about a piece of material which is primarily like a safety flare, it's a slower burning product. They I understand have incinerators and I have not seen them. But this incinerator I also understand that this incinerator has blown up on them a couple of times.

And this is a pyrotechnic, it is not a high explosive. I think this again goes to characterize the type of problem.

MR. NEWTON: This is a question from the floor, please.

What is being done to eliminate secondary reaction to decontaminated wastes?

MR. RUSSELL: That's a good question. I hate to duck it, but I really don't know. I would venture to say that it may be a problem that needs further investigation but then again I just don't know.

MR. LINDSEY: Yes, I have a question again from the audience.

Does the IME sponsor research in the area of sound waste disposal of waste products?

MR. RUSSELL: Very definitely.

MR. KOVALICK: Perhaps you'd like to identify the name of the individual address of the IME.

MR. RUSSELL: Yes, the IME is the Institute of Makers of Explosives, they are at 420 Lexington Avenue, New York, New York, zip code 10017.

MR. LEHMAN: Any other questions?

Evidently not, sir, thank you very much, Mr. Russell.

Next I'd like to call on Mr. Dean Gregg of the firm of Gaines and Moore.

MR. DEAN GREGG: Thank you Mr. Chairman, I am Dean Gregg, Senior hydrologist for the firm of Gaines and Moore. I'm a groundwater hydrologist and have been for about 15 years, and many of those years have been spent with the U. S. Geological Survey.

About a year and a half ago we started performing some work for a client of ours, Commonwealth Edison, in Ogle County here in Illinois. Commonwealth had purchased a parcel of land, a farm, for a right of way, and some months later sometime later, three dead cattle were discovered in a creek, (intermittant creek) coming from this property.

The cattle were analyzed, tissue samples were analyzed I should say, and were found that the cattle died from cyanide poisoning.

The cyanide apparently came from a large collection of drums and canisters that had been disposed of in this intermittent stream. And then lightly covered with soil. We made a thorough investigation of the soil, groundwater, surface water, and other things for us to determine the extent of the contamination and find out exactly the hazard to the groundwater supply for the users of this supply.

Later Commonwealth Edison removed the -- some 1500 canisters and barrels of cyanide waste, some of the barrels were empty, had been punctured, some still contained some of this material. There was not only cyanide but there was also large concentrations of cadmium, chromium, lead and zinc.

The zinc had been deposited in a -- more or less in a dry form and has since been excavated.

We conducted a series of tests in the laboratory to try and determine the best way of taking care of these cyanides that had contaminated the soil. Because the cyanide was then a source of -- the soild was a source material for the cyanide to leach into the ground water supply after heavy rains.

It was found after running various types of tests that there were several types of cyanides. We had a rather simple alkali salt of cyanide, which was easily oxidizable, and we had a complex metallic cyanide which required much heavier concentrations of our oxidant.

After various -- testing various things we determined that the most feasible solution to use was sodium hydrochloride to try and oxidize the cyanide in the soil.

We ran various field tests to determine the permeability of it and infiltration rates of the soil. A system was designed, conceptually designed and implemented this fall. And the system briefly was that the area contaminated by cyanide was clarified several feet deep, all of the brush and excess vegetation was removed, and then the soil was irrigated with the potassium hydrochloride solution for a designated length of time.

The rate of application and the length of time of application was based on the thickness of the soil and these soil properties. We are at present evaluating the results of this treatment of the contaminated soil.

We are pleased to report that the indications are that the treatment was quite successful.

As I said the zinc area was excavated we are hopeful, along with the cyanide.

I'll answer any questions.

MR. LEHMAN: Thank you Mr. Gregg. I think we have a question here from Mr. Lazar.

MR. LAZAR: How do you involve any well contamination cases in the area which could possibly come from this disposal or maybe some other similar practices in the same general area?

MR. GREGG: How do I evaluate this?

MR. LAZAR: No, are you aware of this?

MR. GREGG: We have picked up abnormal concentrations of cyanide in well water in private wells and also in some of the test wells, monitoring wells which we installed, and incidentally we are still monitoring selected wells.

This is being done in the treatment area and outside the area.

MR. LEHMAN: What was the distance of these affected wells from the disposal site?

MR. GREGG: We found traces of cyanide in well water at distances -- I am saying roughly of a half mile or greater.

MR. NEWTON: This is a question from the floor.

What was done with the cyanide that was dug up?

MR. GREGG: The 1500 odd drum canisters that were dug up were excavated under the care of and by a licensed waste disposal firm.

These drums were taken to that facility and disposed of in the proper manner.

MR. LEHMAN: Mr. Gregg, can you estimate the cost to your customers for correcting this situation?

MR. GREGG: I would hate to -- I don't know if Mr. Jerusak would like to address that.

MR. LEHMAN: Please identify yourself.

MR. EDWARD JERUSAK: I am Edward Jerusak, staff analyst for Commonwealth Edison Comapny, and I'm in charge of this project for the company. And the cost for the whole project to date is in excess of $300,000.

MR. LEHMAN: Thank you very much Mr. Gregg and Mr. Jerusak.

I would like to go back now and call upon some individuals who indicated that they would like to give a statement but were not here when they were called earlier.

I would like to now call Mr. Phillip Lindahl of the City of DesPlaines.

If Mr. Lindahl in the audience? Is Mr. Lindahl here?

All right then, I would like to call upon Mr. David Dennis, State of Michigan, Department of Natural Resources. Mr. David Dennis please.

Evidently he is not able to appear at this time.

Well, ladies and gentlemen, that is the end of our scheduled speakers for this day. I would like to thank all of you very much for coming to this meeting, and I hope that you got as much out of it as I know that we did.

Now these speakers' statements were extremely well thought out, and I am sure will be very helpful to the United States EPA in its further development of guidelines and it is a very important area.

I would like also at this time to express our appreciation to the staff of EPA's Region V which has done a great deal of effort to arrange the facilities for these -- for this meeting.

Let me just ask one last time, is there anyone in the audience who does wish to present a statement at this time?

Okay, there being none, I declare the meeting adjourned, and I thank you all very much.

(Whereupon the meeting was adjourned.)

PUBLIC MEETING

held at the

HOLIDAY INN MEDICAL CENTER
HOUSTON, TEXAS

Tuesday, December 9, 1975
8:30 A.M.

PANEL MEMBERS

John P. Lehman, Director
Hazardous Waste Management Division (HWMD)
Office of Solid Waste Management Programs, EPA

Alfred W. Lindsey, Program Manager
Technology Assessment, Technology Branch, HWMD
Office of Solid Waste Management Programs, EPA

Walter W. Kovalick, Jr., Chief
Guidelines Branch, HWMD
Office of Solid Waste Management Programs, EPA

Emery Lazar, Program Manager
Environmental Damage Assessment, Technology Branch, HWMD
Office of Solid Waste Management Programs, EPA

Donald B. Mausshardt, Chief
Implementation Branch, HWMD
Office of Solid Waste Management Programs, EPA

Herbert Crowe
Solid Waste Management Representative
EPA Region VI

P R O C E E D I N G S

MR. LEHMAN: Ladies and Gentlemen, I call this Public Meeting to order.

Good Morning, Ladies and Gentlemen. My name is John P. Lehman and I am Director of the Hazardous Waste Management Division, Office of Solid Waste Management Programs, U. S. Environmental Protection Agency, Washington, D. C.

I would like to introduce Mr. Raymond Lozano, Director of the Air and Hazardous Materials Division for Region VI of the U. S. Environmental Protection Agency.

MR. LOZANO: Thank you very much. Good Morning. I would like to extend a welcome to each of you at this Third National Hazardous Waste Management Public Meeting on behalf of Mr. John White, Regional Administrator of EPA Region VI.

The purpose of this meeting is to gain a better perspective on needed guidance for the propoer management of hazardous wastes. Management of hazardous wastes on a national scale is approaching a critical level. Problems associated with this issue are increasing at an even more rapid rate in the states of Region VI.

Your presence here today indicates you are all concerned with this important environmental issue. We trust that each of you will actively participate in the meeting. I am sure that this will be a most profitable meeting for all present here today.

At this time I would like to extend an invitation to each and every one of you to attend an Environmental Town Meeting that is being held at Sewell Hall on the campus of Rice University at 7:30 this evening. Our Deputy Administrator, Mr. John Quarles, as well as our Regional Administrator, John White, will be there to discuss some of the environmental issues that affect the Houston area.

Thank you very much.

MR. LEHMAN: Thank you, Mr. Lozano. Let me add my welcome to that of Mr. Lozano.

The purpose of this public meeting, as announced in the Federal Register of September 17, 1975, is to gather information and data for the Agency as to the scope and nature of the hazardous waste management problem in this country and the need for and extent of guidance that should be developed by the Agency to help cope with this problem.

For the purpose of this meeting, hazardous wastes are the non-radioactive discards of our technology-based society. They include the toxic, chemical, biological, flammable, and expolosive by-products of the Nation's extractive, conversion, and process idustries.

This is not a rule-making or regulatory hearing. The Agency does not have a proposal or a statement to issue for comment. This is a fact-finding meeting on the record to solicit input from industry, labor,Federal, State, and local government and from other members of the public as to the extent of the mismanagement of hazardous wastes and the available or anticipated systems and technologies to abate this problem.

In order to provide a framework for discussion today, the Federal Register notice announcing this meeting suggested sixteen discussion topics that reflect issues of concern to the Atency. A commentary on these and any other related topics are what we are most interested in hearing today. Copies of this Federal Register are available on the table at the right in back of the room marked "Publications", and I am also submitting a copy of the Federal Register notice for the record.

MR. LEHMAN: The panel here with me is composed of staff of the Hazardous Waste Management Division in Washington and EPA Region VI in Dallas, who specialize in certain subject areas related to this issue. They are from your left, Mr. Herbert Crowe, Solid Waste Management Representative, EPA Region VI.

Mr. Donald Mausshardt, Chief Implementation Branch of the Hazardous Waste Management Division.

Mr. Walter Kovalick, Jr., Chief of the Guidelines Branch of the Hazardous Waste Management Division.

Mr. Alfred Lindsey, Program Manager of Technology Assessment of the Division.

Mr. Emery Lazar, Program Manager for Environmental Damage Assessment, also of the Hazardous Waste Management Division.

In addition to this meeting in Houston today, three other identical sessions are being held in Newark, Chicago and San Francisco during these first two weeks in December. Persons not wishing to deliver a statement here or at the other meetings may send a written statement to the address noted in the Federal Register before January 31st, 1976.

As our time here is limited, I would now like to describe the procedural rules for this meeting, which I feel will maximize the opportunity for persons interested in speaking to be heard and yet make the best use of all of our time.

Persons wishing to make an oral statement who have not made an advance request by telephone or in writing should indicate their interest on a registration card. If you have not indicated your intention to give a statement and you decide to do so, please return to the registration table, fill out another card, and give it to one of the staff.

As we call upon an individual to make a statement, he should come up to the lectern and, after identifying himself for the court reporter, deliver his statement.

At the beginning of the statement, I will inquire as to whether the speaker is willing to entertain questions from the panel. He is under no obligation to do so, although within the spirit of this information-sharing meeting, it would be of great assistance to the Agency if questions were permitted. It is expected that statements will not exceed fifteen minutes in length. For extraordinarily long written statements, I would suggest a brief oral summary and submission of the full text for the record.

The Chairman reserves the right to close off statements which are excessively long, irrelevant, extraneous or repetitive.

Assuming that the speaker is permitting questions, members of the audience will not be permitted to directly question the speaker. By raising your hand, members of the audience may obtain a 3 by 5 card from a member of the staff upon which questions may be written. These cards will be collected by the staff and returned to the panel for consideration during the question period. If a written question from the audience is not presented to the speaker, because we run short of time, I will ask the speaker to respond to those questions in writing for the record.

A transcript of the meeting is being taken. A copy of the transcript, together with copies of all documents presented at the hearing and all written submissions, will constitute the record of the meeting. A copy of the record will be available for public inspection by March 30, 1976, at the U. S. Environmental Protection Agency, Public Information Reference Unit, Room 2404, 401 M Street, S. W., Washington, D. C. 20460.

In addition, I understand the court reporter in Houston can make the transcript available from the local source here for this meeting only.

A VOICE: Would you repeat that first address, please?

MR. LEHMAN: It is in the Federal Register notice, sir, but I will repeat it one more time. It is the U. S. Environmental Protection Agency, Public Information Reference Unit, Room 2404, 401 M Street, S. W., Washington, D. C. 20460.

Finally, I would like to describe the day's activities as we currently see them. We will recess for a half-hour break at 10:30 a.m., a one-hour luncheon break at approximately 12:15 p.m., and reconvene at 1:15 p.m.

Another half-hour break will be held at 3:30 p.m. Depending on our progress, I will announce plans for a dinner break after lunch. At this time, we plan to conclude this meeting today, and I would say most likely before dinner.

In order to facilitate the comfort of all, I suggest that smokers sit on the left side of the room facing the front and non-smokers toward the right.

This concludes my opening remarks. I now call upon Mr. L. P. Haxby of the Shell Oil Company to deliver the first statement.

Mr. Haxby.

MR. HAXBY: Mr. Chairman and Members of the Panel and this great audience of Ladies and Gentlemen: My name is L. P. Haxby. I am Manager of Environmental Affairs for Shell Oil Company. Mr. Chairman and Panel, you have copies of my statement. The press table has copies of my statement. For the purposes of the rest of the public, there are some additional copies I left over on the press table, if you are interested in having them.

MR. LEHMAN: Mr. Haxby, will you accept questions?

MR. HAXBY: Sir, in my statement I advise we plan to respond further to the questions, more of the questions in the Federal Register. I may wish to reserve an answer to questions. I will be glad to give it a try.

MR. LEHMAN: Thank you.

MR. HAXBY: I am pleased to have this opportunity to provide information to you on behalf of the Shell Oil Company and its subsidiaries on the very important subject of hazardous waste management.

As you may know, Shell Oil Company is an integrated oil company, having facilities for producing, transporting, manufacturing and marketing Shell products in 44 of our 50 states.

Our subsidiaries, Shell Chemical Company and Shell Development Company, are involved with products that range from agricultural chemicals to synthetic plastics. These products require involvement with many hazardous materials in the research phases. Because of this wide involvement, not only geographically, but also in the varieties of activities in which we are engaged, we feel it is important for us to share with you some of our thoughts and experiences.

We believe that responsible industries can better handle their waste disposal problems with a minimum of restrictive regulations. We cite two examples in which we have been involved where innovative management has provided solutions to waste disposal better than those which could have been accomplished with restrictive regulation. Neither of these examples has necessarily been the least costly alternative for disposal of waste materials.

The first of these examples is that of oily waste disposal. At one of our refineries prior to 1970, experimental work had been done in disposal of oily wastes by soil cultivation. This attracted the interest of the EPA and a contract was undertaken at this refinery to further evaluate this method of disposal in early 1970.

After a year of intensive study, we concluded that oily wastes could indeed be environmentally disposed in the prevailing soil and climatic conditions found in the Houston area. The EPA agreed with our conclusion. Costs of this soil disposal method, which included fertilizers, were about three dollars per barrel of sludge containing 33 per cent oil.

More importantly, however, it was demonstrated that this was a viable disposal method that could be practiced on one's own property. This practice, when properly controlled, can provide for monitoring of leachate. It is an effective disposal means which is now being practiced not only by ourselves, but also by other companies.

In 1974, after cancellation of a valid Federal Ocean Dumping Permit, we were obliged to seek alternative disposal methods for some 37 million pounds of organic chloride wastes from one of our manufacturing facilities. Being aware of the experiences with ocean incineration ships overseas, we contracted with Ocean Combustion Services to incinerate these materials in Federal waters.

In due course, this attracted the attention of the EPA and after public hearings, permits were issued for four separate burns at a site in the Gulf of Mexico, 165 miles southwest of Galveston. Comprehensive aerial, marine and shipboard monitoring were conducted in co-operation with the EPA. The results were reviewed in considerable detail in a series of public meetings. From this activity, the EPA concluded that a new method of environmental waste disposal had been practiced in the United States and that, and we quote, "Ocean incineration of these wastes under appropriate permit conditions is an environmentally acceptable means of ultimate disposal insofaras any adverse impact on the marine environment is concerned."

You may be interested to know that the cost of this incineration aboard the ship Vulcanus was approximately $1.3 million. This cost does not include the substantial cost of key government and industry people involved in the testing and monitoring of this operation.

Again, this serves as an example that innovative management, knowing both the characteristics of the waste to be disposed of and the practices of their own industry, can provide proper environmental disposal, often setting the example or leading to new metholds of disposal previously unknown as was done in these particular cases.

Shell has been, and will continue to be a responsible corporate citizen. Our corporation's written public policies state that we will strive to attain environmentally acceptable disposal techniques for all of our wastes. In order to achieve this goal, we must have sufficient latitude to determine the best alternative disposal technique currently available for our own particular waste. Without such latitude, innovative or new techniques can become suppressed.

Turning our attention to some of the discussion topics listed in the Federal Register notice of September 17, we would like to offer the following comments.

A specific, narrow definition of hazardous waste is not practical. Under some given condition, literally everything is hazardous. The distinction must be made relative to the potential hazards of a waste under the conditions and location of disposal and the likelihood of eventual human contact.

We suggest a broad definition such as follows: A hazardous waste is one which requires specially considered, soundly engineered disposal methods to prevent substantial harm, short term and long term, to human, plant or animal life.

We believe that the generator of a waste has the ultimate responsibility to find the proper method and location to dispose of his waste. However, we believe that as the ownership of the waste is transferred from the generator to the transporter, and finally to the treater/disposer of the waste, the responsibility to properly handle the waste in the manner and place described on the Bill of Lading, Receipt Ticket, or Invoice must also be transferred.

To properly audit and monitor such a proposal, we believe that a three-part trip ticket approach should be taken. The three-part trip ticket approach allows the appropriate state agency to monitor not only where the waste is generated, but also how it is transported and finally how and where it is disposed. Several states have now adopted this system. California and Texas are examples.

We believe that a properly informed public is necessary. To achieve this goal, an educational program must be instituted which emphasizes the fact that hazardous waste sites when properly managed and maintained, do not present a substantial hazard to the public.

We hope these suggestions will be helpful to you. We do plan to submit more comprehensive written comments to the requested discussion items in the Federal Register before the close of the public record on January

31, 1976.

I would draw your attention to the attachment with this testimony. We have enclosed for your information excerpts from our internal Company "Guidelines for Contracting Waste Disposal." This report, which has provided guidance to Shell facilities in waste disposal matters for some time, clearly details our Corporate commitment to safe disposal practices. If you have any questions, now I would be pleased to consider them.

Thank you, gentlemen and audience, for your attention.

**SHELL OIL COMPANY**

ONE SHELL PLAZA
P.O. BOX 2463
HOUSTON, TEXAS 77001

January 28, 1976

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs (AW-565)
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Lehman:

Our oral presentation (attached) at the public meeting on Hazardous Waste Management in Houston, Texas on December 9, 1975, stated additional comments would be filed by Shell before the close of the public comment period. We are enclosing for your information additional comments and recommendations on a number of the discussion topics which appeared in the "Federal Register" notice of September 17, 1975.

We hope that the enclosed information will provide some guidance to you in developing a national perspective on this important subject. If you should have any questions, about our comments, please advise.

Very truly yours,

L. P. Haxby

L. P. Haxby, Manager
Environmental Affairs

REO:ddj

Enclosures

## GUIDELINES FOR CONTRACTING WASTE DISPOSAL

Shell has emphasized its corporate commitment to comply with all laws and regulations that protect and improve the quality of the environment, although to dispose of waste materials that result from refinery, chemical plant, and research laboratory operations may become more difficult as rules become more restrictive. Often the disposition of these wastes is accomplished through a contract waste disposal company, but the use of an independent contractor for such a purpose does not necessarily relieve Shell of all responsibility in the matter. Therefore, we must ensure that the waste disposal contractor is meeting his obligations safely and responsibly, and is complying with all pertinent laws and regulations.

Locations contemplating the execution of a contract for disposal of a waste stream should consult with the Environmental Conservation Department, Manufacturing, Head Office, regarding legislation and regulations on solid waste management practices and land use regulations. There continues to be considerable legislative activity on these subjects, and because the Environmental Conservation Department normally keeps up with developments, they may be able to provide early input influencing the decision to contract waste disposal.

The unfortunate consequences of an incident involving an inept or unscrupulous waste disposal contractor can be prevented or minimized by observing some general rules.

a. Know the properties of the waste and the regulations governing its disposal.

b. Know the contractor and the facilities he has available for waste disposal.

c. Both contractor and the Shell facility must fully understand their contractual responsibilities, obligations, and liabilities.

Some guidelines for waste characterization, contractor selection and contract provisions follow in the remainder of this report. Although they will not cover all waste disposal situations, the guidelines can help to stimulate critical evaluation during project development.

A. Waste Characterization

When a facility classifies a material as "waste" and starts to seek a contractor for its disposal, it has usually exhausted all reasonable or economic alternatives for sale, storage or internal

(Shell) disposal. By that time, the facility's laboratory, environmental group, and process engineers have defined well the quantity of waste to be disposed of, its composition, what legislation or regulations limit or apply to its disposal (Head Office Manufacturing Environmental Conservation Department will assist), and any other special or unusual properties of the waste. We should then ensure that all pertinent information including a complete explanation of the hazardous properties, if any, is released to the potential contractor and that he understands it fully. The contractor may wish to analyze representative samples in his laboratory (if he has that capability) and we would normally encourage him to do so. Proprietary information can be protected through execution of a secrecy agreement, but this should be necessary very infrequently, e.g., when disposing of licensed or proprietary catalysts, developmental chemicals, etc. The contractor may plan to reclaim or recycle the waste, and a knowledge of its composition may help in negotiating a favorable disposal price.

Waste disposal contracts should not attempt to be too definitive with respect to the composition of the waste material, since even a slight variance from a stated composition could conceivably justify the contractor in refusing to comply with his obligations under the contract. Also, it is doubtful that the composition of the waste can always be defined accurately. Wastes are normally analyzed by methods developed for nearly pure materials, and the accuracy and repeatability of the analysis may suffer as the number of interfering components increases and the purity decreases. The composition of the waste can vary, since it is not manufactured to meet any specification and may result from production during startup or upset conditions. Consequently, in the contract it is best to define the range of compositions of the waste material; to make the contractor fully aware of the chemical, toxicologic, and other properties of the "usual" or "normal" waste material, and how those properties vary as the composition varies over its extreme limits; and, to establish for the contractor the properties of the "normal" waste and how those properties vary over the composition range.

A waste characterization check list and some definitions that might be used to describe the waste or its properties should be provided. Many of the properties described may not be useful or interesting to the contractor and may therefore be ignored. (A little common sense can help to prevent a great deal of unnecessary laboratory work.) For example, a precise definition of the freezing and boiling points of a liquid waste over a wide composition range is probably unnecessary; the contractor wants to know whether the waste will freeze solid in his unheated storage tanks or boil off on a hot day. Similarly, the heating value will be of interest only if the waste is to be incinerated, and thereby becomes an indicator of whether supplementary fuel will be required.

B. Contractor Selection

Before we contract with a waste disposal firm for removal of wastes, we should determine whether the contractor can do the job properly. We should weigh the experience, stability and reputation of the contractor, and his knowledge of regulations governing the disposition of waste materials in the selected manner. At the same time, we must keep the contractor fully informed about the material to be handled and what we expect from him -- frequency of pickups, monitoring of landfills, other services to be rendered, etc. A contractor who will take any material without knowing its composition and properties is not apt to give us reliable, liability -- free, long term waste disposal service.

We must also determine the contractor's ability to handle and transport the waste materials safely. When the contractor transports the material and a second contractor or subcontractor operates the disposal facility, we will need to determine the capabilities of both contractors. Both should be financially responsible and should provide necessary liability insurance coverage on their operations. The contractor should have the necessary permits for transporting the waste material as well as for the disposal operation. State regulatory agencies in Calfiornia, New Jersey, and many other states have set up procedures for proper transportation and disposal of hazardous wastes, and we should verify that the contractor is abiding with state regulations as well as federal.

Many regulatory agencies require that the disposal site be monitored to insure that no adverse environmental damage results from waste disposal activities. We should determine whether contractors under consideration can exercise the required control of the disposal facilities over the life of the contract. Matters of waste material segregation, maintenance of records and respective obligations should be resolved before contracts are finalized. Any waste pretreatment, specifications for containers, etc., which Shell is obligated to perform, should be defined in the contract, as should contractor responsibilities for pickup, vehicle registrations, etc.

C. Contract Provisions

As noted previously, the contractor must understand exactly what he is disposing of. In many cases the nature of the waste materials will not vary significantly from load to load and only cursory inspection and occasional sampling and routine confirming analysis may be adequate for control. If a change in characteristics is critical to proper handling and disposal, representative sampling and complete analysis may be necessary on a load-by-load or day-by-day basis. Mixed loads of waste materials may present special problems for Shell and the contractor. Improperly characterized waste materials can result in serious problems for both parties. The contractor is not responsible for the nature of the wastes we generate and Shell does not have direct control of the waste handling and disposal practices of the contractor - the integrity of both parties must be maintained or the result circumstances will be difficult, expensive, or perhaps disastrous.

Monitoring the waste disposal contractor performance is essential to safe handling and disposal. Arrangements to periodically observe his materials handling equipment and methods and the ultimate disposal facilities and practices should be established at the time the contract is developed. Follow-up on the status of authorities to transport and permits to operate should be routine. It is important that the contractor activities remain in compliance with all applicable laws and regulations and permit conditions; Shell can help to make the contractor aware of changing requirements and, by providing guidance, can assist the contractor in complying with new regulations. Monitoring is particularly important when more restrictive regulations are being promulgated; when contract termination is approaching; or in cases where permit authority is transferred to a second party.

SHELL OIL COMPANY'S RESPONSES
TO SELECTED DISCUSSION TOPICS IN
HAZARDOUS WASTE MANAGEMENT
JANUARY 28, 1976

1a. Definition - As discussed in our oral statement, a specific, narrow definition of "hazardous waste" is not practical. The distinction must be made relative to the potential hazards of a waste under the conditions and location of disposal and the likelihood and extent of eventual human contact. We suggest a broad definition such as the following:

> "A hazardous waste is one which, when disposed of in sufficient quantities in or on the land, requires soundly engineered disposal methods to prevent substantial and persistent harm to human, plant or animal life."

1b. Criteria - Lists of specific criteria such as radioactivity, flammability, reactivity, explosibility, etc., are found in many decision models. However, from a practical standpoint, the testing requirements necessary to completely classify a waste by all of its constituent properties seems to be an unduly burdensome and unworkable requirement. Some testing is necessary and the amount of testing required will vary according to the nature of the waste, the disposal method and the disposal location. It is suggested that the requirements under this section be compatible with the Department of Transportation's H I System with any additional requirements such as toxicity, for example, imposed only to adequately assure the safe disposal of hazardous wastes and at the same time to realistically minimize the quantity of wastes designated as hazardous which must be disposed.

Under some circumstances it will be desirable to segregate certain wastes at the source by their various characteristics (non-hazardous vs. various degrees and types of hazard) prior to disposal by contractors. In most cases segregation by a responsible, knowledgeable individual should obviate the need for laborious analytical procedures before disposal of a waste may occur.

1c. Sampling - Although the nature of some wastes permits only a grab sample for analysis, in most cases the major characteristics necessary for classification of the waste will be present. Individual sampling techniques should be left to prudent judgment depending on the nature of the waste and the method and location for disposal.

1d. Analytical Methods - Complex mixtures of wastes are difficult to sample properly and even more difficult to analyze. Frequently the process or operation generating a waste involves a single principal reaction with minor side products. Information on the composition of the waste is generally available at the source. Such information can be used advantageously to help describe the nature of the waste and guide any further analyses that may be required to assure the safe disposal of the waste in question. Many standardized analytical procedures are available for sample analysis. Modifications to these existing procedures should be required only to the extent necessary to properly identify the waste.

2a. Responsibility and Liability - Each participant in the ultimate disposal of a hazardous waste should act responsibly. The various responsibilities can be identified as follows:

The Generator is responsible for:

1) proper description and identification of hazards
2) proper segregation
3) proper packaging
4) proper records

The Transporter is responsible for:

1) proper handling and control during movement
2) proper delivery of waste according to Bill of Lading, Shipping Ticket, Contract, etc.

The Treater/Disposer is responsible for:

1) proper treatment and disposal of wastes to avoid contamination of the environment and danger to the public
2) proper records

Assurances that the generator, transporter, treater and/or disposer of wastes has carried out his duties responsibly could be audited via a well designed and enforced three part trip ticket system. While this does require additonal work for all handlers of hazardous wastes, the end result of a well conceived program will be that appropriate state agencies will know what quantities of hazardous wastes are generated, where they are located, how they are transported and where they are disposed. Several states have now adopted this system - California and Texas are examples.

Each participant must also be aware that failure to carry out fully the responsibilities cited above can lead to liabilities. In the past, the generator has often been held responsible for consequences related to his particular waste stream. It is suggested that liabilities should be incurrec by the party responsible for a particular circumstance arising from his failure to adequately carry out his particular responsibilities.

2b. Costs - With the increasing number of regulations which must be complied with, concern regarding the costs and availability of environmentally acceptable disposal sites has mounted. These costs and the burden associated with finding methods of disposal for hazardous waste will ultimately be borne by the general public either as consumers, taxpayers or stockholders.

3. Special Requirements - Depending on disposal methods available, wastes may become unwanted, undesirable, and useless substances. Every effort should be made to reclaim useful values from such wastes before relegating them to a useless category. Consideration of all avenues of useful recovery will take time. Therefore specification of time deadlines or disposal methods may not enable gainful recovery of such values because of the various factors which must be taken into consideration when choosing a disposal method. In some

cases, the most expedient method may not be the best or most economical choice over the long term. There must be sufficient latitude to determine the best alternative disposal technology currently available under the prevailing economic conditions. Without such latitude, innovative or new techniques to recover residual values can be suppressed.

4. Special Treatment - For a number of specific cases technology currently exists by which certain hazardous wastes may be detoxified or neutralized, but a generalized, all-purpose procedure, universally applicable, does not! The waste generator should have sufficient opportunity to investigate these possibilities before an expedient method is proscribed. Methods appropriate for detoxification under one set of conditions may not be applicable to other wastes or other conditions.

5. Costs - Waste disposal costs must be examined on a case by case basis allowing for differences in waste composition, disposal location and the prevailing environmental climate and circumstances. In many cases, contracts may involve not only potentially hazardous wastes but also non-hazardous wastes. In specific instances costs can be supplied. In our oral presentation it was indicated that 37 million pounds of chlorinated hydrocarbon wastes were incinerated aboard the ship Vulcanus at a cost of $1.3 million excluding the time and cost of numerous key government and industry people. These costs are now higher as a result of increased fuel and labor costs and the added control measures required.

6. Safety and Security - Facilities should be protected from curious intruders who may enter an area. Regulations by OSHA and DOT currently protect employees who work in these areas. Regulations proposed by EPA should be consistent with existing safety regulations. EPA should require additional measures only when absolutely necessary for the protection of the general public.

7. Site Monitoring - It is suggested that records of the quantity, type and location of hazardous wastes be filed on a monthly or quarterly basis to a state or local regulatory agency involved in Solid Waste Management. In the case of all hazardous disposal areas, recorded land deeds should specify the location of existing, or prior hazardous waste sites.

8. Insurance Availability - No comment.

9. Long-term Integrity - There is a paucity of information regarding the rate of disappearance of degradable wastes in hazardous waste sites. Information to address this question should be accumulated by the operator of the site. Even if later information on rates of degradation become available, the site should be checked to confirm that the wastes are indeed being degraded at the expected rate and to certify when the wastes have been degraded to a safe level.

10. No comment.

11. Transportation Safety - Current regulations by the Department of Transportation address this issue and current interpretation does not distinguish between wastes and substances.

12. Labeling and Placarding - Again, existing regulations by the Department of Transportation published in Titles 49, 46, and 14 adequately establish requirements in this area. Any new requirements established under a solid waste authority should be consistent with the present regulations.

13. Damage and Cost - In the past, damages and costs have been assessed on the direct monitary losses incurred in correcting an improper disposal of hazardous wastes. Investigation has been limited to finding the generator and assessing clean-up costs, etc. It is recommended that damage and cost liabilities be borne by the party responsible (see 2a) and be assessed according to actual environmental and physical damage caused as a result of the failure of the generator, transporter, treater and/or disposer to comply with their stated responsibilities.

14. Citizen Acceptance - As stated in our oral presentation, we believe that the public who receives balanced information will accept the fact that hazardous waste sites when properly managed and maintained do not present a substantial threat to health or the environment. As a first step in this approach, an education program should be established in the area near disposal sites. This will provide a more efficient and more easily implemented means of reaching the directly affected public.

15. Not applicable to our operations.

16. Private Sector Participation - We believe it will be necessary for both the public and private sector to participate in the treatment and disposal of hazardous wastes. We can visualize certain wastes from Federal facilities (notably arsenals) which may pose peculiar problems. We believe any regulations developed must take cognizance of such problems but they should not attempt to prescribe specific solutions as a part of the general problem.

MR. LEHMAN: Do we have any questions?

MR. KOVALICK: Yes.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: Mr. Haxby, in your statement you commented that Shell has set a high mark I guess for other industries to follow in the management of hazardous wastes, but you point out the disposal methods you have chosen have not necessarily been the least costly alternatives and I was wondering if you had some thought on what would motivate those industries less responsible than yours to choose the higher cost alternatives?

MR. HAXBY: Sir, I have not intended to try to hold Shell up as an example against anyone specifically. We are pleading primarily throughout this for an opportunity, a flexibility, if you will, that flexibility which will allow one to dispose of things in an adequate environmentally sound waste fashion in the most expedient method that he might choose to do that, subject to proper approval.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: Mr. Haxby, you talked about the need for a latitude for developing new techniques and you talk about a trip ticket approach as being something you think that is needed. Could you comment a little more on what other regulatory approach you see is necessary, if any, and perhaps what type of Federal initiative is necessary, if any?

MR. HAXBY: Well, as we know and as we stated, hazardous materials, nearly any material can become hazardous. It does seem reasonable to us that there is some record, some monitoring by states, if you will, as to what is being disposed of where. We like the concept that certain states have adopted of designated sites for different classes of wastes. We suggest the three-part trip ticket to go with that in a sense.

We suggest on our own part that we need the innovative ability of flexibility. To practice our innovative ability, we suggest it is our responsibility to go with Federal Regulations and State Regulations to know who our waste disposer is, to know how he is disposing of it and where it is being disposed of to assure ourselves it is being done properly, as well. Further regulatory practices, I would prefer not to comment on at the moment.

MR. LEHMAN: Do we have any other questions?

MR. KOVALICK: Yes.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: A question from the audience asks you to repeat Shell's suggested definition for hazardous waste.

MR. HAXBY: Repeat it?

MR. KOVALICK: Yes.

MR. HAXBY: We have suggested that a hazardous waste -- I beg your pardon.

If someone has it, would you like to read it?

MR. LAZAR: "A hazardous waste is one which requires specially considered, soundly engineered disposal methods to prevent substantial harm, short term and long term, to human, plant or animal life."

MR. HAXBY: Right.

MR. LEHMAN: Before we go to the next question, I would just like to identify Mr. Alan Corson and Cameron Metcalf, who will be handling questions from the audience here. They are the two gentlemen standing at the rear with their three-by-five cards.

Mr. Lindsey, do you have a question?

MR. LINDSEY: Yes. We have heard in Newark and Chicago that disposal of laboratory waste is a problem and you mentioned that you have a relatively large research facility, and so on. Do you find this to be so and can you enlighten us on how Shell handles these materials?

MR. HAXBY: Yes. It is a problem in certain instances and, no, I do not choose at this time to advise you how we handle those.

MR. LEHMAN: Do we have any other questions?

(No response.)

MR. LEHMAN: Evidently not.

Thank you, Mr. Haxby.

MR. HAXBY: Thank you, sir.

MR. LEHMAN: I would like to call at this time Dr. W. A. Quebedeaux from the Harris County, Texas Pollution Control Department. Is Dr. Quebedeaux here?

We will have to come back and get these at a later time.

Next I would like to call Dr. Nugent Myrick, Houston Chamber of Commerce.

MR. WESTNEY: Mr. Chairman and members of the Panel, I am Jack Westney, staff representative, Houston Chamber of Commerce, appearing for Dr. Nugent Myrick, who apparently had some emergency arise so he could not be here. He is the expert in this field on our committee and, unfortunately, I am not, so I would not be able to answer questions, but I am prepared to give his testimony.

MR. LEHMAN: Could you please spell your name for us for the record.

MR. WESTNEY: W-e-s-t-n-e-y, Westney.

MR. LEHMAN: Thank you, Mr. Westney.

MR. WESTNEY: Most all elements of our industrial society generate wastes. In recent years, multi-level governmental atmospheric and aquatic waste management programs have been formulated and are currently being implemented at a substantial pace. In the case of wastewater treatment, concentrated wastes which may not be treated in a dilute wastewater control system are excluded. These materials along with the concentrated residuals, that is sludges, which result from the dilute wastewater treatment and the treatment of air pollutant control systems wastewaters pose a new type of waste management concern.

It is the unique physical, chemical and biological properties of selected types of these residuals that bring us together today to discuss the fate of these materials in the environment. It should be emphasized that this group of waste materials is not new, just becoming more significant as more air and water pollutant control systems are becoming operational.

Therefore, we should approach the development of environmentally acceptable solutions in handling these materials in an orderly technical manner. Similarly, we must educate the public on the handling of these materials in our communities just as we have done for other wastes.

We are pleased to note that the Texas Legislature addressed itself to passage of legislation, Solid Waste Disposal Act, for control of these wastes in 1969. The line responsibility of regulatory authority in control of these materials of industrial origin was assigned to the Texas Water Quality Board.

It should be noted that this agency has responded in establishing information on previous handling methods of these materials as well as developed strong regulations on handling them today and in the future. In this regard, this agency has either just recently adopted or is formulating -- and I believe it has adopted -- new regulations which are very rigorous with respect to identifying past waste handling practices on land, as well as new regulations for their storage, collection, transportation, processing and ultimate land placement. We strongly support these efforts and are of the opinion that they will provide the basis for a responsible program by each waste generator in the state. Our cities are working to effect these requirements to the inner city smaller industries.

At this point we should be concerned about the economic impact of these new requirements on both the consumer and industry. Due to the lack of understanding of the reliability of process technology by the public, regional processing centers for these wastes often cannot be built in or near our urban areas. Similarly, ultimate disposal facilities have not been developed. As a matter of fact, only one site exists in Texas for the handling of many of these materials. Excessive transportation costs and the wastage of energy must be eliminated.

Again, this can only be achieved by rigorous education programs for the public. We are pleased at the recent efforts in this regard by your agency in explaining to the public the application of incineration of specific wastes in very specialized equipment in the Gulf of Mexico. Even though this technology was used in Europe, substantial improvements were made prior to processing these wastes in the United States.

To permit further developments in technology in handling and processing of rather specialized wastes where limited volumes occur nationwide, we request your agency to provide assistance in developing nationwide process center siting policies, including appropriate transportation considerations.

In closing, the most urgent consideration in the management of concentrated wastes which may possess limited hazardous properties is public education on proven technology to solve this growing urban waste management requirement. This effort could lead to the understanding of the need and acceptance for urban facilities to process these materials for recovery of resources or energy volume reduction or ultimate land placement in an environmentally acceptable manner.

These materials are generated in rather small volumes from numerous locations and for the most part must be processed locally. Therefore, we are of the opinion that major line responsibility of planning, permitting and monitoring of operations and enforcement of regulations in all aspects of management of these materials should be a state and local activity.

We request that your agency enhance its educational efforts in a very positive mode, that is, not dwell on the past, but project reliable and meaningful current technology and assist in pacing new technology.

Thank you.

MR. LEHMAN: Thank you, Mr. Westney.

I understand that Dr. Myrick is with us and perhaps might be able to answer some questions.

MR. WESTNEY: Yes. I am sure that he could.

MR. LEHMAN: Do we have any questions from the Panel?

Mr. Kovalick.

MR. KOVALICK: Dr. Myrick, I was wondering, in the prepared statement you suggest that the Agency provide assistance in developing "nationwide process center siting policies, including appropriate transportation considerations." Would you care to elaborate on that? Are you suggesting that the Federal government be involved in the siting policy decisions and could you comment on that?

DR. MYRICK: I think the Committee's main interest in this regard is basically along the line that there is a lot of specialized wastes that require very intensive solutions to the problem of solving and handling these appropriately.

What we would like to propose is to make sure we do not have transportation barriers placed on the transport of these materials in a safe manner.

MR. LEHMAN: You will have to speak closer to the mike.

DR. MYRICK: O.K. To repeat, our basic interest is in regard to the fact that many small volume wastes are generated to require a very unique intensive solution. We can handle these waste materials in a very effective manner, provided we get the economy of scale necessary to provide the facilities to handle the problem. We see some "no importation" barriers and we have heard of transportation problems across certain states and we need to make sure we can move these materials to get to the best processing facility to handle it.

Now whether the Federal government owns it or not is academic. I think the key question is to make sure we have the facilities available and there are no transportation barriers permitted, provided they meet the proper DOT specifications to transport.

MR. KOVALICK: Perhaps I can get you to elaborate. Does your knowledge of DOT regulations regarding the transport of hazardous materials lead you to believe that they are in themselves sufficient for the transport phase, and the second part to that is, are they sufficient at the treatment and disposal site in terms of, for example, labeling and placarding of the waste materials?

DR. MYRICK: You are asking for a lot of generalized information here, you know. In some cases, yes, they are adequate. In some cases they are not.

Now I don't think you can go down the laundry list of many hundreds of these lists at this time. I think there are administrative procedures that can handle the problem once we understand the concern, but these things are not real until you say, I need to process so much polyvinyl chloride waste in the Gulf of Mexico and we agree that incineration at sea is a valid method of handling this, and we need to get those materials, say, to Houston, Texas, and put them on a ship to go out. Then you can sit down and start addressing yourself to ways to get the material here and you can very effectively find out the reality of this in its true meaningfulness.

The key issue is to make sure that we have good credible end solutions to the problem and we can get an economic scale to achieve that goal.

MR. LEHMAN: Do we have any other questions?

I will remind the audience if you wish to address a question to the speaker, merely raise your hand and our staff will provide you with a three-by-five card to write your question down.

Thank you, Mr. Myrick.

DR. MYRICK: Thank you for being on time. Your agency called and said be here at 9:00 o'clock, and I walked in the door. You are always very efficient.

MR. LEHMAN: At this time I would like to call Ms. Brenda Gehan of the League of Women Voters.

MS. GEHAN: Thank you.

MR. LEHMAN: Ms. Gehan, will you accept questions?

MS. GEHAN: Yes.

My name is Brenda Gehan. I am Water Quality Chairman for the League of Women Voters of Houston. The statement I am presenting today is given on behalf of the League of Women Voters of the Bay Area, as well as the League of Women Voters of Houston.

Our organization is not a technical group, but has studied the problems of solid waste management and land use on the local, state and national levels. We have locally encouraged the efforts of the Texas Water Quality Board and the Texas Air Control Board to enforce anti-pollution laws.

Compliance by industries with the provisions of these laws, along with a continuing expansion of technology, has intensified the problem of the management of hazardous wastes.

The threat to public health and to the environment posed by the indiscriminate and unsupervised disposal of hazardous wastes is a concern not only to us, but to many other citizens.

Documented instances of contamination of groundwater because of improper disposal of hazardous wastes are readily available. For example, there is the Perham, Minnesota case where eleven persons developed arsenic poisoning after drinking well water taken from soil where fifty pounds of arsenic had been buried over thirty years previously. Estimates of the cost of correcting the problem are around $28,000.00, an approximate cost of $560.00 per pound of waste.

The death of a bulldozer operator at a landfill near the Raritan River in New Jersey caused by the explosion of a drum of unidentified industrial waste chemicals points out the dangers of accepting such wastes.

Local examples include the French Ltd. dump which operated near the San Jacinto River close to Houston for several years. Water wells and soil near the dump were contaminated, and a continual wave of offensive odors infested the air. Fishing and recreational uses of the nearby river had to be abandoned. Frequent fires gave evidence of the combustible and dangerous nature of the black, oily material present in the area streams. After an agonizingly long struggle during the early 70's, the Water Quality Board finally closed the dump in 1973 after a flood of the area. The land, which now belongs to the State, has not been properly covered and is not able to be used right now for any purpose.

The Sheridan industrial waste dump near Hempstead threatened the Brazos River with pollution by hazardous wastes after heavy rains in 1974. Also in 1974, approximately 5,000 barrels of industrial chemical wastes from industries in Dallas, Austin and Houston were found abandoned in unpermitted waste dump sites in Travis County. The Texas Water Quality Board brought suit against the dump manager, and finally in early 1975 the wastes were properly disposed of at the expense of the industries concerned.

The increasing amount of hazardous wastes being produced by industry, agriculture, government, hospitals and laboratories requires that a program for managing these wastes be developed. We support the EPA's efforts to devise regulations for management of hazardous wastes, including transportation, storage, treatment and disposal. The Solid Waste Disposal Act gives EPA the authority to set forth guidelines. We commend the EPA for the efforts they are making to accumulate a comprehensive data bank on which to base their guidelines, and hope that the guidelines will be promulgated speedily.

The League's position on the environment states that "the Federal government should establish policies and programs to increase the demand for secondary materials to encourage recycling of post-industrial and post-consumer waste, and to reduce the generation of solid waste," and that "the role of the Federal government should be expanded, although the major responsibility for solid waste management should remain with the State and local governments."

In the management of hazardous wastes, we identify the following concerns:

1. There must be strong, uniform regulation of hazardous wastes through Federal and state legislation.

This regulation should be supported by economic incentives, because the private sector must play an important role in hazardous waste management, and the regulation should cover all parties who participate in any phase of hazardous waste management. Vigorous enforcement procedures, following upon inspection and monitoring requirements are essentials. The use of criminal, as well as civil penalties against violators should be considered.

Possible means of implementing such regulation include: Use of state or regional agencies, registration of all generators of hazardous wastes, issuance of permits to qualified hazardous waste disposal facilities. A new set of regulations governing hazardous waste management, recently adopted by the Texas Water Quality Board, embodies many of these provisions, and will go into effect in 1976 here in Texas

2. All disposal sites should be carefully recorded, well-planned according to the best technical knowledge and corrective measures applied to existing sites as needed. The need for long-term care of disposal sites and the potential problems associated with private sector ownership of such sites argues for the use of public lands for hazardous waste disposal sites. Publicly owned disposal sites could be leased to private firms, but legal title should remain with the governmental body. Alternatively, once a privately-owned landfill site were closed, according

to a set procedure, it could be deeded to the government.

3. We believe that any generator of hazardous wastes should be held financially responsible for the proper disposal of these wastes as part of his production costs. He should be legally responsible for them until he has disposed of them in accordance with regulations or delivered them to a facility authorized to provide ultimate disposal. Fines for violations should be significant. The regulatory agency should have access to all information regarding transportation of wastes.

4. Processing facilities to provide recycling reduction, detoxification, incineration, or safe packaging if needed should be available either at the generator site or at a designated hazardous waste disposal facility, whichever is more environmentally acceptable, and economically preferable. Exchange of wastes should be encouraged.

5. As to the choice of disposal methods: Injection wells pose too great a hazard to groundwater supplies to be acceptable; ocean dumping is dangerous to aquatic life and to consumers of fish and seafood. Incineration has replaced ocean dumping as a technique for disposing of some industrial hazardous wastes and can also be acceptable for the disposal of some explosives and military wastes, providing that precautions are observed to avoid air pollution.

For the majority of hazardous wastes, a disposal facility should consist of a secure chemical waste landfill and the appropriate equipment and structures necessary to carry out burial and surveillance. Proper site selection is crucial, as is the use of the proper liner material for the expected wastes.

Besides the social, economic and commercial considerations involved in closing a landfill site, there are geological criteria: Low groundwater contamination potential; location away from floodplains; natural depressions, existing wells; low rainfall, high evaporation rates; soil with high clay content; location of base sufficiently above the high water table; location with no hydraulic continuity with surface or subsurface waters.

We urge the use of public hearings on the siting of hazardous waste disposal facilities.

There is so much controversy among scientists concerning radioactive waste disposal that an informed statement is almost impossible to make. Some scientists feel nuclear waste storage does not pose a technical problem and, although lives will be lost in a nuclear economy, the alternative paths will have an even higher cost in lives and dollars. Other equally renowned scientists say that enough is simply not known about technical problems of nuclear waste storage to make those predictions.

What is apparent is that nuclear wastes pose a special threat to humans and their environment. Since this is the case, we recommend caution and restraint in all aspects of nuclear waste disposal. We must proceed with care and make sure that we don't leave an unmanageable problem for future generations.

Without question, a comprehensive program to deal with hazardous wastes will be expensive, and we know that the consumer will have to bear the brunt of this expense through higher prices and taxes. However, the real question is what happens in our expanding technological society if we do not face this task of properly disposing of our hazardous wastes. We must remember that reckless disposal of hazardous wastes from hospitals, laboratories, industries and municipalities will only result in incalculable costs to health, life and property.

On this subject, it is interesting to point out some results of a nation-wide survey completed in August of this year by the Opinion Research Corporation. Ninety per cent of those persons surveyed agreed that if we do not start cleaning up the environment now, it will cost more money in the long run. Moreover, sixty per cent said it was more important to pay the costs involved in protecting the environment than to keep prices and taxes down, and run the risk of more pollution.

We believe that, although the management of hazardous wastes is a technical subject and unfamiliar to the general public, it is so necessary for EPA to continue its fine work in educating citizens about this extremely vital program. We urge that the public be involved throughout the regulation process, requiring public hearings on the siting of hazardous industrial and governmental installations and their waste disposal operations. We further believe that citizens should have the right to sue to enforce public health and environmental requirements applicable to the future regulations.

With this kind of public involvement, we believe that responsible citizens will be ready to support a program designed not only for the safety of themselves, but the safety of future generations.

Thank you.

MR. LEHMAN: Thank you, Ms. Gehan.

Do we have questions?

Mr. Lindsey.

MR. LINDSEY: In previous meetings, we have heard from a number of people that the siting of hazardous waste, chemical waste disposal sites and other hazardous waste treatment facilities, and so forth, is difficult at best and in many cases an impossible task.

Could you comment further on that as to

whether you see that as a problem in this area and how this particular problem might be overcome. Do you have any thoughts on that?

MS. GEHAN: It obviously is a serious problem, but our feeling is that if people are made aware of the necessity for them, of the enormity of the problem, and of the consequences of not dealing with this properly that people will be more ready to support whatever programs are instituted by the use of public hearings where people can be made aware of the problems and of the possible sites being considered. I think that by bringing them into the decision they would be willing to accept the necessity for it and go along with whatever choice is made.

MR. LINDSEY: Do you feel the State or Federal government should have some sort of educational program for the public at large? Would that be helpful?

MS. GEHAN: I certainly do. I think the publication that you have put out already is a good publication. I think the EPA does a very good job of putting out publications for the general public. I think this is an area that really does need more ....

MR. CROWE: What do you feel is the actual League's role in this specific issue?

MS. GEHAN: I'm sorry. I didn't hear you.

MR. CROWE: What type of a role does the

League feel that it can serve best?

MS. GEHAN: Well, the League tries to promote informed citizens. I think the League would endeavor to inform its members of the seriousness of the problem and of the issues to be considered and would attempt to lobby for effective legislation on a Federal and state level.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: I was interested in your comments regarding the possibility of deeding all sites ultimately to the government, State or Federal.

Does the League have any further thoughts on that subject? We have given it some thought and it's obviously fairly controversial because then the government becomes custodian, whatever level, of sites for perpetuity in much the same as nuclear waste.

Do you still feel, or perhaps you could elaborate why you feel that is the wisest approach from an acceptability point of view, or management's point of view? Could you comment further?

MS. GEHAN: I think what the statement says is that there is always a temptation when property is owned by an individual to wish to sell it eventually and many of these sites really need to be kept undeveloped and unused for a good long period of time and it would seem to me the government is in a better position to keep the land unused than perhaps an individual, although it is agrued that in a deed one could note that certain property had been used as a disposal site. It is a matter of let the buyer beware. Maybe it is much for the buyer to be aware of something as complicated as this.

As an example, the land where arsenic poisoning was buried, 30 years later someone came along and put an office building on that land and drilled a well and people were poisoned. Maybe if it had been in the deed, maybe a person would have found it, but it would have to be pretty clearly indicated, I think, before I would feel comfortable about it.

MR. LEHMAN: Mr. Mausshardt.

MR. MAUSSHARDT: I have a question from the floor here.

In your statement, you urge that the generators of hazardous wastes be held responsible for the disposal. Why not have a certificate or licensing system for solid waste disposal contractors?

Do you have any comment on this?

MS. GEHAN: I think what I said was either they would be able to do it themselves or transport it to a facility that was licensed to do so and I think in many cases the use of regional facilities is more economical and more environmentally acceptable, so I think we feel whichever is more suitable to the particular instance would be all right.

MR. LEHMAN: Are there any more questions?

Mr. Lazar.

MR. LAZAR: Ms. Gehan, you indicated that it would be desirable to have economic incentives for future Federal and state hazardous waste regulations. Would you please elaborate on what you have in mind, what types of economic incentives perhaps, and by whom, by Federal or State governments?

MS. GEHAN: Well, it's possible to consider things like tax breaks. We go into this initially, because there aren't that many companies in the field at the present time and to get companies ready to go and do this in a fairly short period of time, tax incentives are certainly a possibility. This is something that was talked about in 1966 or 1967 for companies that would install pollution abatement equipment without being coerced, giving them tax incentives. Something like this might get a program like that started quickly. It seems to me it needs to be done.

MR. LEHMAN: Thank you, Ms. Gehan.

Any other questions?

(No response.)

MR. LEHMAN: Apparently not. Thank you very much.

Next, I would like to call Mr. C. Leon Pickett, Citizens Against National Nuclear Overkill Technology.

REV. PICKETT: Good Morning. I am the Reverend C. Leon Pickett and for your information, I am blind as a bat and I broke my glasses this morning. So I am asking the one person who has done the most to make it possible for me to be here, as well as everything else I do, my wife, Ms. Teresa Pickett, to read this to you. I ask you for your attention and consideration. I will return to the podium to answer any questions that there may be.

Thank you.

MS. PICKETT: Remnants of Progress, and I quote:

"I am Reverend C. Leon Pickett, Director of C A N N O T, and I am here today to pray for your most earnest attention to what I have come to say for if it were not the most important and the most pertinent statement that you will hear at this or any other place, I would not be here.

"I want most sincerely to thank each and every member of this assemblage for being here today, for by our presence we demonstrate concurrence on the existence of a problem together with our mutual desire to find and implement a solution to the problem, and I use the singular inclusively.

"We are living in an age of miracles and indeed, it would seem that our great and magnificent nation has not only matured on a diet of continuing miracles, but has come to a point where it has developed, if not a need, then certainly a desire for miracles of ever-increasing magnitude for as we stand on the bicentennial plateau we can look back upon fantastic growth and wondrous rewards for the implementation of our intellect and our integrity, and we may take pride indeed in our accomplishments to date, but only if we are prepared to accept the responsibility for what we have done or what we have not done to handle the remnants of progress which brings us to my reason for being here.

"In our effort to produce some new miracle, we have laid waste to some of the deadliest substances known to man and we have poisoned our environment because of it, but as usual what we have done in the past is trivial by comparison to our gigantic success in the present.

"However serious other waste management problems may be, they are all secondary to the dread danger, to the creeping genocide of the stockpiles of waste materials spewed out by the nuclear power plant that we had looked forward to with such great hope, and have come to view with such absolute horror.

"Radioactive waste materials, which are the remnants of progress in the nuclear power technological field, defy management, threaten each and every form of animal life and are a source of contamination which must lead to the insidious creeping death by cancer which is their national function.

"Radioactive substances defy management primarily because there are very few storage methods which can retain the cancer-causing gamma rays which are emitted, and because of the incredibly long life of radioactive particles, for instance, plutonium has a 1/2-life of 24,000 years which means simply that in 24,000 years the plutonium waste shall have reduced its volume by 1/2 and will require another 24,000 years to half the remainder, and we might consider radioactive iodine which has a 1/2-life of 120,000 years, but why should we bother since it is readily apparent that there is only one way such substances can be properly managed and that is to simply declare a moratorium forthwith on the development and use of all nuclear substances and the playing into extinction of all ongoing systems until such time as our ingenuity can develop the technology with which to render nonradioactive (harmless) those waste materials from the implementation of nuclear technology which are presently being spilled, slopped, dripped, dropped, oozed and otherwise exuded into the environment where they will eventually move into the food chain and induce a multiple increase in the incidents of cancer among all the people of the world resulting in a gigantic worldwide act of genocide.

"In closing, let me just make one thing very, very clear, it is already too late to stop the manufacture of the death-dealing plutonium, a substance that does not even exist in nature, but it was created by man and its further development could be halted on order, and it must be.

"The Government has wasted approximately three trillion dollars which it has stolen illegally in the form of excessive income tax levied against taxpayers and handed over as a gift to the electric power industries of this nation to play with in their quest for a thermonuclear disaster, and because of this I would like to suggest that you carry back to Washington a message that the twenty million people who refuse to pay income tax to fund government boondoggles this year will be encouraged to grow to fifty million nonpaying previous taxpayers in 1976 for we will refuse to fund such idiot programs on the simple basis that there has been no legal money in circulation in these United States since 1968, and that therefore no one has received lawful funds against which income tax may be legally assessed, which means in simple terms that no one is legally obliged nor may be compelled to pay income tax on Federal Reserve Notes which are not legal tender nor constitutional money and, further, that all employees may and should demand that their employer cease forthwith any withholding from their pay checks, and by this act we should revolt against the deadly disaster of creating a waste material with which we C A N N O T live by refusing to furnish the funding therefor.

"May God bless you, and thank you."

MR. LEHMAN: Mr. and Mrs. Pickett, I would like to just comment that the proceedings here today concern nonradioactive waste, although we realize that radioactive waste management is a problem, I would like to confine our remarks if we can to the nonradioactive problem.

REV. PICKETT: John, I would like to talk to that, if I may. I heard you complimented for your efficiency here just a few minutes ago. Your efficiency extends to the fact that when I wrote to Washington some week ago asking to speak at this meeting, I was scheduled to speak in San Francisco. I thank you for that.

I know you are well aware from previous contact with me how strongly and how intensely I and my organization have worked to stop the flood of nuclear power plants. I am aware from previous waste management meetings that waste management is just not interested in discussing the only waste that is worthy of discussion, because if we don't stop the dumping of nuclear waste into the environment, and that is what we are doing, we won't live long enough for the other waste to matter a damn, so I don't think you can just not include it because I think it is the one and only vital proper question before you.

MR. LEHMAN: Are you prepared to answer questions?

REV. PICKETT: I certainly am.

MR. LEHMAN: Are there any questions from the floor or panel?

(No response.)

MR. LEHMAN: Apparently not.

REV. PICKETT: I recognize the conspiracy of silence. Thank you.

MR. LEHMAN: Next I would like to call upon Roger Sims, from Lakeland, Florida.

MR. SIMS: Mr. Lehman, Ladies and Gentlemen, I don't have a prepared statement to give. I called Mr. Mausshardt last week and got a call back that I would have an opportunity to speak this morning. I have a few remarks to make, but they will be just informal.

I am an attorney from Lakeland, Florida with the Law Firm of Holland and Knight and we represent numerous companies which mine and process phosphate ore to make fertilizers.

I think before I say anything further, it is important that everyone understand all the clients we work with have a very high level of consciousness in terms of corporate responsibility and the need to be good corporate citizens. I think considering the multitude of regulatory processes that must be complied with, that there are existing now to a large degree sufficient safeguards pertaining to the disposal of industrial waste.

There is, for example, in our part of the state, if you have an impoundment system and you need to discharge water from it, you have to get three different permits, a Regional Permit, a State Permit and a Federal NPDES Permit.

Gentlemen, I realize there may be some areas that are not covered by local, state or Federal existing regulatory procedures, but I would urge the Division, your Department, to take notice of and make provision for existing procedures where they do provide adequate regulations.

In Florida there is a Code pertaining to the development of regional impact. If you meet certain criteria you must file a comprehensive environmental impact statement at the state level. And as part of that, for example, to dispose of tailings, sand and clay that are left after the ore is separated from the matrix, you have to get approval and it is comprehensive under this state environmental impact statement. You must also meet requirements imposed under the State Severance Tax Law and do extensive reclamation. So in that situation, there is more than adequate review and consideration.

I don't think that is an instance of hazardous waste, but is an example of the type of regulation that is going on. So I would say when you are drafting guidelines that you consider carefully making provisions for existing state and local processes and provide an exemption if the handling of the waste is already being permitted and regulated.

I would also strongly urge, I think on behalf of industry in general, that input such as this meeting is critical and when you get to the drafting stage it would be helpful for all parties to be affected and involved in the process to have the opportunity to sit down over the conference table and talk about the best way to handle the problem, after you have identified the problem areas, and give various people with different points of view the chance to get their input into the process so that the best alternatives can be selected.

I don't have any further comments to speak of. If anybody has any questions, I would be happy to answer them, but that is the essence of what our thoughts are.

MR. LEHMAN: Thank you, Mr. Sims.

Are there any questions?

Mr. Kovalick.

MR. KOVALICK: Mr. Sims, do you have any

suggestions from the point of view of the industry that you represent as to the need or lack thereof for guidance on the subject of either the waste specifically from your industry or the places to which your industry takes its waste, presuming that some of them might be termed hazardous?

MR. SIMS: To tell you the truth, I don't believe there is a hazardous waste problem in the industry. I honestly don't. Although when I looked at the discussion topics, I saw it was completely wide open, that this would be one of the things to talk about today. I am really not sure that mining by-products, the sand and clay and so forth, have anything to do with the realm of what we will be talking about today.

However, at this point, since you are seeking general guidance on what areas to hit, I thought it would be helpful to point out that in Florida, for example, there are other comprehensive regulatory programming procedures and they should be carefully considered.

MR. KOVALICK: You made reference to a disposal pond from which there might be water emissions, I presume surface emissions. Is the ground water protected in the State of Florida in some fashion from waste disposal as opposed to surface water?

MR. SIMS: That's a good point. Under the state regulatory procedures, the State Department of

Environmental Regulation has specific jurisdiction to control the ground waters of the state. When you do a DRI -- I think it's a good example; this would apply to not only mines, but industrial plants, chemical plants, what have you -- you have to do extensive work in geology to show the disposal site at the various levels, strata, any ceiling layers, and so forth. It is very involved and it is very, very comprehensive.

It just seems to me where you have a procedure like that there is no point in going through another permitting procedure, one more set of guidelines to just lay another overlapping permit on top of the heap.

I did a tally of permits for one of the developments I'm working on right now and there are fifteen major permits. It's a regulatory hassle. It's just amazing.

I'm not saying the agencies are not doing the best they can and working as efficiently as possible, but just the number and the complexity, the details that have to be complied with, is considerable.

MR. MAUSSHARDT: I have a question from the floor. The question is stated as such: are environmental impact statements required related to EPA regulations, or are they as a result of EPA regulations in Florida?

MR. SIMS: The statements I was referring to are required under Chapter 380 of Florida Law. Now in addition to the State Code, as many of you may know, if you obtain a Federal Permit, a NPDES Permit, A Corps Dredge and Fill Permit, you may be required to file a Federal impact assessment under NEPA, the National Environmental Policy Act of 1969, and in turn the permitting agency would write an impact statement on the basis of that subject. So there are two and we may have to do both statements for certain developments. So they are parallel.

MR. LEHMAN: Does anyone have another question? Mr. Kovalick.

MR. KOVALICK: A question from the floor. What happens to the uranium in the waste for phosphate production?

MR. SIMS: Uranium?

MR. KOVALICK: Yes.

MR. SIMS: Are you talking about a mining operation? Is this mining or a chemical plant?

A VOICE: This is the extraction of phosphates from your phosphate deposits. It unavoidably releases the uranium presently in the rock. Now that's in your waste water. If you don't have any industrial waste problem, I would like to know what you do with uranium.

MR. SIMS: There are natural background levels in the matrix.

A VOICE: They are concentrated significantly in the extraction of phosphate values from the ore. They reside generally in waste water. If you put this in the stream -- I wouldn't put it in my stream if I had one. I wonder what in Florida is the ultimate state of uranium that is concentrated in the extraction process?

MR. LEHMAN: Excuse me, please. None of the other audience can hear this dialogue, so I would like to eliminate that, if possible. The question really is what happens to the uranium, which is a by-product of the manufacturing processing in the phosphate industry? Could you address that question, please?

MR. SIMS: Let me say the background levels of uranium that exist in the ore may be in the processed water. There is a circulating water system. The ore is taken to the beneficiation plant and separated, the result being tailings and water which is recirculated.

If there is any discharge of that water from the site, it must meet, as I mentioned earlier, three permitting requirements, regional, state and Federal discharge requirements. So the processed water itself is contained on site completely.

MR. LEHMAN: Are there any other questions?

(No response.)

MR. LEHMAN: Evidently not.

Thank you very much, Mr. Sims.

I would like to call upon Dr. James Robertson, of the University of Oklahoma. Is Dr. Robertson here, please?

We will have to come back and check with him later.

The next, I would like to call Mr. Jack Woods, the Taxpayers' Rights Association. Is Mr. Woods in the audience?

Mr. Woods, will you answer questions?

MR. WOODS: Yes, of course.

Ladies and Gentlemen, no one, especially no one in our organization, Taypayers' Rights Association, wants more government. We don't want the EPA any more than you do, but this is brought about when local and state officials do not do the job which they are elected or appointed to do, and that is protect the public.

Now when it comes to lenient, stupid or corrupt officials, our state will take a back seat to no one, so you are, therefore, welcomed by some of us.

The brains, financial and political power represented in this room is tremendous. The group of people represented here control this state, they own the politicians collectively and individually. It is only a shame their power is not matched by their morals.

Individually, every one in this room I am sure is a very nice decent outstanding and upstanding citizen.

Collectively, there is a lack of moral consciousness that is appalling. Now those of you who defy the norm and are trying to keep from poisoning the atmosphere and the streams, and all, are to be congratulated. Remember, guilt is the only thing that shrinks the more you spread it.

Now, I have just found, too, in the past month or so that there is a Communist plot to clean up the water of the world. Now let me hastily remind you this is said only as a joke. I mentioned it to someone recently and they said, My God, don't say it. They'll be saying you are like other people that have been blaming EPA for a Communist plot for a long time. I know this is true because it was in a recent edition of the Reader's Digest. (Laughter) So we have to believe it.

You know, we have always heard about cleanliness being next to godliness, but they forgot about the Reader's Digest. It's right between the two. So when they put something in there, you know it has to be so.

It turns out that in Russia, according to Reader's Digest, people taking water from a stream have this intake downstream from the discharge. Now you think about that just a minute and I believe you will find the water will be somewhat cleaner if you are taking some of it back in. I would recommend to EPA that you consider such a thing, the intake pipe downstream from the discharge.

Now much of the blame in my mind for the problems we have in the poisoning of the stream, the atmosphere, and all, it has to be laid on all of us because, frankly, few people realized until recently, and again I do want to congratulate those few who are stepping out and doing what is right, but I blame a great deal of it on labor and on the media.

A recent example of that, a recent example we have had here, for example, when labor put out what they call a white paper on the ARMCO plant. In the past few weeks we have had something like this over in Louisiana on the closing of a plant. And I read through the report and the explanation by Mr. White as to all EPA has gone through in this plant over in Louisiana, and I think they have been far too lenient on the plant, myself, but I am sure they are catching all kinds of unmitigated hell from the labor unions over there.

It is my opinion, and I will discuss this with Harry Hubbard, I think labor is being very negligent, not only not protecting their own people, but protecting the citizenry as a whole and not demanding that these plants do what is right.

Then media, we have great examples of that around us at all times. The media, most of it, is run by the advertising department and too few members of the media are able to report honestly on what is going on.

In the case of this plant over in Louisiana, for example, the reports in the newspapers here were simply a handout from the plant, evidently, that the EPA was closing this plant. I resent that.

We have probably the best or the worst example of the prosecution of the media right here in Houston and that is KTRH Radio, a man called Dewey Compton. You want to poison the stream, sell poison to the people, buy some time on KTRH with Dewey Compton. The man is a functioning illiterate and a 14-carat idiot. (Laughter.)

And I assure you KTRH, when their relicensing time comes up, they are going to have an awful hard time explaining the irresponsible garbage that idiot puts out.

Now I will bring up something I am sure will make all of you, I think at least the subject will make you happy, and that is a plan to where we might get rid of the EPA, eliminate it altogether. Is there anybody in the room that wouldn't go along with that, including these fellows that take this guff all the time? I am sure those of you who are responsible citizens, responsible companies who are trying to keep things straight would welcome such a plan, and all of you say you are.

To show you how this works, we all know the River Thames which runs down through London, for example, up un-til just a few years ago was one of the nastiest bodies of water in the world. It's suddenly clean. They are able to fish in the downtown areas. They are able to eat that fish, too, by the way, not like some of that stuff out in the ship channel.

Now this was not brought about by some great outpouring of moral consciousness. It wasn't brought about by some big tax refunds and all. It was brought about by something that has been given very, very little publicity, but, by damn, it works.

Some eight to ten years ago, England passed a law on corporate responsibility and individual responsibility. This law stated that not only the plant manager who poisons the stream or the air, but the board members, the board of directors, and the stockholders are not only held financially responsible, but criminally responsible.

Now those of you that are all good citizens, you don't poison, you don't pollute, you don't do these things, I hope you will join with me at the next session of the Texas Legislature. I am having some bills drafted that at least in the State of Texas would make it physically, financially and criminally responsible for the stockholders, the board members and everyone else who does this. Now, if you are good citizens, if you are not doing this, you should welcome it, and we will thereby be able to abolish EPA and I think you people would go along with that. All we want is the stuff cleaned up.

So the people, and among you, you know this. Doggone it, you have to go in and you fight your battles. You try to get your management to go along on things, and I am sure there may be rulings that these people may have to change. No one is arguing about this at all.

I will remind you what it says in the Bible. It says, "Thou shalt not kill." It doesn't say Thou shalt not kill by hiding behind a corporate shield, by hiding behind some corrupt or lenient or stupid political officials. It says simply, "Thou shalt not kill."

I will ask you to remember this, too. Ask for recognition of the right, more than that, the responsibility to refuse to participate in actions which you consider immoral.

It is not a new idea. It was the unmistakenable verdict of the Nuremberg trials. Long before that it was said more clearly and more eloquently, "Thou shalt not follow a multitude to do evil," that is from Exodus 23.

Thank you.

MR. LEHMAN: Thank you, Mr. Woods.

Are there questions?

Mr. Kovalick has a question.

MR. WOODS: Excuse me. This is the letter I sent to John White on this one particular broadcast that

Compton did and I want to enter it into the record.

Excuse me. Go ahead.

MR. KOVALICK: I think I understand the tenor of your statement, but do you bring any specific recommendation to us today to take back with us, something to do as opposed not to do?

MR. WOODS: That's right, simply change your intake and discharge on your plants.

(Laughter.)

MR. KOVALICK: Of course, we are mostly interested in the non-water pollution aspects, because that is another portion of EPA.

MR. WOODS: Then I would strongly recommend that you talk to the Federal government or the people who might be concerned about this, about getting Federal laws making the board members, the major stockholders of these companies, personally and criminally liable. Six months in jail for one of these big stockholders of one of these corporations, they'd clean these streams up and this other stuff we are talking about, too.

MR. LEHMAN: Do we have another question?

Mr. Woods, we have one more question.

Mr. Lindsey.

MR. LINDSEY: Mr. Woods, I have a question here from the floor. How do you define what needs cleaning up against what materials, how should that be defined?

MR. WOODS: I don't know what the technical term would be for it, but anything that is injurious to the health of the public or the food supply or anything else.

We know about these streams. We know about poisons that are being sold and many of these things, of course, have just come upon us, due to the research and all, but certainly the hazardous materials that you are more concerned with here are a more immediate problem than, say, some long range pesticide may be, but it is all in the same vein and, frankly, I think you people need help from the public.

I believe the lady with the League of Women Voters was talking about it, an educational project for the public, so that some of these people can go back to their plants and say, "Look, by damn, I've got children and grandchildren the same as you do, who are going to be living here. Let's clean this mess up now."

MR. LEHMAN: Thank you.

Any other questions?

(No response.)

MR. LEHMAN: Apparently not.

Thank you, Mr. Woods.

I would like to call now Mr. J. Gallay of SBB Limited, The Hague, Holland.

Mr. Gallay.

MR. GALLAY: Good Morning, Mr. Chairman, Ladies and Gentlemen.

My company is a Dutch German Company that invented and developed the incineration at sea as the responsible and environmentally protective disposal method for chemical wastes.

It was very interesting for me today to see that the first and second paper given today was talking about the incineration at sea. Mr. Lozano here is the first man I have seen three years ago, exactly three years and two days ago when I came for the first time to the States to talk about the incineration at sea, and from the contact I had during these three years with American industries, particularly with EPA, I can tell you that it is a long way that you have come in the United States with this new idea.

I have to say right from the start that my company does not pretend to be a panacea for the terrible problem of chemical pollution in the world. I have the feeling from Reverend Pickett that he does not, is not afraid about a chemical pollution as something serious. I am sorry, sir. I think we have demonstrated a splendid ability to kill this world with chemical pollution, before we have the proof that we will kill it with radioactive materials.

To give you one small example, because

Mr. Woods, I think Mr. Woods, the last speaker, brought you very good news about the Thames.

Well, I bring you very bad news about the Rhine.

(Laughter.)

I think, although I am convinced he is right, there is a lot to do, a lot of things we must do if we want to survive. Because if you imagine, and all of you heard about the terrible pollution that the Rhine had, now with all the efforts of all the authorities and all these countries, and as he says with the responsible people of all the companies, the fact is by having 200,000 samples during 1974-75, the Rhine authorities determined that Rhine pollution was higher in 1975 than in 1974. Particularly the chlorinated hydrocarbon contents in the Rhine was doubled in 1975, over 1974. Since 1969 we have burned something like two hundred fifty and three hundred thousand tons of chlorinated hydrocarbons coming only from Germany, Poland, Belgium, France and Spain, but this is more the quantity.

Now I say we do not come and say we have a panacea for all the chemical pollution, but we have found a way that opened doors to a new sensible, rational, intelligent responsible way of disposing of chemical waste. To put it very shortly, we do not believe there is anything else to dispose of a particular kind of chemical waste, namely, the chlorinated hydrocarbon which is our field, but two methods.

One is the chemical transformation of the waste material in another product that is useful. However, everybody knows this is not possible always because of technical limitation and because of unfeasibility.

The second one is the incineration at sea which we maintain is the only one that any organization, industry or authority should accept as a disposal method, and this is because you do not do anything but to postpone the problem, as we have seen in Europe, if you dump it somewhere directly or indirectly, and I will explain in a minute what I mean by indirectly.

Let me say right from the start that fifteen minutes is an impossible time to give you an idea of what incineration at sea is. This is my paper, which you see I put it aside. I would like to give you some documentation, but this doesn't say in five pages anything that you would understand what it is.

For those who are interested, please contact me. I will take your name and address and will be happy to send you -- this is the only thing that would explain to you what we want to do and what we do.

Gentlemen, the chlorinated hydrocarbons have been dumped for years in the sea, on the river, on land, whatever you like. Because the time is short, let me tell you quickly in Europe they have faced now the problem to get the chlorinated hydrocarbon from out where they have put it for years. Whether it's in drums, whether it's in pits, whether it's in salt mines, whether it's in the coal mines, wherever they put it.

Now you know how easy it is to get the fluid from a thousand feet or a thousand meters. That's one aspect. The other aspect is that chlorinated hydrocarbon is a material that is very resistant to biological degradation, whether it's in the sea or on the land. Land incineration has been and is still used less and less in Europe because it comes very close to forbidding land incineration, for several reasons.

Land incineration is not a very efficient combustion operation. It lives. The combustion efficiency of land incineration is 70 per cent to 90 per cent. Discarding all the technical problems that land incineration has is not a complete combustion and after the land incineration, usually the HCl, the hydrochloric acid, is neutralized and 10 or 20 or 30 per cent of unburned chlorinated hydrocarbons are later dumped in the sea, in the river, or land.

Since 1969, when we started incineration,

we could demonstrate and we have

records the

character of this incineration at sea, that our operation does not have the problem.

Now as I said, we have burned 250,000 to 300,000 tons this year. We have used two small ships and we build now a third ship which will have 20,000 DWT. Our new ship will be about four times larger and will be burning liquid chlorinated hydrocarbons and solid chlorinated hydrocarbons.

We intend to come to the States as soon as we have cleared all the procedures. The American industry is very interested in what we can do.

Now in the little time I have, I want only to tell you very quickly what we have done in order to insure that our operation is indeed an environmentally protective one.

We have determined with a very knowledgeable and reputed organization in Europe what our combustion efficiency is in the presence of the Dutch and German Government.

Our efficiency is higher than 99.9. You compare with 70 to 90.

The second thing which we have done, we have determined the toxicity of the chlorinated hydrocarbons. We were the first ones who did this in the whole world and for that we used CERBOM Institute, a biological institute in

France, and CERBOM determined by taking seed and putting different concentrations in chlorinated hydrocarbons, the ones which we burn, that by interdilution of one to ten thousandths every animal from plankton to mussels and some small fish, crabs, whatever they liked, was killed within less than ten hours at one to ten thousand dilution.

Now you may not know that in the whole world there's something like 500,000 tons to 1 million tons that is dumped directly or indirectly in sea, in rivers, land, anywhere. I hope you shudder as we did when we put together the five hundred thousand tons to one million tons a year dumping in the whole world, and at one ten thousandth dilution it is killing everything within the sea within less than ten hours.

That is why we believe that one should really consider very seriously as a citizen, as so many speakers said or will say probably today, consider short term and long term responsibilities. This happens to be in Europe. Now that doesn't mean necessarily you will be taking our services. There are other companies.

Now the next one that was very important was what CERBOM did. We asked them to investigate the biological effect on the marine life from the combustion gases that come from the sea which are water $CO_2$ that goes into the air, and the HCL condenses and drops into the sea water, so we want to know what is the effect of the combustion gases on the marine life.

They determined and I have here the papers on all these environmental organizations made the world today from Japan to even Moscow. They have these documents demonstrating that what they have done, they took the gases from the furnace and they bottled up 60 samples for 34 hours, accumulating in these samples of water all the combustion products and they put in this water the same animals that they did before, and after seven days' exposure there was no effect, not even a disturbance on these animals.

Now I said this the same in the public meeting in Newark, when I got a question of: Do you want to say that you can make in seven days a proof that there is no genetic impact on the animals? No, certainly not.

What we have done, we have proved that short term. What we do now is, if you want it like that, more reasonable than it has been done up to now, because if you think that there is still going to have an effect on the animals, what we do, the other method to dump the stuff, whatever you like, in pits or in sea directly, we will have at least ten thousand tons according to a recent survey.

What we do, however, we have started organizing a long-term project to determine the biological effect of our combustions. Let me tell you this. In six, almost seven years, we have been given by the Dutch Government an area in the North Sea to incinerate the chemical wastes from Europe, which has been chosen because of one criteria, and this was the area with the less traffic. Do you know what it is? It's a fishery area of the Dutch fishermen.

Since six or seven years we have burned there and there has been a lot of study and a lot of investigation going continuously to see what effect. I cannot tell you what the effect will be in seventy years, but I tell you what it is in seven years. Better than what we did before and better than any alternative.

We have, I just learned this morning, that it has been already decided that CERBOM Institute is to start immediately with a new ship that will have a long term program of two years for starting the effect of the combustion or gases from the third ship in the North Sea and in north parts of the Atlantic.

MR. LEHMAN: Excuse me, Mr. Gallay. We are running a little late.

MR. GALLAY: Let me say the first paper given by Shell, what they said about their high incineration at sea, I think Shell should be commended for the courage and money they spent toward investigating for the United States a new disposal way. With respect to the costs, I am sorry for

Shell that they had indeed too high a cost. I don't believe the cost of the incineration at sea of normal operation are as high as Shell had to pay.

On the contrary, because I know this will interest you, we are cheaper than the London incineration and many others. This is not an operation comparable to sell melons or cucumbers. This is a very sensitive operation that requires a lot of technology and a lot of discussion and a lot of co-ordination between the generator, the environmental authority concerned, and us.

Thank you very much.

(Applause.)

MR. LEHMAN: Thank you, Mr. Gallay.

Do we have questions?

MR. MAUSSHARDT: Mr. Gallay, in your statement you referred to several points which I thought were very interesting. One was the efficiency of the system that you had on the ship, and, too, on monitoring and technical papers that were developed.

I would like to request any information you have on, one, the monitoring of the ship itself and studies that have been done submitted for the record.

MR. GALLAY: Yes, sir. I said, please, at the break time come to me, give me your name.

I have some documentation here and I will give a quick answer for the whole audience.

The monitoring of this operation had to solve one problem. Namely, nobody is going to be on the ship the whole time of operation from the controlling authority.

SBB has developed a system whereby the control is done at least as well -- well, let's put it this way -- the authority controlling the operation who want to control it can do it at least as well as if they would have an inspector that would sleep 24 hours and awake 24 hours and would be very alert.

Basically, it is this. A difficult problem, as I said, 15 minutes. Anyway, as I said, basically, if there is a panel where there is all the information, the relevant and important information about everything what has to do with the incineration process, from geographical location, from date, hour and minute, with all the temperatures that are in the furnace, where the waste comes from, anything that has to be done in order to make a control is on the panel, and is photographed automatically by a sealed camera every half hour and, therefore, you get a film that has been controlled by the authorities where the ship came to pick up new loading.

They did that for three or four months. However, the film goes into an archives and stays in there for three months, or for thirty years, if you want. It is too rough an explanation to give you the feeling how much liability the system has.

Now, on the third ship we have a much more sophisticated control system. We have worked with EPA in the States and with the German and European authorities in each country so that we have indeed the approval for the work.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: We have several questions here from the floor which relate to this same topic. Let me see if I can put them together into one question.

What is the specific reason that incineration at sea is more effective, I guess, than the relationship of the destruction efficiency than on land? In other words, why couldn't the Matthias incinerator be used on land as efficiently?

Isn't it a function of high enough temperature or oxygen content, turbulence, and that sort of thing?

MR. GALLAY: I'm sorry. I have too little time to explain where the problem is. The problem is, when you burn chlorinated hydrocarbons totally, because if you don't burn them totally, then you get unburned chlorinated hydrocarbons which are poisonous, but if you burn them totally, the combustion products are three -- water, $CO_2$ and HCL. Now, the HCL, if it is left open, the spray in the atmosphere will land on the planet and will give destructive effects. That is why the land incineration today, they either try to recover the hydrochloric acid, which is -- well that is a mess.

Second, they neutralize the hydrochloric acid with some alkaline solution.

Now, what we do on the ship, we have a very large opening in our furnace and the HCL can go into the sea where it disassociates and the chlorine ions join the chlorine ions already present in the sea.

Well, a ton of water, which is a cubic, 27 cubic feet -- 27 cubic feet contains 19 kilograms of chlorine. That is a natural sea water.

Then tons, that's about 45 -- okay, 28 foot of sea water contains 40 pounds of chlorine. What we add, the combustion are grams, per square yards, per square foot, particularly, because the ship will move.

In other words, it's insignificant what the chlorine amount comes or the hydrochloric acid comes in the sea. Therefore, the difference between land incineration and the sea incineration is that the hydrochloric acid in the sea can be naturally integrate by the environment , whereas, on the land it is going to provide corrosion.

MR. CROWE: I have a question from the floor.

Have you an estimated cost per ton of

chlorinated hydrocarbons disposed of by incineration at sea?

MR. GALLAY: Yes, sir, I have, and the answer is we have chlorinated hydrocarbons liquids. There are the only ones we have burned until now with the ships, Matthias and Matthias II, but with the third ship, we are going to burn liquids and solids.

Now, for the liquid chlorinated hydrocarbon, we are priced about the same here as in Europe. This is the highest price for the minimum quantity is $60 per ton, but it can go lower with the amount of chlorinated hydrocarbon, amount of waste, and with a contract for one or two years. We can go as low as possibly something like $40 which we know is cheaper than the land incineration first here and even in Europe.

Second, for the price for the solid, we haven't burned yet solid. We are going to do it, but we are going to start it very slowly under control to determine perfectly the technique we have to follow and on that monitoring of the operation by EPA, by the French Government, by the German Government, because we work together with them, and the price for this, we do not know exactly what it is.

We will have to follow guidelines and we think it will be somewhere around $100 and we realize this is too much, but we say to every interested party, wait until we have had the opportunity first of all to burn a larger quantity to determine our cost exactly.

We have been 20 years or 25 years in industry, working in an oil company and then a chemical company. I know what this means. You have to pay money for something to destruct and not to get anything.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: Yes, as a result of your statement at Newark, a question came up later on which I would like to pose now.

As you mentioned, the most responsible incineration facilities on land to incorporate scrubber facilities which would mitigate any problems in the event of a malfunction, such as a flame-out or something of that nature, what control does the Matthias have in the event of such a malfunction or a flame-out to prevent the emissions of unburned or partially burned materials, and do you see this as a potential problem with the incineration at sea?

MR. GALLAY: No, sir. We have determined on our own program and our own time what are the conditions at which chlorinated hydrocarbons have to be incinerated. As you know, an organic molecule can burn at a temperature of 800 degrees C.

There is one temperature which is crucial. This is 1100 degrees C, which is about 2000 degrees F, at which all organic compounds will crack, will be destroyed. This was the basis of our operation and the incineration is made at the temperature that goes between 1200 and 1400 C, in order to give us that margin.

Now the ships are built in such way that you cannot -- it is impossible -- to build it in such a way, you cannot inject waste in the furnace before the furnace has been heated up at 1200 degrees C. with fuel.

Only at that point you can mechanically open the valve that leaves -- we have a special burner that will leave the waste coming in the furnace gradually when reducing the fuel. That is one.

Second, if by any chance something happens in the furnace that the temperature falls, automatically falls below 1200 degrees C., automatically the supply of the waste to the furnace is stopped.

Point of interest, the same mechanism is arranged is set also at 1500 degrees C. Actually at 1650 C. you get the disassociation of the HCL, hydrochloric acid, and chlorine and chlorine is a poison. HCL is not a poison. It is an irritant, but not a poison. Chlorine is a poison. At 650 degrees C., the HCL would disassociate in chlorine and the nitrogen will fall with oxygen. Nitrogen oxides which are also poisonous. Therefore, we keep automatically the conditions between 1200 and 1400 degrees and automatically the operation is stopped if these conditions are not there.

MR. LEHMAN: Thank you, Mr. Gallay.

I believe that's all the questions we have.

If there are any further questions, we will submit them to you and ask you to respond in writing to them.

MR. GALLAY: Thank you very much.

MR. LEHMAN: Ladies and gentlemen, it is time for our break.

I would like to urge you to take no more than a 30-minute break because we have a large number of people yet to come.

At this time I will recess the meeting until 11:00 a.m.

(A short recess was taken.)

MR. LEHMAN: Ladies and gentlemen, I would like to reconvene the meeting.

I would like to call at this time Dr. Geoffrey Stanford, Agro-City, Incorporated.

Dr. Stanford.

DR. STANFORD: Good Morning. My name is Geoffrey Stanford. I am trained as a physician and surgeon, with specialist training and qualification in radiotherapy.

I practiced for many years before turning my attention to long-range preventive medicine. This I now practice as a regional planner with special emphasis on integrated urban-rural ecosystems.

MR. LEHMAN: Pardon me, Dr. Stanford. Could you please speak directly into the mike.

DR. STANFORD: I am General Manager of Agro-City, Incorporated. I am a Trustee of the Environic Foundation International, and a Technical Consultant of the International Center for the Solution of Environmental Problems. I am Project Director to a field research program currently funded by the EPA to demonstrate some of the possible benefits or disadvantages of applying municipal wastes to agricultural land as a soil improver for increasing food production.

I would like to offer some general remarks which may give you some fresh insights into the importance of the subject we are now addressing. I will now go on to some more detailed suggestions for your consideration.

This Spaceship Earth is some five billion years old. Life as we know it is only some thirty million years old. Man emerged some three million years ago. One tenth of life's time. Some of the simplest life forms which first evolved ten and more million years ago are still with us, almost unchanged in their design, today. In environmental terms, they have proved adaptive and resistive to environmental changes over all that time. That is to say, they are well designed.

New life forms have developed largely through changes in the make-up of their life programs, that is, by mutation. These random, unpredicatable, mutations occur partly by accident as the organism develops and partly under the influence of cosmic rays and other radiation damage. These mutations are usually very slight in their effect. They change the chemical programming in some small way, and that change induces the production of another chemical which is strange to that organism and which can affect it for good or for bad. That is, it can make it better adapted or less well adapted to its environment.

Most of these mutations lead to death of the organism. That is, they are lost to evolution as soon as they are formed. Now the chemical programs which form our life processes proceed mainly by pathways which are assisted by complex enzymes.

By definition, enzymes are chemicals which take part in a chemical reaction, but which are unchanged by that reaction. So any of these mutations which produce an improved enzyme will produce an improved organism. Conversely, any mutation which produces a destructive enzyme will lead to the death of that organism. The same will happen if a chemical is introduced by mutation which blocks the action of an enzyme.

So we can imagine that mutations occur perhaps every hundred generations. That is, in every hundred generations any one species or type of living organism has the opportunity to improve itself with respect to its brothers and sisters, and to lead on to an improved species; that mutation will tend to be retained. But the lethal mutations, the harmful ones, are different. They are, as I have said, immediately lost again.

Now, what I am getting at is this. During the thirty million years of life, and the three million years of man, there has been ample opportunity for producing a vast array of new chemicals by mutation. There has been ample opportunity to retain the good ones. The bad ones all are being lost, I comment again, along the line. In other words, all the chemicals we can find on earth now, which occur naturally in life forms, can be assumed to be more or less necessary for life processes.

On the other hand, any chemical which we cannot find occurring naturally, and which conceivably can be made by an enzymic system, must be assumed to be harmful to life unless that it is proved to the contrary over many generations.

Here is my first important point and I would like to repeat it. Any chemical which we are making today in industry, and which could conceivably be made by an enzymic program, and which does not already exist in nature, must be presumed to be harmful to life unless proved harmless over many generations.

My second point is this. If any such chemical is harmful not at once, but insidiously, over perhaps ten generations, shall we say, then we can observe that harmful factor in a few hours with bacteria, and in a few years with annual plants, but we shall not find out their effect on man for two hundred years, on the ten-year analogy.

So, in summary, I have explained to you any chemical which is being made in industry today and which does not already exist in nature may possibly, by delayed mutation, kill off all mankind and even all life on earth within decades or centuries if that chemical is not quickly broken down by natural physical or chemical processes, or natural pathways in living organisms -- that is, is not biodegradable into harmless breakdowns or alternative products.

If you accept this thesis, and I think it is very difficult not to accept this at least as a prudent point of departure until it is disproved, then the EPA has two immediate and grave responsibilities and duties.

One is to recommend to our government that the production of all chemicals which are not already occurring in nature must be stopped until they are proven harmless to all life forms.

The second is to secure that, until that complete ban is in effect, the production, dissemination and ultimate resting place of all such chemicals is carefully controlled and executed in such a way that it does not affect life forms today, and cannot affect life forms into the infinite future.

The EPA indeed has a grave responsibility not only on behalf of the United States, but of the world, and of the future generations of the world. The U.S.A. is indisputably the world leader in producing new chemicals, and in distributing them around the world. The U.S.A. has the responsibility now to set an example in controlling that practice. The EPA has the responsibility of securing that that example is set.

It is nothing less than that that we are considering today.

Now in light of that analysis, I would like to offer a few suggestions for managing ultimate disposal facilities to meet those objectives.

Our comments are concerned with treatment and disposal of toxic and hazardous wastes, in general, and the facilities for managing them. They therefore apply to any and all such sites wherever they may be world-wide, unless we refer to obviously a local situation.

The proposals we are offering are not exhaustive. They are presented here as first thinking, as a basis for discussion of some aspects of control.

Hopefully, legislators at Federal and at state levels, and administrators at city and county levels, will assist the promulgation of the principles I am about to propose. Hopefully, industries will recognize the intention and produce their own regulations to provide the same levels of safeguards, as they have already begun to do in the drug industry, for example, for safe disposal of used containers for agri-drugs. Then we will have fulfilled, so far as we can, the stewardship entrusted to us, that of preserving our resources for the benefit of our grandchildren.

In general principles, we suggest that no industry or enterprise has any right to produce any material that may be dangerous or offensive to any citizen or to the environment.

Secondly, all wastes should be recovered for beneficial use. The term, wastes, should soon be obsolete and waste resources should be mandatory.

Under certain circumstances, which include compliance with safe, proper and prudent precautions, it may be permissible for toxhaz materials to be produced, providing that, at all times into the foreseeable future, the prime emitter of that material retain full legal and financial responsibility for any damage caused by that material.

Now that responsibility cannot be discharged by subcontracting to some hauler or a processor. But where a hauler or a processor is employed, then they also should be responsible for any damage caused by their action or inaction.

Now the purpose of this is to secure that the emitter shall take care to select a reliable subcontractor, and not necessarily be tempted to employ the lowest bidder, without regard to quality of care. It should be noted that it is already established for pharmaceutical drugs that the manufacturer is responsible for any damage caused to patients, irrespective of the intermediacy of a doctor or hospital.

Another purpose of this proposal is to secure that an aggrieved party shall have recourse for damages in law against a substantial defendant, the manufacturer, even if a subcontracting hauler or processor concerned has ceased trading.

The circumstances under which an industry may reasonably produce a toxhaz material includes, for example, clear labeling of contents, clear labeling of their dangerous nature, clear labeling with explicit and detailed instructions on how to treat a person or to decontaminate a surface or volume which has become contaminated, effective and safe packaging, explicit and clear instructions for safe disposal of contaminated empty containers, and so on.

The responsibility I have just mentioned is expressed there as related to any emitted product. As we have phrased it, it may seem to apply to marketed finished products, and the "processor" will be interpreted as the agricultural spray contractor, or the painting shop, for example. But it also includes, under the term "emitter", the producer of by-products, of conversion end-products, and of unwanted surpluses of any or all of those.

In short, any and all who are involved in the chain of production, handling, conversion, end use, and disposal of any toxhaz material should individually and collectively be responsible in law for any harm done at any point in that chain. Only by total acceptance in this way of responsibility by all concerned can we hope to secure responsible management to toxhaz materials.

Now, nothing I have said is intended to suggest other than that it is the prime responsibility of the producer or emitter to manage his own wastes for himself. If he cannot do so, he should not be allowed to continue in business.

If it is more convenient to him to acquire the services of a specialist to manage this aspect of his business for him, that must not diminish his responsibility for that management and he must carry the full burden of costs of that subcontracting.

It is of no benefit for the community through its taxes to subsidize part of the real costs of a business just because that business is contributing to the taxes. Still less does it benefit that community to do so for a business in another community. Environmental damage is a real cost, no matter how difficult it is to quantify in short-term dollars.

Once this principle is established, that the producers, emitters and users should not, by subcontracting, be able to divest themselves of their responsibilities in law for safe management and ultimate disposal of their products or of their wastes, we are now going to consider some comments about ultimate disposal of those wastes, the responsibility of the emitter.

At the present time there are no Federal laws I know of that specifically and directly govern or regulate toxhaz management, or that can be related to this topic. The EPA has prepared drafts, which we are probably considering in part now. We have no direct management in Texas.

It is debated whether any existing transport regulations could be used to control or prohibit the transport of toxhaz materials across the state or county boundary. This needs to be investigated.

There is a need for good, efficient, effective, well-run toxhaz facilities, nationwide. Distances involved suggest that more than one should be in Texas. In this highly industrialized civilization, during the ten years, 1960 to 1970, we produced as many new chemicals as were recorded in all the years before 1960. This rate of increase will continue as the techniques of tailored synthesis are refined. It is inevitable that a proportion, as I have already explained, and perhaps a large proportion of these will be toxhaz to a greater or lesser extent.

The thalidomide tragedy and the Denver radioactive mine tailings debacle are examples whose results were recognized within a decade. Many of the problems we foresee may require several human generations to become evident, and that will be too late, and we already have warnings, for example, about DDT and its genetic effects which are delayed.

We propose that Texas should establish at least three comprehensive and large regional sites, perhaps, for example, at El Paso, Dallas-Fort Worth and Houston. These should provide high standards of management for the same routine wastes, that is, they replicate each other and save distance of trucking or train loading.

If there is a local concentration of industries which produces a class of exceptional wastes, then the nearest one of those three centers should, in addition, have specialized facilities for managing that class of wastes for the entire state, in order to acquire common scale management.

This probability justifies establishing a fourth central site. Both the Austin and the Groesbeck regions are, geographically, logical sites. Further, the clay deposits are near ideal for long-term safe storage, so far as we know today.

It is, therefore, unfortunate that in both these areas attempts have been made to introduce a toxhaz facility hurriedly, and without the careful program of information and explanation to the surrounding communities of the nature of such an operation that should precede definitive planning.

Now in order to manage a toxhaz facility efficiently and safely, we suggest that an applicant for a new license to operate a disposal facility should be required to show that there is a need for it in that area. This is analogous to the "certificate of need" which is a requirement for opening, for example, a new hospital, a regulation that is enacted in many states, and is now being considered in Texas.

It is not sufficient to show it will be cheaper for the emitter to use a facility which is nearer. It should also be shown it would be cheaper for the state and the nation. This is analogous to the "benefits-of-size" thinking that underlies the present regional planning of, for example, sewage works and of sanitary landfill sites.

The applicant should be required to declare what additional services he will provide at his facility that are not available at other facilities in the state and in all the bordering states and what services are available at each of those that he will not provide, in order to show that he has studied the specific need requirements.

MR. LEHMAN: Excuse me, Dr. Stanford. We are running a little short of time.

DR. STANFORD: How long would you like me to proceed?

MR. LEHMAN: You are already over the fifteen minutes.

DR. STANFORD: I see. Thank you.

Okay, I will skip that and come on to the next point, that which is facilities, which is crucial.

Each site should include a fully equipped and staffed analytical laboratory. The certificates, which was also suggested by Mr. Haxby, should be verified against the contents as authorized by the material permit.

These laboratories should be staffed and funded by the University of Texas in its different centers answerable to the University and their records should be open. They can also be used as teaching facilities.

Each laboratory should also be charged with day-to-day supervision of the safety and good management of the entire facility and should be answerable in this regard both to the legislature and to the regulatory board.

The funding for each laboratory should be obtained by a tax on each barrel or on each unit volume or weight of bulk material that enters the facility. The management of the laboratory should be completely independent of the management of the facility that treats the materials.

I think I will stop at that and hand in my full written declaration.

Thank you very much.

MR. LEHMAN: Will you accept questions?

DR. STANFORD: Yes.

MR. LEHMAN: We have an urgent message here for Mr. Henry Gregory of the City of Houston.

Now, Mr. Lindsey, do you have a question?

MR. LINDSEY: Yes. By way of clarification, Doctor, as I understand , what you are saying is, you are recommending three or four sites for Texas. Are you saying that these should be state run, state franchised or completely private?

We have also heard on one additional point relative to that, we have alse heard in previous meetings and in this one that the problem of too few suitable sites is a real problem.

Is there also a problem on the other end of the scale if we have a multiplicity of sites? In other words, you are recommending three or four.

DR. STANFORD: I agree with those points. I think there are too many small sites and not enough well studied big sites which are able to cope with the requirements of bulking and neutralizing one chemical against the other so that you could hold both until you got regular amounts of both.

The logical thing to do is to establish a toxic facility in a chain link common fence compound that is completely enclosed for management facilities and to leave space in that chain link for factories to move in which wish to produce toxic materials, specifically and tie them in with the disposal management plant, such that they can be encouraged to take each other's wastes, so they are all, you know, under complete surveillance.

This could produce very high taxes to a region. For example, to Austin or to Groesbeck.

I am suggesting that a facility for disposal can be managed by the state or by private enterprise, providing the analytical laboratory emitting the materials verifies what they are. This provides for management control because it is indeoendentlv funded.

MR. KOVALICK: Dr. Stanford, could I get you to elaborate on the point that there is a demand in one state, for example, Texas, and therefore it is deserving of or should have three or four sites to meet that demand?

That comment leads me to the point that only those wastes that are generated in Texas should be handled in Texas. Those private industries that want to be in this business, are they only going to be limited to Texas wastes because other states would follow this pattern? Is that what you are suggesting, that waste from a state are only that state's responsibility?

DR. STANFORD: I think because I left out some sections -- I am suggesting, frankly, the opposite. A state should work very closely and that is why I have suggested that any applicant for a permit should include information about neighboring states' facilities to show there is nothing within a reasonable distance, interstate cooperation is desirable.

Have I answered your question?

MR. KOVALICK: Yes.

MR. LEHMAN: Do we have any other questions?

(No response.)

MR. LEHMAN: Evidently not.

Thank you very much, Dr. Stanford.

I would like to call George Maxon.

MR. MAXON: Mr. Chairman, I am George Maxon, an employee of the Texas Water Quality Board.

Out of deference to Mr. Woods' statement, I am, as yet, an uncommitted employee. If any of you rich industrial people want to buy one, I'm available.

(Laughter.)

I have a statement that is rather lengthy. I will not read it. I think it is available to you. I would like to make some few comments, however.

We in the state or more specifically in the Water Quality Board have been in the solid waste business approximately five years. We feel we have done a pretty good job and we feel we can do better and intend to do better.

We are one of the few states in the nation with a split responsibility for solid waste. The municipal waste is controlled and regulated by the Department of Health Resources. We have the regulatory responsibility for industrial waste. The Department of Health Resources has the responsibility for mixed municipal and industrial waste.

Most of the hazardous waste which is of interest to this group, as nearly as I can determine, is industrial waste, and we feel a vested interest in this particular group, and this is primarily why we are here.

We recognized several years ago the need for improvement in our system. As a consequence, about 18 months ago we started a series of public hearings revising and feeling the pulse of industry in an effort to develop a more practical solid waste regulation.

Strangely enough, one of the most difficult tasks that we have tried to solve, and it is as yet unsolved, is defining hazardous wastes. We think we almost have it and then some other individual gets up and brings out something we hadn't thought of or a lawyer says, well, this and that, so we have attempted to define solid waste and we try to use the EPA definition in 92-500, and a lawyer shot us down on that. We tried others, but I think that everyone in this assembly knows what hazardous waste is, regardless of what the legal definition is. And if I can leave it at that, then I won't belabor the point any further.

We were successful in passing our new solid waste regulation at the last Board Meeting on the 24th of November. I have given you a copy of that, Mr. Chairman. I do not have enough to pass out to everyone.

We feel that this will give us a pretty good handle on solid waste disposal throughout the state. From an egotistical standpoint, if you want to call it that, we feel that we as a state regulatory agency are capable of handling the solid waste within the state. We need help from individuals. We need help from the Federal government, and we need help from industry.

One of the primary problems that we have encountered over the years in solid waste disposal is public acceptance of the fact that you have to dispose of solid waste. We have found sites throughout the state that are geographically and geologically ideally suited for disposal. They have been shot down the tubes by citizens who do not want that type of stuff next to them or in their county.

I think the EPA started out well in the public awareness and their edification program, if you would like to call it that, to the public, and unless and until the public is willing to accept adequate well-regulated, well-controlled disposal facilities for the waste products that are generated through the manufacture of items that they demand as a public we are going to be in deep serious trouble.

We need desperately research data that can educate the public as to what happens to waste. Are we burying time bombs? Are we sure that burying a substances within the constrictions, restrictions and constraints of the disposal techniques that we employ, would be a harmless waste by the time our controls have been eliminated?

I am not smart enough to give those answers and we have found from time to time that the people in good faith who are in opposition to us frequently will take quotes out of context and through emotionalism stir up the general public and make it extremely difficult for a regulatory agency to do just that.

We work for the state and it is our job to please the state public. We solicit your help. We earnestly request that you bear with us. We will cooperate with the EPA to any extent we can. We feel we are capable of adequate regulation and disposal of the solid waste within the state. We would ask help for research data. We will exchange information with anyone who wants to. We are in the learning process and we would like to learn as rapidly as possible and pass whatever information we might obtain from anyone to any other individual or company who is interested in it.

Thank you.

Statement for the Record

The regulatory responsibility for the disposal of solid wastes in Texas is divided between the Department of Health Resources and the Water Quality Board. The Department of Health Resources is responsible for municipal and mixed wastes disposal while the Board is the regulatory authority for industrial waste disposal. The subjects we are addressing today appear to fall primarily in the industrial waste classification and as such are of vital interest and concern to the Texas Water Quality Board.

For the past five years we have been working at State level to establish a program which will provide adequate sites and the safe and proper disposal of hazardous wastes. We have encountered several roadblocks. Some of these are: (1) Lack of public acceptance. People actively seek out new and better products. The production of many of the items results in the generation of a more sophisticated or hazardous waste materials that the same people are unwilling to allow to be disposed of in their area. (2) Technical limitations and lack of research data. Our technological advances are more toward development of new products than adequate disposal of the residue generated by such developments. This is only natural. We are grossly lacking in the technology necessary to adequately dispose of the more sophisticated wastes, however. Very limited research data is available. Many waste products lack economically acceptable disposal techniques. A limited number of hazardous wastes must be returned to the factory for disposal. This void in the treatment or disposal practices generates many "what if?" questions that have no answers. We need answers. (3) Acceptable and economically feasible recovery techniques. The abundance of some products and the high cost of recovery of others encourages temporary storage of some wastes until cheaper recovery techniques are developed or until esculating market prices for that product make recovery profitable. "Temporary" in some cases is five or more years. (4) People trying to beat the system. This problem will exist as long as people exist. It should and can be reduced through tighter controls and a better "police force" to ferret out violators.

The above problems were highlighted in a series of public hearings recently concluded by this agency. The hearings gathered information and felt the pulse of both industry and the public. With inputs from the hearings, we developed a new industrial solid waste regulation which was approved November 24, 1975 and will become effective January 1, 1976. We feel confident that this new regulation will provide adequate controls over the generation, and disposal of industrial hazardous wastes in Texas. We will require an inventory/shipping control system for the disposal of such wastes.

The public hearings confirmed that many ill-informed people feel we are burying time bombs which could and probably would destroy our drinking water, wildlife and people within five years or perhaps a thousand years. Lack of information provides the opposition with a fertile field to manipulate half truths into "what if" questions and generate actions through emotionalism rather than facts. We need substantiated facts to counteract these tactics. This can be done to a degree through a public awareness program. The people need to be made aware that proper disposal techniques are available and they must have confidence that these techniques will be followed. Basically the public must be informed of the wastes generated by the products they demand from industry. They should be encouraged to permit disposal of these wastes in an authorized, regulated manner rather than the alternatives public pressure is forcing on industry. It's time the facts surfaced and the public not only be made knowledgeable of the disposal problems encountered but also encouraged to accept the civic responsibility of entering into a sane solution to the disposal of hazardous wastes. A properly channeled, public awareness program can be of immeasurable help.

I have studied Senator Randolph's proposed amendment (S2150) to the Solid Waste Disposal Act with considerable concern. I would hope that the Environmental Protection Agency gained enough knowledge through implementing the NPDES program to avoid the similar pitfalls contained in Senator Randolph's proposal. Any amendment to the Solid Waste Disposal Act must avoid the administrative false starts and the many changes in forms, procedures and definitions contained in the NPDES program. Duplication must be avoided. States with adequate solid waste programs should be allowed to continue until those with inadequate programs have been "brought up to speed". Let EPA learn, develop a program, and gain experience in that manner rather than attempt to regulate the entire nation without being properly equipped. Bring about equality and standardization by upgrading the less effective rather than downgrading the effective programs. Organization and preparation are essential to a well run program. Hopefully the EPA will be given enough time for both before undertaking a nation wide solid waste program as opposed to the compressed time frame and pressures they were subjected to under the NPDES program.

Thank you for the opportunity to present my views. I feel confident that the lessons we have learned over the past five years are reflected in our new solid waste regulation. It will produce the desired results. We feel the most effective assistance the EPA can provide us is through selective research and other grants. Our solid waste program will continue to improve. We would prefer to "go it alone", but will work with the EPA to establish an effective Federal program within the State if it becomes necessary.

Geo E Maxon
George E. Maxon, Chief
Solid Waste Branch
Central Operations Division
Texas Water Quality Board

Date December 8, 1975

TEXAS WATER QUALITY BOARD
P. O. Box 13246, Capitol Station
Austin, Texas 78711

ORDER NO. 75-1125-1

AN ORDER of the Texas Water Quality Board approving and adopting the attached industrial solid waste management regulation; repealing Board Order No. 71-0820-18; repealing Section 310 of the Rules of the Texas Water Quality Board; and directing the staff to mail a copy of this order and the attached regulation to all persons known by the Executive Director to be interested in this matter.

PREAMBLE

As directed by the Board, public hearings have been held and an Industrial Solid Waste Management Regulation has been developed in order to more effectively safeguard the health, welfare and physical property of the people of the State through controlling the collection, handling, storage and disposal of industrial solid wastes. The proposed regulation is consistent with the Solid Waste Disposal Act, Art. 4477-7, as amended, V.T.C.S. Such regulation, if approved by the Board, would probably be effective by December 31, 1975.

Hearings concerning the regulation of industrial solid waste have been conducted over the last eighteen (18) months. First, hearings were held around the state to feel the pulse on what was needed in solid waste regulation. Following those, five additional hearings on various draft proposals were held. Comments were received and evaluated and a draft proposal considering these was circulated to all interested parties prior to the November 10, 1975 hearing. In order to give the most complete and up-to-date picture of the staff's views concerning what should be in the regulation, a final draft proposal, taking into account comments received, was prepared for handout at the November 10, 1975 hearing. So that any confusion as to what changes were being made would be minimized, George Maxon, of the staff, went through the draft pointing out and commenting on the changes.

In light of the evidence and testimony included in the record of the public hearing conducted on November 10, 1975, the Texas Water

Quality Board finds that (1) the Industrial Solid Waste Management Regulation should be approved and adopted, (2) Texas Water Quality Board Order No. 71-0820-18 should be repealed, (3) Section 310 of the Rules of the Texas Water Quality Board should be repealed, and that (4) the proposed regulation is consistent with the Solid Waste Disposal Act, Art. 4477-7, as amended, V.T C.S. Now, therefore,

BE IT ORDERED BY THE TEXAS WATER QUALITY BOARD THAT:

1. The attached Industrial Solid Waste Management Regulation be approved and adopted.

2. Board Order No. 71-0820-18 be repealed.

3. Section 310 of the Rules of the Texas Water Quality Board be repealed.

4. The staff be directed to mail a copy of this Order and the attached regulation to all persons known by the Executive Director to be interested in this matter.

Issued this 25th day of November, 1975.

TEXAS WATER QUALITY BOARD

J. Douglass Toole

J. Douglass Toole, Chairman

(Seal)

ATTEST:

Hugh C. Yantis Jr.

Hugh C. Yantis, Jr., Executive Director

TEXAS WATER QUALITY BOARD

INDUSTRIAL SOLID WASTE MANAGEMENT REGULATION

# CHAPTER I GENERAL

## Section 1.01 - Introduction and Purpose

Industrial solid wastes as defined in the Solid Waste Act range from wastes that are solid, or nearly so, to wastes that are entirely liquid. Wastes may be found in almost any form and may be in any type of containers. In short, the term industrial solid waste may encompass essentially anything that does not flow from the regular waste discharge pipe or system of the industrial or commercial enterprises that created the waste.

The regulations following are based upon the basic policy that the collection, handling, storage and disposal of industrial solid waste must be a carefully designed, technically feasible, professionally carried-out operation. Because of the variety of technical processes and arrangements which may be needed and due to the probability of future technical innovations, the Regulation does not attempt to define or state specific technical or operational requirements.

The purpose of this Regulation is to safeguard the health, welfare, and physical property of the people by controlling the collection, handling, storage and disposal of industrial solid waste, pursuant to the Solid Waste Disposal Act, Art. 4477-7, as amended, V.T.C.S.

## Section 1.02 - Definitions

For the purpose of this Regulation, the definitions of terms used in the Regulation are those provided in Rule 100.0 of the Rules of the Texas Water Quality Board and Section 2 of the Solid Waste Disposal Act, and for the purposes of this Regulation, the Board ascribes the following meaning to the following terms:

1. "Act" - means Solid Waste Disposal Act, Art. 4477-7, as amended, V.T.C.S.
2. "Annual Disposal Summary" - report to the Texas Water Quality Board submitted by generators summarizing on-site waste disposal, and off-site shipments of Class II wastes

for the prior one-year period.

3. "Board" - Texas Water Quality Board.
4. "Class I Waste" - All waste materials not classified as Class II or III, normally including all industrial solid wastes in liquid form and all hazardous wastes.
5. "Class II Waste" - Organic and inorganic industrial solid waste that is readily decomposable in nature and contains no hazardous waste materials.
6. "Class III Waste" - Essentially inert and essentially insoluble industrial solid waste, usually including materials such as rock, brick, glass, dirt, certain plastics and rubber, etc., that are not readily decomposable.
7. "Carrier" - Any person who conveys or transports industrial solid waste off-site by truck, ship, pipeline or other means.
8. "Commercial Disposal Operation" - Those disposal operations which store or dispose of waste generated by others.
9. "Disposal Operation" - Refers to the activities of an operator in receiving, storing, retaining, processing, or disposing of industrial solid wastes.
10. "Disposal Site" - Includes all land, facilities, fixtures, structures, and appurtenances for receiving, handling, processing, storing, retaining, or disposing of industrial solid wastes.
11. "Essentially Insoluble" - Means if when placed in either static or dynamic contact with deionized water at ambient temperature for seven days, it will not leach any quantity of any constituent of the material into the water in excess of USPHS limits for drinking water.
12. "Executive Director" - The Executive Director of the Texas Water Quality Board or his designated representatives.
13. "Generator" - Any person who produces industrial solid waste. The generator is also the shipper in the case of off-site disposal. The carrier will be considered to be the generator for those wastes received from out-of-state.
14. "Industrial Hazardous Waste" - Means any waste or mixture of waste which, in the judgment of the Executive Director, is toxic, corrosive, flammable, a strong sensitizer or irritant, generates sudden pressure by decomposition, heat or other means and would therefore be likely to cause substantial personal injury, serious illness, or harm to human and other living organisms.
15. "Industrial Solid Waste" ("industrial waste" or "waste") Solid waste resulting from or incidental to any process of industry or manufacturing or mining or agricultural

operation, including discarded or unwanted solid materials suspended or transported in liquids, and discarded or unwanted materials in liquid or semi-liquid form.

16. "Mixed Waste" - Means combined municipal and industrial waste as described in Section 3(c) of The Solid Waste Disposal Act.
17. "Off-Site Disposal" - A disposal operation in which a generator or shipper transports industrial waste to a receiver for disposal.
18. "Off-Site Disposal Summary" - A monthly report to the Texas Water Quality Board submitted by shippers of Class I wastes summarizing shipments for the prior one-month period.
19. "Operator" - Means a person who accepts industrial solid wastes from other persons for storage, retention or ultimate disposal on property owned or controlled by him.
20. "On-Site Disposal" - A disposal operation in which a generator, under the provisions of Section 4(f) of The Solid Waste Disposal Act, Art. 4477-7, V.A.C.S., disposes of industrial solid waste within the boundaries of a tract of land which is owned and controlled by the generator and which tract of land is located within fifty (50) miles of the generator's facility from which the waste is produced. A disposal operation shall not be considered on-site disposal if the waste is collected, handled, stored or disposed of with waste from any other source or sources. Other source or sources means generating points under different ownership and does not prohibit one company from using one site for disposal of its waste from more than one generating point within fifty (50) miles of such generating points.
21. "Permit" - Means a written permit issued by the Board which, by its conditions, may authorize the permittee to construct, install, modify, or operate a specified disposal site, conduct specified activities, or dispose of industrial solid wastes in accordance with specified limitations. Permits do not apply to activities regulated under Chapter II of this Regulation.
22. "Person" - Means individual, corporation, organization, government or governmental subdivision or agency, business trust, partnership, association, or any other legal entity.
23. "Receipt Summary" - A monthly report to the Texas Water Quality Board by receivers of waste shipments summarizing shipments of waste received during a one-month period.
24. "Receiver" - Any person or organization who received

industrial solid waste generated by other persons for processing, storage, or disposal.

25. "Shipment" ("Transport") - Any action involving the conveyance of industrial solid waste off-site by any means.
26. "Shipper" - Any person who ships industrial solid waste for off-site disposal. The shipper is usually the generator but may be a person collecting wastes at a central location prior to further shipments.
27. "Shipping Control Ticket" ("Shipping Ticket") - A Texas Water Quality Board form to accompany shipments of Class I industrial solid wastes.
28. "Storage" - Means interim containment or control of waste after generation and prior to ultimate disposal.
29. "Water" or "water in the state" - Means groundwater, percolating or otherwise, lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Gulf of Mexico inside the territorial limits of the state, and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or nonnavigable and including the beds and banks of all watercourses and bodies of surface water, that are wholly or partially inside or bordering the state or inside the jurisdiction of the state.

Section 1.03 - Responsibility of Industry Producing the Waste

Any generator that allows its industrial solid waste to be disposed of at a disposal site which is not covered by valid authorization, Permit, Certificate of Registration, Waste Control Order, or Order of the Board permitting the solid waste disposal operation is in violation of the Solid Waste Disposal Act and this Regulation. In the event of any unauthorized disposal of industrial solid waste, the Board will seek recourse against not only the owner and operator of the disposal facility but also against the generator which allowed or suffered its solid wastes to be disposed of in this manner at that location and may require the generator to participate financially in whatever steps must be taken to place the site in an acceptable condition.

Section 1.04 - Prohibitions

This Regulation prohibits the collection, handling, storage and/or disposal of industrial solid wastes in such a manner so as to cause:

1. The discharge or imminent threat of discharge of waste into or adjacent to the ground or surface waters of the state, except pursuant to a valid Texas Water Quality Board Permit issued under the Texas Water Quality Act;
2. The creation or maintenance of a nuisance;
3. The endangerment of the public health and welfare; and/or
4. The disposal of industrial solid waste in an unauthorized site by either the generator or carrier.

Section 1.05 - Deed Record Requirements

A. The owner or person controlling an industrial solid waste site is required to submit for recordation in the county deed records of the county or counties in which the site is located the following:

   1. A metes and bounds description of the portion or portions of the tract utilized for the ultimate disposal of industrial solid waste;
   2. The Texas Water Quality Board class or classes of the materials disposed or proposed for disposal; and
   3. The name and permanent address of the person or company operating the site where more specific information on the materials can be secured.

B. Proof of recordation or denial of such request for recordation shall be provided to the Texas Water Quality Board in writing.

C. Such recordation shall, in the case of sites opened after the effective date of this Regulation, be made prior to the acceptance of any waste for disposal. All sites in operation on or before the effective date of this Regulation shall record the information required in Section 1.05-A within one hundred eighty (180) days of the effective date.

Section 1.06 - Violations

Under Section 8 of the Solid Waste Disposal Act, violations of the Act or any rule, regulation, permit, license, or other order passed under the Act are subject to injunctive relief or civil penalty, or both.

Section 1.07 - Guidelines

In order to promote proper collection, handling, storage and disposal of industrial solid waste consistent with the intent of this Regulation, the Texas Water Quality Board will make available upon request copies of technical guidelines developed by the Board's staff. The guidelines will outline methods deemed adequate by the Executive Director to prevent the creation or existence of the conditions prohibited in Section 1.04 of this Regulation.

Guidelines are suggestive only. Other procedures determined by the Texas Water Quality Board to be equally as effective in preventing the creation or existence of the conditions prohibited in Section 1.04 of this Regulation may be employed.

Section 1.08 - Exclusions

A. Disposal sites for soil, dirt, rock, sand and other natural and man-made inert solid materials used to fill land where the object of the fill is to make the land suitable for the construction of surface improvements are not considered industrial solid waste disposal sites under the Solid Waste Disposal Act.
B. Disposal of waste materials which result from activities associated with the exploration, development or production of oil or gas. Such disposal activities are under the jurisdiction of the Railroad Commission of Texas.
C. Under the Solid Waste Disposal Act, industrial solid waste does not include waste materials, the discharge of which is subject to the Texas Water Quality Act. To discharge under the latter act, includes to deposit, conduct, drain, emit, throw, run, allow to seep, or otherwise release or dispose of, or to allow, permit, or suffer any of these acts or omissions. Under the Board's water pollution abatement powers of the Water Quality Act, it may control or regulate situations where a threat to discharge exists.
D. This Regulation does not apply to radioactive wastes which are controlled by the Texas Department of Health Resources and the appropriate Federal agency.

Section 1.09 - Emergency Orders

Whenever in the judgment of the Board or the Executive Director there is good reason to believe that a violation or threat of violation of an industrial solid waste permit, registration or the Solid Waste Disposal Act is creating or will create an immediate and serious threat to human life or health, or is causing or will cause extensive or severe property damage or economic loss to others, and that other procedures available to the Board or the Executive Director to remedy the situation or prevent the situation from occurring will result in unreasonable delay, the Board or the Executive Director may issue an Emergency Order to the person or entity responsible for the violation or threat of violation, directing that corrective action or other appropriate remedial or preventive measures be taken. If the Board or the Executive Director issues an Emergency Order under this section without a hearing, the Order shall fix a time and place for a hearing to be held before the Board which shall be held as soon after the Emergency Order is issued as is practicable.

## CHAPTER II NONCOMMERCIAL OPERATIONS (ON-SITE)

### Section 2.01 - Regulated Activities

This chapter applies to "on-site disposal", as defined in Chapter I, to include the collection, handling, storage and disposal of industrial solid waste which is disposed of within the property boundaries of a tract of land owned and controlled by the owners or operators of the particular industrial plant, manufacturing plant, mining operation, or agricultural operation from which the waste results or is produced, and which tract of land is within fifty (50) miles from the plant or operation which is the source of the industrial solid waste. This chapter does not apply if the waste is collected, handled, stored, or disposed of with solid waste from any other source or sources.

### Section 2.02 - Notification

Any person who stores or disposes or plans to store or dispose of industrial solid waste or who plans to modify existing facilities or procedures under the terms of this Regulation shall notify the Board in writing and is required to submit to the Board such information as may be necessary to enable the Board or its Executive Director to determine whether in the judgment of the Board or its Executive Director the waste disposal activity is:

1. One to which Subsection 4(f) of the Solid Waste Disposal Act applies; and
2. Capable of complying with the terms and not violating the prohibitions of this industrial solid waste management regulation.

### Section 2.03 - Other Requirements

Provisions of Chapters I, IV and V also apply to those activities regulated under this Chapter.

## CHAPTER III COMMERCIAL OPERATIONS

### Section 3.01 - Permit Required

A commercial industrial solid waste disposal site shall not be established, operated, maintained or substantially altered or expanded and a substantial change shall not be made in the method or type of disposal at a disposal site until the person owning or controlling the disposal site has first obtained a permit or an amendment of an existing permit from the Board.

### Section 3.02 - Permit Application

Permit applications to establish a new disposal site or to substantially alter, expand or improve a disposal site or to make a change in the method or type of disposal shall be filed and permits shall be issued, denied, modified or revoked after notice and public hearing. In order for permit applications to be considered complete and accepted for processing, they shall:

1. Be submitted in triplicate on forms provided by the Board and be accompanied by a like number of copies of all required exhibits;
2. Include recommendations, if any, from the local and/or county governments within whose jurisdiction the proposed site or facility is located; and
3. Include such other information as the Board may deem necessary to determine whether the proposed site and industrial solid waste disposal facilities and the operation thereof will comply with applicable guidelines and requirements.

### Section 3.03 - Detailed Plans and Specifications Required

A. Before a new commercial disposal site is established, constructed, maintained or operated and before an existing disposal site is substantially altered, expanded or modified, an applicant must submit to the Board final detailed plans and specifications for construction, operation and closing of the proposed disposal site and all related facilities. Permit issuance shall constitute approval of such plans and specifications which shall be incorporated by reference into the permit.

B. Engineering plans and specifications submitted to the Board shall be prepared and sealed by a professional engineer, with current registration as specified in the Texas Engineering Practice Act.

C. Engineering plans and specifications, operating procedures, and a staffing pattern including the qualifications of all key operating personnel shall be sufficiently detailed and complete to insure that the proposed disposal site and any related facilities will be constructed and operated as intended and in compliance with all pertinent state and local air, water and solid waste statutes and regulations. Any changes to the foregoing shall be transmitted by letter to the Texas Water Quality Board within thirty (30) days.

D. A completed application for a commercial-industrial solid waste permit may be preliminarily reviewed by the Executive Director of the Board and interested state and local governments prior to the preparation of final detailed plans and specifications, if requested by the Board.

Section 3.04 - Final Closing

Until final closing of a disposal site in accordance with permit provisions and final cancellation of the permit by the Executive Director, the operator of the disposal site shall be responsible for the proper operation and maintenance of the site.

Section 3.05 - Public Hearing

A public hearing shall be held on each permit application pursuant to the Rules of the Texas Water Quality Board.

Section 3.06 - Amendment

Permits may be amended at the request of the permittee, Board or Executive Director after proper notice and public hearing in accordance with the Rules of the Texas Water Quality Board.

Section 3.07 - Bond Requirement

When a permit is issued, the Executive Director shall require the permittee to execute a bond or give other financial assurance conditioned on the satisfactory closing of the disposal site on final abandonment. Such bond or other financial assurance shall be in full force and effect during the life of the permit and for so long thereafter as is necessary for the proper closing of the site to the satisfaction of the Executive Director. Any site which is closed in accordance with the terms of its permit shall be considered satisfactorily closed by the Executive Director. The permit shall have no force or effect until the Executive Director has received satisfactory evidence of compliance with the requirements under this Section.

Section 3.08 - Existing Permitted Disposal Operations

All existing commerical-industrial solid waste disposal operations authorized by the Board may continue to operate their disposal sites under the terms and conditions of the registrations or permits previously issued by the Board. These operations shall comply with the terms and other requirements in this Regulation relating to shipping, receiving and reporting.

Section 3.09 - Other Requirements

Provisions of Chapter I, IV and V also apply to those regulated under this Chapter.

## CHAPTER IV SHIPPING AND REPORTING

Section 4.01 - Purpose

A. Purpose
This chapter establishes an industrial solid waste shipping control and reporting system, prescribes the entities required to participate in the system, and sets forth shipping control and reporting procedures. This chapter applies to noncommercial operations (on-site) and commercial operations.

B. General
Three entities involved in the process of industrial solid waste off-site disposal are: the shipper, who is usually the waste generator but is sometimes a central collector or broker of waste; the carrier or hauler of waste materials; and the receiver of waste who may dispose of the waste directly or after processing.

Section 4.02 - Application of Regulations

A. Entities required to participate

1. On the basis of information available to the Board, waste generators and shippers who employ one hundred (100)

or more persons and generators and shippers who employ less than one hundred (100) persons but who generate or ship Class I wastes.
2. Carriers of industrial solid waste.
3. Receivers of industrial solid waste.

B. Exemptions

1. Industries employing one hundred (100) or more persons shall fall under the purview of this Regulation, unless they demonstrate to the satisfaction of the Texas Water Quality Board or Executive Director, when authorized by the Board, that they should be exempted and have received written confirmation of such exemption.
2. Industries employing one hundred (100) or more persons who generate only Class III waste and industries employing less than one hundred (100) persons who generate only Class II and/or Class III waste will be exempted. To obtain an exemption, the applicant bears the burden of substantiating the classification of his waste.
3. This Regulation does not apply to waste routinely collected by municipal refuse collection programs operated by or under the authority of governmental entities.

C. Implementation

1. Effective sixty (60) days from the date of this Regulation, all receivers of industrial waste holding a valid Permit or Certificate of Registration issued by the Texas Water Quality Board for the disposal of Class I or Class II waste shall participate in accordance with this Regulation.
2. Effective thirty (30) days from the date they are so notified by the Executive Director, generators shall participate in accordance with this Regulation.
3. Effective immediately, all carriers involved in the shipment of industrial waste which is accompanied by an Industrial Waste Shipping Control Ticket shall participate in accordance with this Regulation.

D. Mixing of Wastes

1. Industrial waste generators and shippers shall be responsible for assuring that wastes stored for shipment are segregated according to their classification and identified by labeling of containers, erecting signs, or other means necessary to clearly indicate the presence

and character of the waste materials.

2. When wastes of a given class are mixed with waste(s) of another class or classes during shipment, the resultant mixture shall be classified according to the waste with the lowest numeric classification present in the mixture (i.e. - A mixture of Class II and Class I wastes would be considered Class I waste.).

Section 4.03 - Procedure

All Class I industrial wastes must be transported in accordance with the following shipping procedures. All Class I and Class II waste disposal must be reported according to the following reporting procedures:

A. Shipping Procedures

1. All shipments of Class I industrial waste off-site must be accompanied by a Texas Water Quality Board Industrial Waste Shipping Control Ticket.
2. The generator or shipper will complete Part I of the shipping ticket and retain one copy for his records.
3. The carrier receiving industrial wastes for shipment will complete Part II of the shipping ticket and deliver the waste materials and the shipping ticket to the designated destination. Upon delivery of the waste to the receiver, the carrier shall obtain the signature of the receiving site manager or other representative authorized by the receiver to accept waste shipments.
4. The receiver, upon delivery of the waste shipment and shipping ticket, will complete Part III of the shipping ticket and retain one copy for his records, returning the original and one copy of the shipping ticket to the carrier.
5. The carrier must return the original to the shipper and retain the final copy for his records.

B. Reporting Procedures

1. Off-site Disposal of Class I Waste

   a. Shippers of Class I waste shall compile a monthly Off-site Disposal Summary from their copies of shipping tickets. Receivers of Class I waste shall compile a monthly Receipt Summary from their copies of shipping tickets. These reports are to be transmitted to the Texas Water Quality Board by the 25th day of each month for all shipments originating (shipped) during the prior month. The quantity and classification of waste shall be itemized by shipping ticket number on reporting forms provided by the Board.

b. The Off-site Disposal Summary and Receipt Summary shall be submitted monthly regardless of the number of shipments made or received during the month.

2. On-site Disposal of Class I and Class II Waste; Off-site Disposal of Class II Waste

a. Waste generators who dispose of Class I or Class II industrial waste on-site under the provisions of Section 4(f) of the Solid Waste Disposal Act, Art. 4477-7, V.A.C.S., must maintain records of their on-site disposal activity. These records shall include, as a minimum, information regarding the quantity, character and classification of the waste, and the method and location of disposal.

b. Shippers shall keep records of Class II waste shipped without shipping tickets. These records must include, as a minimum, the carrier identity, date of shipment, and the waste description and quantity.

c. Generators who dispose of Class I or Class II waste on-site and shippers who dispose of Class II waste off-site may be required to compile an Annual Disposal Summary from their records of these activities to be submitted to the Texas Water Quality Board. The dates of reporting shall be determined by the Executive Director.

C. Records

1. All copies of shipping tickets and records of Class II off-site disposal shall be retained for a minimum period of three (3) years from the date of shipment.
2. Records of Class I and Class II on-site disposal shall be retained for a minimum of three (3) years from the date of disposal or shipment.
3. All records and shipping tickets shall be kept readily available for review upon request at any reasonable hour (usually operating hours) by the Texas Water Quality Board staff.

D. Completion of Forms

1. General
   To comply with this Regulation, the shipper (generator), carrier and receiver of industrial wastes must enter complete information to their respective part of the Shipping Ticket and their respective Summary Report.
2. Classification of Waste
   For purposes of adequately identifying waste materials so that a waste classification code may be assigned, the Texas Water Quality Board may require a chemical analysis to be performed and a written description provided, or may take samples of the waste for analysis, or both.
3. Forms
   All forms for summary reports and shipping control tickets shall be those forms developed or approved by the Board or Executive Director.

Section 4.04 - Specific Shipping and Reporting Prohibitions

A. Shipping or transporting of industrial waste by persons or organizations to which this Regulation applies without the utilization of a Shipping Ticket as prescribed herein, or
B. Failure to report as prescribed herein, or
C. Filing reports that are fraudulent, constitutes a violation of this Regulation.

## CHAPTER V SEVERABILITY

Section 5.01 - Severability

If any provisions of this Regulation or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Regulation which can be given effect without the invalid provision or application, and to this end the provisions of this Regulation are declared severable.

Section 5.02 - Effective Date

This Regulation becomes effective on December 31, 1975.

MR. LEHMAN: Thank you.

Do we have questions now from the floor?

Mr. Crowe.

MR. CROWE: What kind of approach are you anticipating taking to get these sites accepted in the geographical areas and prove to the people that these are not time bombs?

MR. MAXON: We are bound by the state statute which indicates one of the reasons for disproving a site is the public opposition. What I am saying in English is we do not have the authority to jam something down an individual community's throat. If they don't want it, we can't make them take it.

I might say this, that we are not overly concerned with industry because industry by and large takes care of their own and we can regulate that. It is the by-product that they create and disseminate throughout the state in bits and pieces and smatterings that someone calls up and says, What do I do with it? We say, haul it to Galveston and put it on the incinerator ship, and they tell us what to do with that suggestion.

(Laughter.)

MR. LEHMAN: All right. Do we have other questions?

Mr. Mausshardt.

MR. MAUSSHARDT: I have a question from the floor here. The question is: Do sites which industry own, which receive industrial waste, go through the same public hearing procedures as municipal and private sites?

MR. MAXON: They do not.

MR. MAUSSHARDT: Could you elaborate on why the difference?

MR. MAXON: Because the state law says so, that's the only difference I can give you.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: Another question from the floor. Why do so many solutions always ultimately terminate in a so-called well-designed, well-operated drained and engineered landfill.

It's apparent that almost all substances are caustic and concentrated and yet all the answers point to concentrated substances which are caustic even at low levels.

Does your office advocate concentration?

MR. MAXON: I don't fully understand the question. By concentration, if we want it into one place, yes, we do want it concentrated as opposed to sprayed over the land.

We are endeavoring to approve as many commercial sites as we find that are adequately prepared and people who are responsible enough to run them as they say they will. We encourage this throughout the state. We have not been overly successful in doing this.

Some companies have invested upwards of a quarter of a million dollars in a site and find that in a year or two they go in receivership because they don't have the business that they anticipate.

MR. LEHMAN: Mr. Lazar.

MR. LAZAR: Mr. Maxon, here is a question from the audience.

What requirements are imposed in Texas on solid waste disposal contractors?

MR. MAXON: What requirements are imposed on solid waste disposal contractors?

The first requirement is they have a valid permit. They must have a permit or permission, if you would like to call it that, from the Texas Water Quality Board to operate.

The site must be proven to protect the ground waters and surface waters. It must be, the types of waste must be identified by classes, and for the most part segregated.

They are subjected to periodic inspections, which we call compliance inspections. They are required to post a closing bond, in the event that they for any reason close the gate and walk off. Rather than have the taxpayers pay for closing it, we would prefer they pay for closing it.

I don't know whether I have answered the question or not.

MR. LAZAR: Perhaps I could ask this, which is related. You mentioned there is provision for ground water quality protection. Is there any monitoring requirement and who does it, who pays for it? Is it the state or is it the contractor?

MR. MAXON: The monitoring that is required to insure compliance with the provisions of the permit that we issue is done by the Texas Water Quality Board on a periodic basis. We do require from time to time some sites to drill monitoring wells and to report the results of their sampling, either on a monthly, quarterly or annual basis. But there are specific provisions and individual permits which we feel are necessary to insure compliance of the protective measures against ground water, surface waters, flooding, and so forth.

MR. LEHMAN: I have a question.

You mentioned one of the requirements of a disposal contractor is to have a closing bond. Could you elaborate on that? What is the nature of the bond and the amount?

MR. MAXON: We have had problems with determining the amount of a closing bond. We have addressed this problem more specifically in our new regulation. The old regulation was totally inadequate and as a rule of thumb in order to provide uniform requirements throughout the state, we more or less said two things.

Normally we considered 25 acres as a minimum size for an industrial solid wast site. We then arbitrarily placed a thousand dollars per acre for a closing bond. While it is uniform within the regulation, it is completely and totally unfair to specific individuals and it is totally inadequate in some cases.

We are now endeavoring to evaluate the types of waste that the individual will be handling and the disposal or the closing cost will be predicated on what he is handling and what if he gets mad and walks off right in the middle of it, that is going to cost more than if he says, O.K., we are not going to receive any more waste and after we treat what we treat, then we are going to walk off and leave it or we are halfway through. There are so many variables here, it is going to have to be treated on an individual basis and I don't think that you can say so much per acre or so much per gallon because it depends on the waste, the process it is in at the time, the process is stopped and things like this.

So we are going to endeavor at this point in time to look at the worst possible situation for any given site and establish a closing bond at that particular level.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: I have another question from the audience.

It starts off, why not dispose of solid or liquid hazardous waste in desert regions where rainfall is very small and therefore where leachate potential is very small?

Does Texas support such an approach, that is, moving industrial hazardous waste to desert regions for disposal?

MR. MAXON: Texas will support anything that will adequately and properly dispose of our accumulating industrial solid waste. We cannot dictate, for example, that someone in El Paso or Pecos set up an industrial solid waste site and we cannot, therefore, dictate that someone from Houston deliver that waste to El Paso.

It is a competitive market. The state has no control over who does what except to regulate those who are interested in going into this business.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: Could you give us a rough number as to how many treatment and/or disposal sites there are in Texas and do any or all of them accept waste from out of state?

MR. MAXON: We have approximately 200 solid waste sites registered in the state. About 175 of these are noncommercial sites, which means it is an industry generating their own wastes, disposing of it on their own property. This mathematically and logically then equates to about 25 commercial sites of various types which include a very sophisticated site down to rubble that they are going to use for something, building later on.

We have perhaps ten exclusive of injection wells , perhaps ten sites throughout the state that will accept some form of hazardous waste on a commercial basis, and two or three of those individuals are in the audience today.

MR. LEHMAN: How about the aspect of accepting waste from out of state?

MR. MAXON: We have no objection to it. It is a business. We do not feel we can regulate interstate commerce any more than we can keep somebody from Oklahoma going to a Safeway Store and buying a package of bread. They are in business and as long as they comply with the rules, we are happy to have him.

MR. LEHMAN: Mr. Maxon, will your new regulations -- we haven't had time to read your statement so I will just ask you -- do your new regulations cover the transport of wastes from the time they are generated until they reach a permanent site?

MR. MAXON: Mr. Chairman, our new regulation alludes to this. Unfortunately, I think, as you are probably well aware, we have no control over licensing haulers. That is another agency. We endeavor to control it to the extent that we issue the generator, as we call it, a trip ticket. It is divided into three parts, quite similar to the California trip-ticketing system.

The hauler, the trucker, or transporter, or whatever you want to identify him by, receives two of these three, after having signed the first one. When he delivers that amount of waste to its disposal destination, he gets his receipt signed by the receiver, who in turn signs it and then all three ultimately end up back to the generator, who in turn sends us a report.

In this manner, we hope to be able to discourage the individual who says, I will take it to Site X and finds a blow hole somewhere and delivers it free and collects for disposal. We do not have enough police force throughout the state to regulate from a practical standpoint things like this. The system can be beaten and it will be beaten and we hope to reduce the number of violators by our trip ticket control system.

MR. LEHMAN: Are there any other questions?

(No response.)

MR. LEHMAN: Apparently not.

Thank you very much, Mr. Maxon.

Next I would like to call Dr. William Brown, Bio-Ecology.

DR. BROWN: Mr. Chairman, Gentlemen of the Panel, and the Assembled Multitude:

This morning we have heard there is no industrial waste problem. We have heard that it is an insurmountable problem. We have heard it is an insignificant problem because something else is going to get us first.

I might add I have got just as many prejudices as the other guys do and you are going to hear another story. In particular, I am going to address my remarks to the questions that were in the Federal Register and I'm going to skip through them. I'm not going to try and answer all of them because I don't think I know all those answers, but I do know some of the problems and I will talk about those.

First, in the definition, we have heard a great deal on definitions of hazardous waste. It is indeed a difficult problem and I think some of the definitions that have been proposed by EPA and the National Solid Waste Management Association definition are workable definitions, but what is a definition useful for if the people who are trying to classify waste don't understand what they are working with?

We think it has got to be simplified and I think perhaps the "decision tree" that was proposed in the Battelle report (Program for the Management of Hazardous Wastes, July, 1973 - Hazardous Waste - Decision Model Figure 1) which basically has a yes-no, go-no-go, and you use a series of qualifications for the waste and if it is a nuclear waste that's a bad one. That goes off to the side. You can't handle that one in a hole in the ground.

You go on down. Does it have other deleterious effects, and eventually if you get down to the bottom you end up with something that's fairly innocuous. Yes, you can put that in a hole in the ground.

That gets back to the company that I am with, which is one of the so-called Class I waste handling sites. We handle toxic and hazardous waste. We operate under a permit by the Water Board, from the Air Board, and by the Grace of God, by industry sending us a few things once in a while. And I address some of those things in more detail.

Our thesis basically is this. You have to take most of these wastes and treat them. These are the toxic and hazardous ones. I think perhaps 90 per cent of industrial wastes is very innocuous. It's probably less hazardous than domestic wastes. It's boards, boxes, materials which don't present a real problem, but that other ten per cent, or maybe it's only five per cent is real whiz bang stuff and it will eat your arm off if you are not careful and we take that in every day in our plant.

I don't think that some of the remarks that were made here earlier are very realistic. For example, the requirement to analyze the samples. Somebody runs into your front door with a tank truck full of a waste product. Now this material is truly a waste and all of the good has been squeezed out of it. It's sludge, it's a gunk, it's a tar, it has no commercial value. In fact, it has a negative value. It is something you've got to get rid of and it's going to cost you to get rid of it.

All right. What do you do with it? You sit down and say, we should analyze this. It will probably cost you on the order of one hundred thousand dollars to get an ultimate analysis on this one bucket of waste you've got here. It's ridiculous to even propose that these things be analyzed because they defy analysis.

What is not ridiculous is to have the originator say where this mess came from, how did he produce it, and you can work back from that and get a fair idea of what it's got in it. It may have a hundred thousand different organic materials in it, but if it's not a chlorinated hydrocarbon or halogenated then you know you've got a good chance of burning it and that is what, indeed, we do with most of the waste. We do not accept halogenated materials because we are not equipped to process them properly. We do accept other organics and we process them mainly by incineration, although we do recover materials wherever we can and try to resell them.

Here is another point which I think is a fallacy, the recovery, recycle business. Right now I have on hand the raw material for approximately 10,000 gallons of ethanol CDA 19 grade, it's pretty good stuff. In fact, we got in trouble with the Treasury Agents because the first cycle that came out was potable. They didn't think much of that. They were about to padlock the gate, as a matter of fact. All right. I've got 10,000 gallons of ethyl alcohol. What do you bid? I'll knock off the going price by 30 per cent to start. Any takers? We don't have any takers.

What I am going to do is in January if we haven't found a market for it, we are going to run it in the incinerator and burn it. Now what kind of recycling is that?

I cannot tie up our tanks forever and it's been in there for three months now with the material for recycle. I don't think there exists a recycle market for small quantities of material and 10,000 gallons is not a large enough quantity to be commercial. What is a large enough quantity to be commercial?

Only a generator who can recycle the stuff out of the back of the plant into the front of the plant has got a large enough market to recycle, or if he's got a next-door neighbor who can use it. But I think to take a disposal site and insist there be recycling is ludicrous. It won't work. We have tried it. We have invested thousands of dollars in just this batch. It's a test case.

I went through all the files and folders with the Treasury Agents, and if anyone has ever tried to handle ethyl alcohol you know what I mean. It's a tedious task and not go to jail to just have a bottle of it, and we almost went that route.

(Laughter.)

It is interesting how the Federal government, I called them up and asked them what are the procedures for processing this and would you please give me some information And they said, "Yes, we will give you some information." And shortly thereafter three Federal Agents burst into my office literally. They didn't knock. They came in. They walked right past the secretary and burst into my office, flashed their badges and said who they were and where is the alcohol. I told them, I don't have any. It kind of deflated them a bit, but we did work with them successfully and devised a mechanism whereby we could make a CDA 19, which is a completely denatured alcohol article, as you call it, and if you drink it, it is kind of rough on you. So we don't worry about that one.

But getting on with the question, we think a decision tree can be made to where this group comes in and you can yes-no it and decide right on down the line how to handle it.

We indeed run our business that way. We have worked out waste streams with each company and they have Waste Stream No. 127. They so identified on the three-part trip ticket which Mr. Maxon so described. We have been using it three years. The originator keeps a copy of the ticket to come along with the truck. When it's received at our plant, we sign it and the signature on that, the signed copy, is turned back to them. It gives them a legal release for liability for that waste. We have accepted it as ours, not his.

Unfortunately, most of the waste doesn't go that way and in the Dallas area right now my guess is 60 to 70 per cent of the industrial waste disappears. It does not go to a legitimate disposal site, either the originator's own site or a permitted site by the State of Texas or any other state.

To give you a little bit of information on that, we have our annual contracts with the various originators. We had a phone call the other day from out of state from the National Headquarters of this international firm, saying it's time to renew our contract. We said, great, let's renew the contract, but why? And the person on the other end was a little nonplussed by this. Why do you ask why? We haven't seen any waste from your company for eighteen months. Now what do you want to renew your contract for? And they said, Oh! Where could it be going? We said, We certainly don't know. Well, they admit they didn't have a facility. They didn't know where it went.

The local manager, of course, he's got down to the bottom of the line. It's his responsibility. He has to maximize his profit and one way to do it is not spend money on waste and he sure didn't. Now where it went, we don't know, but I think he's got a red face trying to explain where it went. He may get a promotion, who knows. Maybe he's found a cost-saving method for the whole company.

Most of this stuff does not go to a legitimate disposal site and the reason it doesn't is because there is a cheaper solution and the cheaper solution ranges all the way from a hole in the ground to one place which I can show you at the intersection of the Trinity River and Valley View Lane where you drive your truck up to the side of the stream and let her rip. There are many such sites in the state. These unfortunately take the bulk of the business.

As I said earlier, I think it is perhaps 60 per cent in the Dallas area. It's just going all over the place. How do you control this? You have to control the waste all the way from the originator to the disposal site. If you don't, the hauler is going to make it disappear because it is to his economic advantage to do it and there is no penalty right now on the originator of the waste, at least none that I can find, for giving it to "Cheap John." This is our local jargon that we've developed in some of our internal discussions. "Cheap John" is a guy that will make it go away for nothing. He does it very efficiently and as I said, if he can handle 70 per cent of the waste in Dallas he is doing a better job than we can because if all the waste in Dallas came to our plant, we'd drown. But we would like a little more than we've got because we are drowning the other way at the moment because we are getting less and less of what there is and I know that the other gentlemen from the waste disposal industry in the area, I know they are not getting it because we have checked out to see where it's going. I don't mean they are not getting any. There certainly is waste moving all over the state legitimately. I don't mean to say there is not.

To get an idea how far can you move waste, how far can you move this stuff without running an economic penalty? The Report to Congress and some earlier work, plus the other report on alternatives to national disposal sites, shows the economics is very favorable for a central disposal facility which can detoxify waste up to 600 miles.

We found them to be very accurate.

Our waste comes in from as far west as New Mexico, as far east as Arkansas and other parts of the country. We don't get a great deal at those distances because there is not a lot of industry out there that knows about us or perhaps that needs waste disposal. But when you head west from Dallas, the next legitimate disposal site is in California. There aren't that many around.

I don't want to dispute Mr. Maxon's comments, but there are by our reckoning four toxic hazardous waste disposal sites in Texas that process waste, and I'm saying that they have the capability of doing something other than putting it in a hole in the ground. Of those four sites, two in Houston, one in the Corpus Christi area and one in the Dallas area, which is our site, but they do not see anywhere near the amount of material that is generated.

What is happening, it is disappearing. It is going just everywhere.

Okay. Let me proceed here and stop preaching at you.

Question No. 3, which discusses the means for handling the wastes, we feel that a specific method for waste is not an answer. We rather feel that you should establish standards for the end products of processing. It is a little bit like, let's take the manufacturer of an automobile. If you decide to take some steel and pound it, stamp it, twist it, beat it and paint it, you don't end up with an automobile. You might, but then you might not.

On the other hand, if you say you want a vehicle capable of doing these things, then you get an automobile. So we feel that the standards should be on the end product. In other words, having done something to this waste you end up with this material which is nontoxic, non-teratogenic, and so on down the line. Then you've got a handle on it. There may be some waste where a specific process is applicable and this doesn't mean you eliminate that possibility.

What I think you have to do is say, O.K., Plant A produces a product and we have learned, they have learned, how to do this and very often the originators know quite well what can be done with their wastes. It is amazing how well they know what can be done with their wastes.

We have labored in our laboratories to develop methods and we say, Hey, did you know if you did this, that and the other thing, it turns green and grows from a tiger to a pussycat? They say, Yes, we've done that before. As a matter of fact, the only way we have developed any credibility with some of the major corporations is by essentially duplicating the work that they have already done in their laboratories on the treatment of their own wastes. In other words, we have to kind of prove to them we know what we are doing before they will even talk to us about handling their wastes, which is a good point. They don't want to hand it out to somebody who doesn't know what he is doing, but it is difficult, and of course, costly, for us to duplicate their efforts. We wish we could get their believability at an earlier stage.

But specific waste may need specific processing which has already been developed and for that I have no argument with that concept.

What practices are particularly effective for wastes? One of the things we believe is essential here is to get the cost of waste treating down. You've got to get it down because the economic advantage to the "Cheap John" is greater when the processing costs are high.

One thing we think one can do is to use one waste to detoxify another. Here again a plant which serves a large geographical area has an advantage because we can pull in wastes from a number of different sources which then can be used to react chemically with each other. We have done preliminary work and found it successful in getting a substantially mutual detoxification in heavy metal and cyanide plating waste by the appropriate blending of these wastes.

For instance, you have the choices with cyanide, for example, to purchase chlorine and try to oxidize the cyanide with chlorine. You can take it all the way if you wanted to, $CO_2$ and nitrogen, if you have the appropriate condition, but you are buying virgin chlorine and you are creating pollution on the back end with the manufacture of chlorine at the alkali plant. You are creating further pollution by contributing chloridine to your effluent.

Now, if you have a waste, another waste which you can combine with the cyanide and an oxidizing agent, what we have done is use promic acid, waste plating acid, to oxidize the cyanide. This is a bit of a delicate job because if you don't do it properly, you generate hydrogen cyanide gas and then you don't have any problems any more.

(Laughter.)

It can be done. We have done it in the laboratory. We have done it in 500 gallon batches, and we have done it in 10,000 gallon batches. It does work. It does require post treatment, because your reaction does not go to completion.

You have to take the effluent from this process and process it further to get all the heavy metals out, but it can be done and what we have done here, and the message is that you can cut the cost down by eliminating the purchase of new chlorine, new alkali, new sulfur dioxide and other materials that are normally used in the standard process.

You have to post-treat to clean it up because the reaction only goes about 90 percent of the way, but still you have cut 90 percent of the new material out of it, and this reduces the volume of the waste and gives you a real economic advantage.

I am going to skip down now to one partial answer to No. 9, "What are the necessary and sufficient requirements to assure long-term integrity and care of operating as well as closed hazardous waste storage sites?"

We feel in this case that this is a very difficult one because it can vastly increase the cost of waste disposal and we think that -- I've got a whole list of things here, I won't go through those as it is too time-comsuming -- but one point is that all the participants in the field of hazardous waste management, the generator, the recycler, the processor, the treater, the broker, the hauler, the disposer or any combination, should come under the same regulatory system.

We have a number of competitors that -- well, George, you probably know about them -- but they are recyclers, they aren't waste disposers. They take in the materials for recycling. We have not been able to find anything that they recycled, but they sure have disposed of a lot of stuff. But they aren't under the regulations at the moment because they are not in the waste management business, they are in the recycling business. So, you can play the game anyway you want to, but, nevertheless, they are "Cheap Johns" of another color.

We think if you are going to have an industry, a viable industry, you have got to have equal application of the regulations. Everybody has got to get the same treatment otherwise "Cheap Johns" flourish, and the legitimate companies disappear. We know one facility in Texas which was a very nice facility, one of the better ones that we had, that is no longer in operation because they could not get a reasonable return on their investment. That's the way it goes.

I'll go down to question No. 13, "To what extent are the damages or costs of improper hazardous waste management evident?"

The damages and costs of this improper management are well hidden. Every taxpayer bears a part of the cost of the hazardous materials that slip into the sewer,which is where a lot of the waste in the Dallas area goes, but he has no knowledge nor does anyone take any pains to point out what this cost is. No one tries to calculate it. Certainly who knows how much it costs each citizen when "Cheap John" dumps hazardous wastes in the streams, roadside ditches, and pastures? Who publicizes the cost of treating the toxic leachate from an all-purpose landfill where the losses occurred when it contaminated surface or ground water ?

There exists a great deal of incentive to keep this information quiet. There is no incentive to publicize it unless you are trying to oust some incumbent from office, or unless you are starting an environmentalist campaign, or perhaps you are trying to determine the most cost effective way to handle waste. Now there is really no incentive to get the news out.

Does anybody here know how much it costs the city of Houston to handle the drinking water that comes down the Trinity River to remove the toxic elements that are added all the way up the stream -- there is quite a bit of things put in at Dallas and Forth Worth, and just anywhere -- this stuff comes down here. Somebody has got to clean it up. There is no information on what it costs to clean the water up once it is polluted.

I know this, that if you have got a bucket of clean water and you put a little bit of dirt in it, it takes a heck of a lot of extra effort to get that little bit of dirt out to make it clean water again. The answer to the problem is keep the dirt out in the first place, and that is where I think the "treat before you dispose" philosophy that we are preaching has an impact.

We believe that you shouldn't dump hazardous wastes at all, you shouldn't put them in clay, you should not put them in glass tanks, you should not dispose of them by storing them. The proper way to handle hazardous wastes is to detoxify them.

Now, everything on this earth was here with the exception of the synthetic radioactive materials, but all the materials have been here all along. Now, chlorine didn't come popping up out of a hole in the ground somewhere, or someone didn't invent it. It has been here all along.

We have changed it. We have increased the energy level of all of these materials. The toxic materials we have now have been created from natural products. Life existed with all of these materials, the natural materials, ever since it began.

Now, the threat to life is from the unnatural high energy forms of these materials. I don't think anyone will argue that it is possible to take these things, with the exception of the radioactive materials, you can take these chemical things and reconvert them back to the equivalant of the natural form. This can be done without the tremendous cost, without the tremendous effort on anyone's part. It is something that we have to do because I feel that if we don't, the grim fate that we've heard about is going to be there awaiting us. We are going to have all of our water polluted, all of our air polluted and most of the soil polluted.

I guess, in closing, the thesis is treat the wastes to detoxify them. It can be done. It is not exorbitantly expensive. We feel that industry can do this job better than government can because just like the "Cheap John " in there trying to carve out his block, well,industry can do this if we can find out how to get hold of "Cheap John" and we are working on it.

We need the help of the regulatory bodies. We think if the EPA can do one thing, and that is to track the materials from the originator to the disposal site in some foolproof system, that a lot of this will be controlled.

The private industry is there. It is ready. It is willing. We have excess capacity in almost all of the industries that I know of who are working in this area. They would like more business. We are being defeated mainly because of the ability of the waste to disappear which is in part due to the low level of enforcement that now exists in the whole United States.

bio-ecology systems inc.

Comments
Addressed to the

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## RESPONSES TO DISCUSSION TOPICS

1. What is a hazardous waste....?

We believe the following definition to be properly structured for effective use in regulation.

"Hazardous Waste" - means any waste or combination of wastes which because of its quantity, concentration, or chemical characteristics * poses a substantial present or potential hazard to human health or the environment because such wastes are bioconcentrative, flammable, reactive, toxic, irrating, corrosive or infectious.

> * greater acceptance of this definition might be achieved by insertion after "characteristics" (at the *) of the phrase - "during handling, processing or disposal".

We further believe that the utilization of a standard "decision tree" type format such as that proposed in the Battelle report ("Program for the Management of Hazardous Wastes, July, 1973 - Hazardous Waste Decision Model Fig. 1.) is the best approach to the "what criteria?" problem. Although substantial study might be productively employed in selecting what specific level of test result is "hazardous", a reasonable starting point would be achieved by pre-assigning a level as a "standard" and making provisions for other consideration on a generator proven, case basis.

Since the waste processing/disposal industry seems to have settled into from 9 to 23 working categories of hazardous and/or industrial waste, it seems reasonable to propose a presumed hazard level for each category of specific generic wastes such as those developed under the 16 industry studies conducted for the EPA during 1974 and 1975. A specific waste (generated by A at location B from process line C) might gain exception from its generic group classification by specific testing against the decision tree.

**NOTE:** We propose use of the "generic classifications" of each industries' wastes suggested by those studies - not the commentaries on their "hazardousness", many of which we seriously question.

2. What responsibilities and liabilities....?

The generators of "hazardous wastes" (and through the pricing mechanism - their customers) should have responsibility for:

a) proper identification and classification of hazardous wastes

b) environmentally acceptable handling and ultimate disposal and/or recovery of all the component parts of the wastes, either by themselves or through approved commercial operators

c) the cost of assuring the above

3. For which wastes....?

Specific methods are not the answer! Rather, establish "acceptable standards" for final disposal to the air (emissions), the water (discharges) and the land (land emplacement). These standards and their interrelationships will then determine which methods and/or combinations of methods might be used. This approach, recognizing, as it does, the chemical nature of the components of a hazardous waste, offers the maximum opportunity for the development of cost effective and environmentally adequate technology by the many generators and commercial operators.

Translated into the language of manufactured products, we prefer an "end product" specification rather than a "process" specification.

We do note, however, that there may be a small percent of the waste types for which the specific assignment of a method may be the best approach - for the next 2-5 years at any rate.

The "recovery" of many materials is technically achievable; the "reuse" or "recycle" is an entirely different matter being dependent on the relative economics (both capital and operating) of:

a) costs of virgin materials (including varying supply factors)

b) recovery processing costs

c) "adequate" disposal cost alternatives

d) the costs of disposal of the residue separated from the waste (the separation of which has made a portion of the original waste mass "reusable")

e) costs of getting the "recovered" waste to a "reuser"

f) the prospects of malperformance in use i.e., might a $500 savings in material costs or reduction in disposal cost result in the scraping of a $10,000 batch of "product"? If the chance is 1 in 1000 - OK - if 1 in 100, it is a poor risk!

4. What practices,-----, are particularly effective....?

High on the list of "effective practices" is this one - "Use one waste to treat another". Beyond the obvious savings on expenditures on treatment chemicals the following advantages accrue:

a) elimination of non-productive use of natural resources

b) savings in transport and storage of materials

c) reduced volume for processing and final disposal of "processed end products" - the cost of a cubic yard of properly engineered, lined, leachate collectible, well-monitored, chemical land disposal facility is considerable

In-plant implementation of this combined waste concept has been going on for years. It can be greatly expanded by professionally operated regional waste management facilities, resulting in increased recovery + reuse, lower total costs, improved resource utilization and increased environmentally appropriate disposal practices.

5. To what extent are cost data available....?

There is considerable cost data in existence, however, it is widely spread through the many generators and the relatively few commercial operators.

A review of the data collected in your July 75 edition of Information About Hazardous Waste Management Facilities (EPA/530/SW-145) offers a reasonable look at price structures. Unfortunately, of the 64 facilities covered, only about a dozen offer actual "treatment" services across a fairly broad spectrum i.e., oils, solvents, acids - with and without heavy metals. Single source, comprehensive cost data is therefore scarce. Other factors leading to "cost scatter" are:

a) tremendous variance in capital equipment utilized

b) the effective regulatory situation, i.e., grandfather clause "blend it in" operations vs newly developed, capital and technology intensive firms whose facility and operating plans were reviewed by the regulatory agency for permit requirements before construction began.

c) local conditions such as rainfall/evaporation rates and available soil conditions

d) partial recovery and recycle prospects

e) available volumes in the market area

f) prospects for effective cross blending of mixed wastes

g) access to unregulated disposal alternatives

Although specific costs on specific wastes may vary, there is a definite hierarchy of costs related to the entire disposal situation (see Fig. I attached). Continually increasing costs are encountered as you move down the list. Therefore, volume considerations taken into effect, the first alternative that is available and "acceptable" will be used. There is little motivation to move beyond the point of "accepted" method even though considerable improvements in environmental method may be available there.

The cost data for hazardous wastes generated by your contractors, Battelle and Arthur D. Little, is good. It runs somewhat above current commercial practice. This is primarily due to the need to compete economically (on an adjusted basis) with grandfathered disposal operations and/or alternative, unregulated disposal methods. This forces a very heavy cutback in what may in fact be appropriate and/or necessary costs at both the capital and operating levels. The net result of this, in all likelihood, is disposal by less environmentally acceptable methods, reduced cash flow, and low profit and growth prospects for the capital and technology intensive sector of the industry; and high profit potentials for grandfathered and unregulated disposal alternatives.

6. What are the minimal safety and security precautions....?

No statement at this time.

7. What provisions for monitoring, record keeping and reporting are necessary?

We strongly recommend the use of a standard manifest, or shipping control document that carries the following information:

a) nature and description of the waste

b) quantity of the waste

c) generators (shippers) name and address with responsible individual

d) carriers name and address

e) designated processing/disposal site to which it is being shipped

The document itself should follow the entire movement, receipt of the waste at the disposal site must be noted on it and then a copy is returned to the generator to show arrival at the proper destination. The generator, carrier and processing/disposal site should all be responsible for maintaining their copies. We see this as the only practical mechanism likely to offer assurance, if the system is monitored, that hazardous wastes get to where they are supposed to go instead of disappearing.

8. What has been the availability and price of insurance -- to reduce the risks of operation....?

There is a strong possibility that extreme requirements appearing in some proposed legislation and regulations may drive the price of this type protection out of the range of use. Obviously, financial coverage and responsibility need to be established but extremes should be avoided. These hazardous materials have been with us for some time. The potential benefits of bringing them together for proper processing and controlled disposal may be lost if emotionally generated, artifically high levels of protection are required.

9. What are necessary and sufficient requirements to assure the long-term integrity and care of operating as well as closed hazardous waste storage disposal sites?

We consider the following 6 points to be required:

a) interaction of site, facilities, processes, personnel and the hazardous and other material types to be handled should be subject to review and approved by regulatory authority

b) proóf of adequate financial strength may be required to assure appropriate construction and operating capital to initiate operation of a proposed facility

c) adequacy of technical competence in hazardous wastes management and business experience should be required to avoid problems that could potentially revert to the public if inappropriately handled

d) adequate financial reserves and/or bonds may be required to assure processing of all stored materials i.e., those that have not been processed to be in compliance with final disposal standards, and provide for continuing care or re-development of final disposal landfill sites

e) licensing of both facility and the operators should be required

f) all participants in the field of Hazardous Waste Management, the waste generator, re-cycler, processor, treater, broker, hauler, disposer or any combination thereof, should come under the same regulatory system

10. What are feasible methodologies, if any, to set limits....?

Site location, size and characteristics as well as planned processing and storage capacity are obviously factors here.

Major attention should be given to the chemical condition of the matter when it is emplaced in the land, not as it was when initially designated a hazardous waste. In most instances, treatment can be utilized that results in a non-hazardous solid that is environmentally acceptable for land emplacement. The cost of this treatment is considerable; when properly handled, the "processed end products" should not be unnecessarily penalized by being subject to ultra-costly land emplacement requirements.

We favor the establishment of "final disposal standards" of a chemical nature that will serve as an objective in the processing and treatment of hazardous wastes. When the material has been de-toxified to these standards, the solid end products may be land emplaced under conditions far less restrictive than those appropriate for its original "hazardous state".

11. To what extent are transportation....regulations....sufficient?

The major lack in existing transport regulation is that they address the material being transported as an asset -- an item of value to the shipper and the receiver. Hazardous wastes in transit are a liability. In many cases, parties in the process would just as soon see the material simply "disappear-go away". When the hauler takes title to the waste, there is no loss to him and probably again if it "disappears". Regulations covering the transport of hazardous wastes definitely require a fresh look.

12. To what degree should labeling....?

We have no statement at this time.

13. To what extent are the damages or costs of improper hazardous waste management evident?

The damages and costs of improper hazardous wastes management are well hidden. Every taxpayer bears a part of the cost of the hazardous materials that "slip" into the sewer, but he does not know it nor does anyone try to calculate the cost or tell him about it. Similarly, who knows how much it costs each citizen when "cheap John" dumps hazardous wastes in streams, roadside ditches, pastures, etc. Who publicizes the cost of treating toxic leachate from an "all purpose" landfill, or the losses incurred when it contaminates surface or ground water? There exists much incentive to keep these costs and damages hidden, and no incentive to publicize them -- unless you are trying to oust an incumbent from office, start an environmentalists crusade or perhaps determine the most cost effective approach to achieving pollution abatement objectives.

14. What mechanisms and experiences are effective for soliciting citizen acceptance of hazardous waste management facilities?

Obviously, the name itself gets you off on the wrong foot. We find, however, that it can be productive to introduce the concept of an environmentally acceptable processing/disposal facility to interested, environmentally conscious citizens in the terminology of chemical processing and material management as an alternative to past dumping, discharging and other inadequate and/or illegal disposal practices.

15. What Federal facilities typically generate....?

The range is great, from simple sand, oil and grease from traps for sewer protection at many administrative and vehicle maintenance locations to the mixtures of chemicals, fuels, cleaners, solvents and oils or the corrosive metal finishing and cleaning wastes to be found at military installations, arsenals, etc.

We have found of late that some federal facilities are setting an excellent example in their hazardous waste management efforts. This is quite a turnaround from earlier practice when some facilities where considered major problems by local and state regulatory authorities.

16. To what extent should the private sector be involved in the treatment and disposal of hazardous wastes....?

To the full extent that they can effectively provide a needed service to the market and make a profit at it! Given the developing standards for environmentally acceptable disposal of hazardous wastes, it is now and will become more so, a capital and technology intensive field. The economies of scale indicate that a few specialists in hazardous waste management can efficiently serve hundreds of small to large waste generators on a commercial basis so that they can more effectively utilize their resources within their own industry.

The tremendous variety inherent in hazardous wastes calls for a flexibility and creativity that has long been indentified with the private sector. A very significant start has been made by the private sector as noted in the report prepared for the EPA by Arthur D. Little, Inc., entitled "Alternatives to the Management of Hazardous Wastes at National Disposal Sites". The past year or two has seen the industry take a more cautious stance versus the expansion needed. This was due to several factors:

a) regulatory programs falling behind legislative goals

b) continual regulatory adjustments, frequently having a heavy impact on this new and highly visible industry

c) a rash of "quick buck artists" who saw big profits to be obtained from offering 20% price reductions and then making the material "go away". The methods ranged from digging a hole in good clay, putting a fence around it and calling it a Hazardous Waste Disposal Site; to "working it in with municipal refuse; to just plain dumping and "perenial" storage in obscure locations.

Note that the generator of the waste may have no knowledge of and actually little interest in the fate of his hazardous wastes if he is relieved of any liability for it when it leaves his premises. This plays into the hands of the "cheap Johns" who make wastes "disappear".

There is an important message here. When an industry contracts to have hazardous wastes handled it can have two interests:

1) to have the material removed -- to make it go away,

2) to have the removed material subjected to environmentally adequate disposal procedures.

When the generating industry follows through to assure that both steps are taken the developing private waste processing industry can prosper and develop to fully meet the need. However, we have a serious problem when only the first interest is pursued, and it often is since small savings can look very big in competitive and difficult economic times, particularly when viewed against some rather obscure long term, away from here potential environmental danger. This produces a very substantial drain on the revenue of the capital and technology intensive waste processing industry and makes it impossible to generate the profits that are essential to sustain the growth necessary to serve the national market. Please don't get us wrong -- many generators, large and small, are very diligent in assuring that their wastes are properly handled. This makes it all the more difficult when these people have to receive price increases because others, often their competitors, are utilizing sub-standard disposal operators.

Here, again, the hazardous waste industry is different. Every disposal operation or process that is accepted openly, or indirectly, by the regulatory authority is instantly a full fledged competitor to all existing hazardous waste processing facilities.

We hope regulatory people at all levels of government will realize this and act accordingly.

In closing, we would like to return again to the aformentioned Arthur D. Little study -- "Alternatives to the Management of Hazardous Wastes". The following conclusions were presented:

a) "On economic grounds alone, off-site treatment facilities i.e., commercial treatment industry or specialty designed and constructed public facilities will be preferred by a majority of producers of industrial hazardous wastes...."

b) "This conclusion will be true for all regions of the United States".

c) "Existing risk, legal or institutional considerations will not alter this basic conclusion".

d) On large volumes of dilute aqueous wastes, cost effectiveness may be found in on-site pre-treatment, with the pretreated (concentrated) but still hazardous waste then being shipped to an off-site processor.

e) Further economies of scale are obtainable when all specialty wastes (both hazardous and semi-hazardous) are treated at a central processin facility.

We at Bio-Ecology Systems fully support these conclusions.

The private sector will provide the facilities and services needed if the governmental bodies set their minds to creating and maintaining a responsible climate within which the hazardous waste management industry can work.

MR. LEHMAN: Thank you, Dr. Brown.

Are there any questions?

MR. LINDSEY: Yes. You indicated in order to control the "Cheap Johns", as you are calling them, that a trip-ticket system would help to do that. In other words, I understand Texas is instituting such a system. Do you feel that it will be effective in controlling this?

DR. BROWN: Only if there is enforcement. You can have all the tickets in the world and if nobody is watching, nothing is going to happen.

It is going to require a match up between the originator's ticket and the disposal site's ticket to see that the stuff went from one to the other. If there is no followup to make sure that that happens, then the thing will be so much paper.

MR. LOZANO: Will the generator at least not be able to match up the tickets? In other words, if we have a responsibile waste generator who wants to send it to the proper addressee he at least -- we will be able to compare the tickets, no?

DR. BROWN: Yes, he will be able to, but you remember the responsible generator who has a contract with us, and we have many responsible generators, and I don't mean to knock all industry. What I am saying is there are many industries who are breaking their back to do it right and they are suffering an economic penalty because they are spending more money to have their waste adequately treated than some of their less civic-minded competitors. The guy who is dumping it now is going to dump it with a three-part ticket if somebody isn't watching. So, you don't change the situation very much.

MR. CROWE: I have a question from the floor. Several times you have made reference to a hole in the ground. What is your definition of a "hole in the ground"?

DR. BROWN: A "hole in the ground" -- we laugh about this. A "hole in the ground" is simply a place where someone has gone out -- it may be a natural depression, it may be a scraped up thing, or it may just be the flood plain of the Trinity River -- a hole in the ground is dumping it on the surface of the ground. Now, whether it is retained in that spot or not doesn't make any difference and I'll tell you why.

Let's say we have a completely impermeable soil. Nothing can ever go through it, never, nothing ever. Agreed? Nothing can get out of this. All right, we are going to dump waste in it. We have never seen any waste, including fairly clean material that doesn't have an oily film on top of it. Now, put this out here and you are going to dump chromic acid, cyanide, and it has an oily film on top of it. The rate of rainfall in this area, where we are at least, is a little over 30 inches a year. If the evaporation rate is anything less than 30 inches a year, as it rains nothing is going out the bottom. Remember, as it rains it slowly comes up. Let's give it a very magnanimous 90 inches of free board. Three years of normal rainfall it is flowing over the top and down the Trinity River and the people of Houston now have some additional trace minerals in the ground.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: I noticed in your prepared statement -- although you didn't have time to comment about it and since you do have a statement, I would like to elaborate on it.

You mentioned that Federal facilities are indeed generators along with industry of industrial-type waste. Could you elaborate a little bit on the general kinds of waste that you receive from Federal facilities and, if possible, some volume kind of scope?

DR. BROWN: We receive very little waste from Federal facilities. We do receive it from subcontractors. We have just finished a job of, oh, I guess 5,000 drums of miscellaneous waste. A great deal of it was solvents and oils. Some of it was cleaning chemicals and cleaning compounds which was from an air base which was being phased out. That is the type of waste we have gotten. It ranges all the way from toxic and cyanide to plating materials to as innocuous things as used lubricating oil.

MR. LEHMAN: Mr. Mausshardt.

MR. MAUSSHARDT: Dr. Brown, I have a question from the floor.

How do you suggest getting your originator to state the content of his particular waste?

Secondly, what regulations would be required? Which agency should be involved -- state, Federal, regional?

DR. BROWN: We have no trouble getting the originators to tell us what is in the waste even in cases where the waste had proprietary materials. We sign a confidentiality agreement with them and we identify it as "Waste Stream No. X."

If someone wants to come in, as the Water Board has the right to do, and examine our records and see what waste we have received, they will see that here we have got 5,000 gallons from Waste Stream No. X, from such and such a company. Now, if the Water Board says, "What is X?" We will say, "It is a proprietary material. You go to company X and they will tell you what it is, but we aren't going to tell you."

Now, we have to know what it is because we can't handle it if we don't. They give us very, very complete information on what it is and it is surprising again, and I want to re-emphasize this, that industry knows what is in its waste.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: Your example of the ethylnol situation you ran into was quite interesting. Since the price was apparently right and since the government apparently blessed the quality of this stuff, at least they didn't appropriate it in any way.

DR. BROWN: No, we are clear. It is legal.

MR. LINDSEY: What then, as you see it, are the impediments in selling the material? Why did you have problems selling it?

DR. BROWN: Well, I knocked on every door in town, I guess maybe I have got BO or something, but --

MR. LINDSEY: You don't understand why?

DR. BROWN: The answer is: if we could promise 10,000 gallons per month from here until the end of the world, we could attract some customers, but when you come up with one batch of material and you want to sell 10,000 gallons of I don't care what it is in one batch, nobody wants it.

MR. LINDSEY: So, it would have to be a continuing type of product that you would manufacture before you know what the deal would be.

DR. BROWN: That appears to be my conclusion. If you aren't a manufacturer of it, the market doesn't exist in this area for small quantities. Now, I checked with some people up in the northeast, New Jersey area, and they said if it were there, they could find a home for it at a reasonable price, but in our area we don't have any consumers who use that material.

MR. KOVALICK: Again, another question.

Part of your statement related to the question of insurance and I was just interested in if you could share with us some of your experiences as to your ability to get insurance and what kind is it? Is it for property damage or other kinds of liability or other kinds of employee liability and if it has been available, has it been extremely expensive or reasonably priced?

DR. BROWN: Insurance is available and, actually, I think in our situation we probably don't have any more risks than the manufacturer does and perhaps less risk in that we are getting the dregs. Most of the stuff we get has been, the volatiles have largely been removed from a fire viewpoint, so our insurance costs, while they are high, are not abnormally high. It is available for a price. You can get the insurance.

I don't think that we have been turned down on the insurance in any matter. We do pay a higher premium, of course, than you do pay on your home because we have a greater exposure. I think the insurance is available; the cost is high, but not unreasonable.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: I have one here from the audience.

How can chlorinated and halogenated hydrocarbons be treated or detoxified economically?

DR. BROWN: I wish I knew. I think the gentleman who earlier commented on this really had the answer and that is you have to decompose them.

Here again, I might say while we do not process halogenated materials, we accept them and we only get small quantities. We accept them for trans-shipment to facilities who can process them, but we get them from time to time and I am sure that we have gotten small amounts of chlorinated hydrocarbons along with the combustibles that we burn. We try to check, but it is impossible to find these materials so I am sure that we are burning some, but the amount is so small that we haven't been able to find it.

MR. KOVALICK: You made reference in your statement to either drowning in waste or not drowning in waste, and I was interested in perhaps a projection on your part as to what the fate of the private hazardous waste industry will be, perhaps not in Texas, but other parts of the country if the "Cheap Johns" continue to be available.

DR. BROWN: Would you run through the question again, I am not sure I understood it?

MR. KOVALICK: I was interested in just a general comment about your industry, not necessarily in Texas, as to what you think the state of the hazardous waste treatment industry will be in the future as long as the "Cheap John" solution continues to be available.

DR. BROWN: I think there will not be a waste treating industry if the "Cheap John" continues making inroads.

In our area, "Cheap John" is getting more and more of the business rather than less and less. The only way that the industry can survive is to contract with larger and larger companies that have such public visibility that they cannot afford to use "Cheap John".

What happens to the bulk of the waste that comes in from the small companies and that is one of the reasons that our company was set up in the Dallas area because there are over 1,000 small industries that generate toxic and hazardous waste. They do not have in-house technical capability to treat their own waste. In the main, they really don't understand what they have.

Our facilities function then would be to accept their residues, plating materials and such. And with the group that we have in technical confidence -- we have a chemical engineer, two chemists and a mechanical engineer on our staff -- we can process their waste. Now, we often have to go back to the supplier, to these companies, to find out what is in their waste, but the suppliers will tell you. If you ask them, "What is in your proprietary ripening compound used in Plating Vat No. 693?", they will tell you. It is not that big a problem.

So we try to provide that service for the little guys, but the little guys are the ones that have got the real competition. The noose is around his neck. If the guy two doors down isn't paying to have his waste hauled away, then this guy can't either. So, he has to disappear the same way.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: One last question.

You indicated you don't knowingly receive chlorinated hydrocarbons for treatment at your own facility. Technically, why is it that you can't incinerate these types of materials in your facility?

DR. BROWN: We do not have a scrubber on our incinerator that would handle that. You have to scrub it and I think one of the points that came out this morning and perhaps it might help to just say about two seconds worth on that.

When you run a scrubber, you generate a high volume of fluid and then to treat that fluid you have to add another high volume of materials to neutralize it, to precipitate it, and then you end up with more tons of waste than you started with. Admittedly, the stuff you end up with is comparatively innocuous, but you have a temendous pile of waste.

We, in our operation, can't afford to run a scrubber, so we exclude those wastes. Now, there is here in the Houston area an environmental service that has a scrubber incinerator which can handle chlorinated hydrocarbons and they can go there and that is taken care of, but we cannot afford for the small volume of chlorinated material there is in our area to even contemplate a scrubber.

MR. LEHMAN: Thank you, Dr. Brown.

Are there any other questions?

Apparently not. Thank you, very much.

Ladies and gentlemen, we are running a little bit behind schedule. I would like at this time to recess for a lunchbreak and reconvene immediately at 1:25.

Thank you, very much.

(Whereupon, at 12:25 p.m., the hearing was recessed until 1:25 p.m. of the same day.)

AFTERNOON SESSION

(1:25 p.m.)

MR. LEHMAN: Ladies and gentlemen, I would like to call the meeting to order, please.

For your information, we have seven more speakers scheduled for this afternoon. So, since that is a fairly large number, we will try to stick right on schedule.

I would like at this time to call the representative of the National Barrel and Drum Association. I am sorry I do not have your name. Is there a representative of the National Barrel and Drum Association here?

(No response.)

MR. LEHMAN: Perhaps he is not back yet. We will come back to that.

I would like next to call Dr. James Robertson, the University of Oklahoma.

Dr. Robertson.

A VOICE: He is here but not in the room.

MR. LEHMAN: Not in the room. Okay, we will have to come back to him.

I would like to call on Mr. John R. Montgomery, Malone Company, Texas City, Texas.

Mr. Montgomery of the Malone Company, is he in the audience?

(No response.)

MR. LEHMAN: We will come back to him.

I would like to call on Mr. James Dement of the Soil Conservation Service, Forth Worth, Texas.

MR. JAMES DEMENT: Mr. Chairman, I notice the crowd has diminshed some from this morning. I think though if you and the panel would have taken time to find some of the good eating places here in Houston that you might have delayed a bit yourself. I suspect these people will show up after they enjoy a good meal.

I am James A. Dement, soil scientist with the U.S. Soil Conservation Service at the South Technical Service Center in Forth Worth, Texas.

I have been asked by our Washington office to make the following statement and, Mr. Chairman, if there are questions, I will try to answer them or respond to them later.

This is a statement on hazardous waste management.

For disposal of many kinds of hazardous wastes, the safest method is land disposal. The capacity of the soil to safely absorb and hold such materials is influenced by its chemical and physical properties, including its cation exchange capacity, the percent base saturation, the soil reaction, the organic matter content, the soil permeability, and the soil depth.

These properties are identified by soil surveys prepared by the U.S. Soil Conservation Service. Such soil surveys are completed for nearly 60 percent of the land in the United States.

For disposal of specific hazardous wastes, soil chemists and soil physicists of the SCS, using data from these soil surveys, can determine the limiting soil properties and make useful evaluations of the potential of soils at a specific site to safely dispose of the wastes.

Thank you, Mr. Chairman.

MR. LEHMAN: Thank you, Mr. Dement.

Do we have questions?

Mr. Kovalick.

MR. KOVALICK: I have several clarifying questions.

First, to what depth are the soil surveys that are complete in the United States? Are they available?

MR. DEMENT: Yes.

When you say depth, do you mean to what extent do we examine?

MR. KOVALICK: Yes.

MR. DEMENT: Normally, two meters. That is about 80 inches. We do have soil survey investigation people who are geologists and geomorphologists who upon specific requests at a particular site can examine to any depth necessary.

I might add that the upper two meters of the soil are the part in which many chemical and biological reactions take place and we do not infer that we get into the business of a geologist insofar as rock stratigraphy, ground water supplies and things like that go. We do consult with these people but our examination primarily is in the upper two meters of the soil.

MR. KOVALICK: For the 60 percent of the land in the United States that has been surveyed, first of all: is that data readily available to the average inquirer?

Secondly, does that data cover largely urban or rural areas, or both, to the same extent?

MR. DEMENT: All of these data are available to the public in the form of published soil surveys and these published soil surveys can be obtained locally from the local Soil Conservation Service representatives.

I'm sorry, what was the second part of your question?

MR. KOVALICK: Just a clarification as to whether the surveys that are complete cover largely urban or largely rural areas, or both?

MR. DEMENT: Both. The initial input from soil surveys was primarily for agriculture purposes, but within the last 10 to 15 years when we began to see problems, of the nature that we are discussing today, we began to concentrate more and more on urban areas. Consequently, I would say that perhaps equally well represented in rural and urban areas.

MR. LEHMAN: Mr. Mausshardt.

MR. MAUSSHARDT: One question on the statement you made here which does concern me.

As you indicate, there are many kinds of hazardous wastes that can be safely land disposed. Would you care to enumerate on what kind of hazardous wastes and types of studies or information you have?

MR. DEMENT: I think that was kicked around a little this morning and we saw that there are some questions even as to the definition of "hazardous wastes".

In broad terms, we are thinking of wastes that are biodegradeable. We are thinking of wastes that can be absorbed by the soil itself through its exchange capacity and retained there. We are thinking of wastes that can be retained in place in certain kinds of soils, without becoming toxic in place.

But I can't answer your question in its entirety.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: Doctor, we know of some laboratory and field work being done to determine the cation exchange capacity of various soils for various wastes. As a matter of fact, the EPA labs are doing some of it. Do you have some additional experimental data which relates to cation exchange capacity and these other things you have listed here on which you base these?

MR. DEMENT: Yes. We have three basic sources of information in determining the things I have listed.

First, we have a national soil survey laboratory located in Lincoln, Nebraska. These people are equipped to do all of the kinds of things I have listed here, these determinations.

Second, we work very closely with the state universities and their research people and we are pretty much up on the data that they have collected.

Thirdly, we work closely with the Agriculture Research Service,which is a service dedicated to research, and they have specific sections for research in hazardous materials, or the kinds of things we are discussing today.

MR. LINDSEY: Has this information been codified into some sort of a document which could be made available which shows tenure or capacity of various soils for things of that nature. If it is, we would certainly like to be able to obtain it.

MR. DEMENT: With your permission, I'd like to pursue this further. If you would care for a response, I can tell you off the cuff that I know of no specific place where all of it has been gathered into one bundle. I tried to find that the other day. I am on a waste disposal committee with our service and we do not have a complete bibliography on this subject that I am aware of. I am still pursuing this. Now, if I can find anything, I can let you know.

MR. LINDSEY: We would appreciate that.

MR. LEHMAN: Mr. Lazar

MR. Lazar : Mr. Dement, would you agree though that the problem that arises when one land disposes potentially hazardous wastes is not just related to the soil but it is sort of a specific. What is the underlying graphic formation under the soil? So, even if we know in 60 percent of the country the soil is composed of certain types of constituents, we would still have to know at that specific site what is the underlying rock formation.

MR. DEMENT: We agree specifically on that, and when we are called upon for a specific site study, if our local soils men can't determine this information, then they go either to our soil survey investigation people who are qualified to make these studies, or they obtain local help through universities and the scientists that they have who are capable.

I might add that our soil scientists are cautioned not to make statements that they can't back up. We don't want to mislead the public.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: Mr. Dement, in listening to a couple of other statements this morning there have been several individuals who have said that in their view the breakdown of hazardous wastes whether it is by thermal breakdown or by chemical treatment to form basically non-toxic or residuals was far preferable and I would presume by that environmentally more sound than land disposal.

Would you care to comment on that point of view vis-a-vis your statement -- is that the safest method for disposable hazardous waste many times is land disposal.

MR. DEMENT: Yes, I listened to those discussions and they are well taken. The safer the material is when it is initially deposited, of course, the less problems that we are going to have in any sense.

There are some wastes, however, that just by their sheer volume, as was discussed earlier this morning, don't lend themselves to prior treatment. And there are some that never get into a system where they can receive prior treatment.

I'm thinking in this case perhaps in rural and even some suburban areas of septic tank disposal. Many states have very strong regulations on septic tank effluent disposal and as far as I know there is no economical means in these rural areas or in some cases suburban areas to dispose of it other than by direct disposal in the soil.

Here we, as I stated in the last paragraph: make an evaluation to tell the builders and the local and regional planners which soils lend themselves to this kind of disposal better than others.

MR. LEHMAN: Thank you.

Are there any other questions?

Mr. Lazar:.

MR. Lazar: Mr . Dement, even though the soil has a certain amount of attenuative capacity, we at the EPA are aware of numerous incidents of damage that have been caused by land disposal where actually the soil didn't attenuate all of the toxic hazardous wastes. Are you aware of such incidents?

MR. DEMENT: Yes. I think it is pretty common knowledge that you can oversaturate a soil. The only area in which we might contribute in that case is to tell you that this soil has the ability to accept more waste of certain natures than another soil in the same local area, so that planners might select one soil over the others.

Now, if they are overloading it to the extent that none of the soils can accept this, then they have got to look for other programs as I see it.

MR. Lazar: One more question.

Then we do have a disposal site. To me, it seems that the likelihood of overloading is quite appreciable because that is a place where for years probably industrial wastes will be deposited in large amounts. So, wouldn't you say that the question of overloading is quite acute in many instances?

MR. DEMENT: Yes, I think when you concentrate hazardous substances in this specific area that you have got to realize that there comes a time when you have got to abandon that site.

MR. Lazar:: But how can you determine when to abandon a site? By continuous monitoring?

MR. DEMENT: We aren't in the monitoring business. I understand that the Texas Water Quality Board does some monitoring. I think it might not be a bad idea where a site receives hazardous material of this nature, if they did have some monitoring. I think that would be good.

Specifically in answer to your question, no, I don't think we can tell how you can put so many tons on this.

MR. LEHMAN: Are there any other questions?

Apparently not.

Thank you very much, Mr. Dement.

I would like to next call Dr. James Robertson of the University of Oklahoma.

While Dr. Robertson is coming up, let me remind any of you who are just arriving for the afternoon session that if you wish to direct questions to the speakers, merely hold up your hand and one of our staff will provide you with a three-by-five card on which you can write your question and it will be delivered to the panel.

Dr. Robertson, please.

DR. JAMES M. ROBERTSON: Well, I am a native Texan, although I have been sort of misplaced, I guess you might say. But anyway, it is good to be back.

I wanted to speak a little bit on the subject of environmental monitoring requirements for hazardous waste sites today.

The present legislative climate is inducing generators of hazardous wastes to dispose of them on land with little or no environmental controls. Without adequate controls or enforcement of further controls or restrictions, the deposition of certain hazardous wastes on land could present potential threats to operators or the pollution of groundwater and the surrounding land areas. Given the apparent lack of identification or selection criteria of hazardous wastes and the permissive nature of the disposal methods, there is an obvious lack of adequate control, management guidelines, and information available to estimate the potential hazards generated by operation of a hazardous waste disposal site.

A hazardous waste management program should result in the creation of a system with certain characteristics: adequate treatment and disposal capacity statewide, lowest cost to society consistent with public health and environmental protection, equitable and efficient distribution of costs to those responsible for waste generation and conservation of natural resources achieved by recovery and recycling of wastes.

Some of the basic objectives and criteria include the following:

The basic objectives of environmental anaylses are the protection of the environs from the buildup of significant quantities of hazardous materials and the collection of adequate data to substantiate just claims and to repudiate unjust claims should they arise concerning the sources of contamination. In general, environmental analyses are performed to: protect people in the environs from exposure to hazardous materials in excess of guidelines or fractions thereof; to protect property from contamination in excess of guidelines or fractions thereof; to ensure adherence to local, state, and Federal regulations; to foster good public relations and to express a responsible social attitude by informing the public and establishing effective control measures.

Therefore, the environmental analyses can aid in:

(a) Establishing background levels of chemicals and fluctuations due to man's activities.

(b) Confirming efficient operational controls for containing hazardous materials.

(c) Determining the rate of buildup before hazardous levels are reached.

(d) Determining the levels of contaminations following an accidental release.

And finally, (e) Collecting specific data that may be useful in litigation.

When environmental analyses are to be performed for regulatory legal, social, or technical reasons, criteria should be established to ensure effective analyses and evaluation of data. In general, criteria should be developed in the following areas:

1. Collection of samples.

(a) Type of samples (soil, vegetation, milk, water, air, et cetera).

(b) Method of collection (spot sample or continuous, representative or proportional samples).

(c) Frequency of collection (daily, weekly, monthly).

(d) Collection specifications (location, number, size, et cetera).

(e) Packaging specification (identification, labeling, type of container).

2. Method of analysis and detection.

First of all, we would have the method of analysis involved whether it be sophisticated or non-sophisticated.

Materials to be analyzed. What types of materials we are looking at.

Sensitivity and reproducibility.

Calibrations and controls.

Required correction factors.

3. Evaluation of analytical results.

(a) Comparison of results with regulations that are existing.

(b) Comparison of background levels.

(c) Examination of possible trends.

Three types of environmental surveys of a specific disposal site should be made:

(1) A preoperational environmental survey,

(2) An operational environmental survey, and

(3) A post accident environmental survey.

Preoperational surveys, made before the facility is in operation, determine the background concentration quality of the environs. Operational surveys determine any buildup of contaminants. Post accident environmental analyses, performed rapidly following an incident, establish the location and levels of contamination.

Under preoperational surveys, the value of preoperational surveys and the extent to which they should be conducted has been open to considerable discussion. In general, however, analysis of environmental samples prior to operation of a facility are a prudent investment.

The extent to which a preoperational survey is conducted will depend upon the nature and the magnitude of the operation. This program should (1) identify the probably critical exposure pathways, (2) the critical population groups, (3) select the same media, and sample site locations, (4) collect and analyze the environmental samples, and (5) interpret the data.

Minimum sampling would include ground and surface water, air, soil and vegetation samples. These samples can be used to substantiate or repudiate a claim that hazardous waste disposal operations caused contamination in the environs.

Under operational surveys, as with preoperational surveys, the magnitude or extent of the operational survey activities depends on the type of operations and the character of the surrounding area. The survey results should indicate the degree to which protection from contamination is achieved, and the extent to which additional control and sampling are needed.

Under post accident surveys, post accident surveys should be made rapidly to reduce the consequences of an incident. This could be involved with both disposal and transport of hazardous wastes. Collection and analyses of air, water, vegetation, soil and aquatic life samples should be made as rapidly as possible.

Classification of environmental samplings.

Environmental sampling would involve essentially three areas: air, ground and water sampling. The selection of sampling equipment, sampling sites and techniques used for collecting and analyzing environmental samples are important considerations. The choice of sampling equipment and method of analysis are dependent on the chemical composition and quantity of material released in the environment. In some cases, it is possible to run a fairly simple test. In other cases, it would require a more exotic testing.

Air sampling. Air sampling is a primary means of environmental sampling. Particulate samples are normally collected on a filter medium with an air pump and flow-measuring device. Gaseous sampling will most often be very specific for a particular contaminant. There are, however, various detection systems that can indicate total organic contaminants.

Under ground samplings, ground sampling may be considered in its broadest aspect to cover soil, vegetation, and animals. Soil is an excellent sampling medium retaining contaminants for long periods of time. Soil analyses are somewhat complicated because soil is a difficult matrix from which to extract many materials.

Soil samples should be collected in areas where (1) the vegetation cover is good, if applicable, (2) the land is level with a relatively small possibility of water runoff from a higher level, (3) the soil is highly populated by worms, which affect the vertical distribution of activity, (4) the soil is not packed when dry, and (5) the soil sample is free of roots and flora.

For many purposes, samples of soil collected to a depth of one-half to one inch are satisfactory. Sampling programs have shown that multiple borings to a depth of six inches over areas one to two feet square are representative.

Vegetation samples usually consist of the leafy or above-ground portions of vegetation. The leafy portions generally reflect the quantity of material falling directly from the atmosphere. The quantity of contaminant reaching the leaves through the soil and the roots of the plant is indicative of the long-term buildup of materials in vegetation. Of course, it could occur if a site were operating for an extended period of time. The leafy portions of vegetation samples are analyzed to provide an index of the contamination recently deposited in the environs.

The selection of an adequate number of properly located sampling sites is of great importance in obtaining meaningful data. Ideally regular sampling at carefully selected locations should ensure that all phases of the program are running smoothly before operations begin.

In planning the survey, prepare a map of the area in which the site is situated. Geological survey maps, when available show such physical features as bodies of water, land contours, roads, and swellings that are especially important in selecting off-site sampling stations. The map should contain such significant features as disposal site, out-buildings, stacks, if an incineration facility is used, neighboring plants, farmlands, and dwellings. A detailed map is necessary to show points immediately surrounding the site.

The usual mapping procedure is to place the plant or other principal source of discharge or in this case, the disposal site in the center of a series of concentric circles spaced at varying distances. These circles may be further subdivided by radii to form sectors that may be coded for convenience.

Under water-system sampling, which is probably one of the more important components, water-system sampling includes collecting water, fish, sediments, algae, plankton and aquatic vegetation. Of these samples, only water provides truly quantitative data.

For simplification and classification, water sampling may be divided into four general categories: precipitation, surface, ground and plant-process and wastewater.

Precipitation samples. Of all the types of water samples, precipitation samples are the most flexible with regard to location. Such samples are usually taken in close proximity to regular air-sampling stations, whose locations have been determined by a study of predicted or demonstrated emissions under various conditions of wind speed and direction. Data on the prevailing winds at different seasons of the year should be studied, and samples should be located to reflect the difference in concentration of air currents approaching and leaving the plant.

Again, speaking about the hazardous waste disposal system. If the prevailing wind is southwest, for example, sampling stations should be located both to the southwest and northeast of the disposal site. Other stations might be located in exactly complementary directions, that is, northwest and southeast, or in slight variations, depending on the locations of other plants, dwellings, or livestock grazing areas.

Surface-water samples. Sampling locations for other types of water are not so flexible as precipitation samples, and consideration of additional factors is necessary. Flowing water should be sampled at least upstream and downstream of the site to indicate any differences in concentration due to the possible release of materials from the site. In addition to samples taken from the surface of the water site, silt or sediment should be dredged from the bottom, particularly at locations where stream velocity is low to indicate whether or not the increased concentration of contaminant is due to deposition by coagulation or settling.

Ground water samples. Ground water samples are obtained from monitoring wells, existing springs or wells and various seeps. The monitoring wells should be situated to reflect possible seepage from holding lagoons or ponds and final disposal pits. A hydrologic study should be performed to determine potential underground water flows as a guide to monitoring well location. A minimum of four monitoring wells, one in each quadrant, should be provided.

For most types of samples, accurately described and numbered stations should be located at varying distances from the plant. The maximum distance will be determined by the amounts of materials handled or likely to be released, the meteorological and hydrological conditions in the plant environs, and the proximity of population centers. Periodic, random samples at locations other than regular stations will add credibility to regular data. Occasional samples can be taken at a great enough distance from the plant to serve as controls for the program. In many cases, data obtained from sampling programs conducted by Federal, state and local authorities may be substituted.

Now, under frequency of samplings, a recommended minimum level environmental monitoring program is included in this statement. This table is a guide and it should be recognized that there is no substitute for good professional judgment in the development of a specific monitoring at a given site. Environmental conditions around a site will vary and may necessitate a modification to portions of this table according to the individual site characteristics. Usually, the number of locations sampled and the number of samples analyzed are considerably reduced after a number of years of successful operation if new and more complex operations are not introduced.

Under the format of an environmental sampling program, we have "Sample Type", "Frequency", "No. of Sites", and "Location". It has been established that in certain types of hazardous waste disposal sites, there is a danger to air pollution and air particulates and gases should be sampled monthly with the sampler to operate from five to seven days each month in at least two stations. The two locations are -edicted or measured highest off-site ground level concentrations. Precipitation should be monitored monthly in at least two sites for the same -- in the same sites on a hazardous waste site as air particulates and gases.

Surface water should be monitored monthly if applicable in at least two sites. One upstream and one downstream after dilution, for example, one mile.

Ground water should be monitored monthly in at least four sites in monitoring wells.

Soil should be monitored semi-annually in approximately 12 sites, three from each quadrant at various distances.

Vegetation should be monitored seasonally in 12 sites, three from each quadrant at various distances.

In general, from technical and administrative viewpoints, the frequency of sampling depends on: (1) the significance that can be placed on a specific number of samples, (2) the magnitude of operations, of course, this is very important. It is realized that these numbers of samples would vary with the size or magnitude of the operation being monitored, and (3) the possibility of significant releases. For example, as I mentioned earlier, if you do have a type of holding facility and you do have this layer of oil on top, it does build up to a significant level and you get a flood like we occasionally get in Texas, then there could be a significant release which would mean that you would need to take some tests immediately of course.

From an economic standpoint, the frequency may be affected by the total cost of sampling and analysis. We know that this cost can be considerable and that we do need more simplified techniques that do not cost as much so that the cost of sampling can be kept down.

The final number of environmental samples collected and analyzed will be based on the magnitude of the potential hazard, particularly in relation to the public and on the requirements set by various legislative authorities.

MR. LEHMAN: Thank you very much, Dr. Robertson.

Are there any questions?

Yes, Mr. Lindsey.

MR. LINDSEY: Yes, could you give us some general indication of what the cost would be for say the format you have given us here in Table I for that magnitude of a sampling effort?

DR. ROBERTSON: Well, I haven't put that to a pencil: it would be considerable and as I said before, these samples, the number of samples would vary. This table was set up sort of as an ideal thing and, of course, we strive for these things, but never do reach them, but I don't have a figure for that right now.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: You have emphasized the importance of air pollution sampling at hazardous waste facilities.

DR. ROBERTSON: Right.

MR. KOVALICK: You also mentioned an operational sampling would be one of the functions of comparing emissions against existing regulatory requirements. Has your experience in doing this kind of work led you to any conclusions about the adequacy of existing ambient air standards to meet the needs of your sampling requirements? In other words, are they easy to sample against for the few that there are and are they sufficient to address the kinds of emissions you expect from hazardous waste?

DR. ROBERTSON: Yes, there are standards set for both particulates and organics in air, you know, in vapor form. In general, I think they probably are. It may be that as we learn more about the nature of some of the hazardous materials, that additional criteria may have to be added. But, as far as I know, I think that from a general standpoint they are fairly adequate.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: Under your section dealing with ground sampling, soil sampling and so forth, you indicate that soil surveys one-half an inch to an inch, and perhaps as much as six inches are usually satisfactory. For preoperational, particularly for preoperational surveys, don't you see the subsurface environment as being important?

DR. ROBERTSON: Yes. We mentioned the monitoring wells and, of course, core samples should be taken along with existing geological data. This particular type of soil sampling was to establish the movement of say pollutants after the site was established, but, of course, there should be a lot of presite work done which would include fairly extensive corings.

MR. LINDSEY: If you have a recommendation at a later time you could send to us, we would appreciate that.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: On your discussion of post-accident surveys, I was wondering if from your experience you have any specific incidents where you had experience and you have some idea what the costs were, if that is the kind of sampling program you suggest, do you wish to give us the flavor for that?

DR. ROBERTSON: We have not had that experience.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: Yes, I have a question here from the audience which is a little confusing. Let me see if I can get the gist of it.

If, after disposing some hazardous material on a site for say ten years, and then a new site is opened, and then perhaps at the first site some 10 or 20 years later the ground water monitoring shows high level pollutants. What can be done about that? Do you have any thoughts on that?

DR. ROBERTSON: That sounds like a loaded question. Would you mind running it by one more time?

MR. LINDSEY: We have a site that we dispose of hazardous materials for perhaps ten years and then we move on. We close the site. At some point later, perhaps 20 years or so later, we find that the ground water monitoring shows a high level pollutant. What can be done to ameliorate the problem -- long-term care I guess it would be.

DR. ROBERTSON: That sounds about like closing the barn door after the horse has gotten out to me. I don't know of anything exactly. Of course, we had the examination earlier today of the arsenic that had been buried. This was a fairly small quantity and you are talking about a reasonably small figure to clean it up, but if this was a fairly large site and you had a fairly large volume and, of course, you know, there is a lot of variables. You know, the distance going down to the water table, you know, how much actual depth is involved, the type of soil and the type of pollutant.

It would be pretty well impossible to say. Of course, in some cases you might have metals migrating, but it is not as likely. It most likely would be possibly either salts or certain types of organics and once these have gotten down there, other than just maybe trying to prevent further spreading I don't know of any other solution.

MR. LEHMAN: Are there any other questions of this speaker?

MR. Lazar: Just to go back to the previous question, you said other than preventing further spreading, what would you do to prevent further spreading?

DR. ROBERTSON: Again, this would depend upon the depth of, you know, the depth between the bottom of the pit and the water table and I guess in some cases it just has to be mechanical removal of the material depending on how far it had gone. It sounds as if in this particular case that not enough planning had been done before the site was actually utilized the first time or otherwise these contaminants would not have gotten down to the water table.

Again, hopefully in the future, we will not have any problems of this nature.

MR. LEHMAN: Dr. Robertson, one last question from the audience.

Is any study being done on treatment of contaminated ground water in the ground, to your knowledge?

DR. ROBERTSON: Not to my knowledge. It sounds like a reasonable idea. I think this is one area that we do need to do more work in. There are a lot of different areas that do need to be studied, but both treatment -- say, after it has gotten into the ground or either that or if we have say large holding ponds that have been there for a period of time and the site is about to be closed down and you have got just a real hodge-podge or very gross mixture of a lot of different things, organics, acids, metals and so forth, how to treat this sort of thing. I think these are some problems that need to be addressed.

MR. LEHMAN: Okay.

Thank you very much, Dr. Robertson.

A VOICE: May I address one last question?

MR. LEHMAN: I'm sorry, if you would like to address something to the record or comment on what the speaker said, that's fine.

Thank you very much, Dr. Robertson.

At this time, I would like to call Dr. W. A. Quebedeaux of the Harris County, Texas Pollution Control Department.

Is Dr. Quebedeaux in the audience?

(No response.)

I would like to call at this time John R. Montgomery of the Malone Company, Texas City, Texas.

Mr. Montgomery, please.

MR. JOHN R. MONTGOMERY: Panel members, ladies and gentlemen, I didn't make a prepared statement or paper here today because I didn't know what the nature of the meeting was to be. Now that I have seen a wide variety of speakers and interested parties, et cetera, that have been here, I think I was right in not doing so.

I would like to make a couple of things clear in advance.

First of all, I will be happy to answer any questions that I can for anyone, but you aren't talking to a scientist of any kind. You aren't talking to a chemist, a biologist, a geologist or any other sort of scientific person. You will be listening basically to a rate man, a traffic man, a regulatory person who deals with regulatory agencies. So, in that capacity I am representing the Malone Company of Texas City, which is a firm dealing exclusively in waste transportation, waste treatment and waste disposal and I guess it is safe to say at the outset that everything we handle is hazardous, by broad definition.

Second of all, by word of clarification, my name is John Montgomery, but if any of our customers are here in the audience they can probably assure you that I am not one of the "Cheap Johns" that Dr. Brown referred to.

(Laughter.)

We provide a service to the public and we are happy to do so and we hope to be able to continue to do so, but it is not an inexpensive service. We are regulated by several agencies in the State of Texas and by other Federal agencies, most notably the Department of Transportation.

We wear two hats at the Malone Company: we have several divisions. Malone Trucking Company I suppose is the most profitable. That is a Railroad Commission of Texas regulated carrier. We have one piece of authority and that is to transport waste chemicals, that is liquid waste, from all points in the State of Texas to licensed points of disposal within Texas. The material has to be of no commercial value.

Now, in that role we have quite a little bit of supervision from the Railroad Commission. All of our waybills, or bills of lading, are inspected regularly by the Railroad Commission. The commission also fixes the rates at which we can haul this material, all charges relating to the transportation of the material and they also monitor the final destination of the material. This is good in one way and conversely it is bad. If you are a regulated carrier in Texas, which some people in the room may be, you have a fairly reasonable return of profit that you can expect. Now, in return for that, the Railroad Commission checks all of your papers, all of your transportation, all of your trucks.

The bad part of that is that if you are not a regulated carrier with authority, you aren't checked at all. This goes back to something that I believe Dr. Brown spoke about this morning, the "Cheap Johns". We have to comply, of course, we intend to comply anyway, but we have to comply or we are out of business.

There are some other people in our business who don't have to comply and don't comply. This is a problem and by way of recommendation to the Environmental Protection Agency, I would recommend that continued or possibly expanded enforcement of this triple ticket idea, the idea that the generator of waste will record how much waste he has produced and where it went and who took it there. This would help us and I think it would help the people of this state and any state.

Switching to the role of Malone Service Company, another subsidiary, which is our disposal plant, let me describe the situation basically. We take in waste chemicals from several different sources, probably I guess 100 different customers. These people tend to be smaller plants. Larger plants with a large fund of money to deal with can become involved in tax exempt, bonded, Federally supported waste disposal programs such as the Gulf Coast Regional Waste Disposal Authority.

At Malone Company we don't have any Federal assistance whatsoever. Any state assistance -- we work with the state, but we don't get any money from them. Now, this precludes our going into such things as incineration, huge expansion of our plants, anything that requires a lot of money. Basically what we do is accept waste of all different types with a few exceptions. If we can reclaim it, we will. If we can't, we neutralize the material and dispose of it in an injection well system.

Now, oils generally speaking can be reclaimed. We have oil from several sources. As a matter of fact, we have a subsidiary company, Marine Pollution Control, which is basically an oil spill contractor, to use a euphemism there, in the oil recovery business. They have contracts with the Port of Houston Association which is called the Clean Channel Association, the Texas City, a similar association in Texas City and the Port of Galveston. I believe for about a year's period there in 1974 and 1975, they cleaned up well over 100 oil spills.

Now, if the oil is contaminated, or it has been on the water too long, or if it has a lot of grass or sand or other foreign matter in it, we accept that oil at our disposal plant and we don't dispose of it. We treat it, we clean it, we filter it, in what even I not being a scientist would say, is a fairly simple method. And then we can resell it or recycle it. We can use it as road oil. Some of it can be reused as fuel. Some of it can be fed into a process that can be used as part bunkering fuel for ships, low quality oil.

The rest of the material is, generally speaking, neutralized and injected. Now, here again, you aren't talking to a scientist so I can't tell you all that is involved in it, but we make a blend of materials which is just slightly on the acid side and put them into a well. The well is basically a dry hole. Instead of having oil in it or water it has nothing, so we fill that with a neutral base chemical that is a little bit on the acid                to keep the well running, to keep it from clogging up.

Now, the disposal plant is permitted by the Texas Water Quality Board and the Texas Air Control Board and they, I can assure you, work with us on a regular basis to make sure we comply.

We have monitoring wells as was discussed earlier to make sure that the material doesn't get out into the water table and these are monitored by us and by the Texas Water Quality Board. So far, we have had no problems since 1968. And without giving any exact figures on the amount of waste we are talking about, I can say that Malone Trucking Company operates about 60 trucks around the clock, around the year, hauling waste to this site. So, we are talking about a sizeable amount of material.

Our main problem is not water, but air pollution. Of course, we are permitted by the Texas Air Control Board, but all chemicals have to be, at least on our budget, stored in holding pit areas. This is not a hole in the ground, a permanent arrangement where you leave it out there and hope it evaporates, but this is an area where they are blended together before they are taken for final neutralization.

Our main problem is being careful not to accept any waste that has a high aromatic content because although our plant is located in the Texas City area, there are people who live there, believe it or not, and they are rather particular if they have to leave their home over something that was brought into our plant. This has happened on a couple of occasions and if anyone is here from that area, I would like to apologize for that.

We have some people with a scientific background on our staff. We don't spend a whole lot of time as Dr. Brown suggested analyzing every bit of waste that comes in. It is really prohibitively expensive and I don't think it is necessary either. The main thing that we check is what its relative weight is so that we know where to put it, whether it will float on top of what we already have or whether it will go to the bottom: and what the aromatic quality of it is. If we can in fact release this material into the open air or not.

Now switching back to the carrier operation. Several people today have talked about whether or not the regulatory bodies, Federal, state, or local, are adequate or not.

First of all, with regard to the disposal operation, I feel that they are. We certainly aren't left alone by the State of Texas. We are rather closely supervised and I feel that we are fairly supervised and the supervision is not of a defeatist nature. It is of a health nature. We know what procedures to take when we want to expand, and the Texas Air Control Board and the Water Quality Board will really go out of their way to help us do that. It is my opinion that they want us to continue as a private enterprise and certainly we hope to.

As a carrier the Railroad Commission, as I have already said, is very particular about where we haul to and what we have and the rates that we charge on the state level.

Now on the Federal level, the Department of Transportation has become involved as you know in hazardous material handling. I just returned from a seminar in Cincinnati that the Department of Transportation or rather the American Trucking Association is putting on in behalf of the DOT, concerning shipments of hazardous waste. After spending about nine hours in learning what I could do to keep out of jail, I can assure you that the Department of Transportation is interested and they do have a pretty comprehensive program about transportation, shipping, and receiving and record keeping on hazardous materials of all types.

I believe that is all that I have in the way of direct comments. I'll be happy to answer any questions.

MR. LEHMAN: Thank you, Mr. Montgomery.

Are there any questions?

Yes, Mr. Lindsey.

MR. LINDSEY: Mr. Montgomery, we have heard, not here today, but prior to this, that in order to deep well dispose satisfactorily one must be quite careful of the geology of the subsurface strata into which you are pumping this material. To be careful that you know what the capacity and the extent of this strata is to receive and hold these types of waste. You are in this business, and apparently have been doing this for a while. Can you tell us do you have any procedures for determining the capacity and extent of the strata to which you are pumping to hold these kinds of waste. Could you tell us how you do that?

MR. MONTGOMERY: In a way I can. First of all as I said before, that particular question is a little bit out of my department, but I would like to say that in order to get permitted to do this type of work around 1968 we surveyed the well site, which incidentally we have been operating one well, the same well, since 1968, and we surveyed that as to capacity and as to possible contamination of surrounding ground waters and that sort of thing. We also have a general idea of how much material has been put into that since then.

Now, I really apologize that I can't tell you any more specific information than that as an answer to it, but I know that this is done not just by our hands, but by a survey of geologists which we contracted.

MR. LEHMAN: Mr. Mausshardt.

MR. MAUSSHARDT: I have a question from the floor here. The question really is a two part one.

First of all, do you line your holding pits that you place materials in and if so, what do you line them with? Do you also line or protect your injection wells as far as sealing the top part of it so that materials can't come to the surface?

MR. MONTGOMERY: Yes, sir. Well, as far as the holding areas go, I think the most general answer that I can give you is, no, they aren't lined other than by oils and materials that we had in the material that we have put into it.

Now that is true to form. I know that there is no plastic liner in there. Actually, at this time I am operating only one large pond for chemicals.

Concerning the disposal well itself, it is completely sealed up. It is constructed in the oil well fashion, cemented, fractured and completely protected.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: I was interested in some of your comments about transporting waste. Could you give us any more information about the amount of interstate traffic these 60 trucks that operate around the clock carry, and the second question is related to the transport. You mentioned the bill of lading or other shipping documents often contained quite a bit of information. Could you just describe for us the kind of information that usually appears on a bill of lading for mixed industrial wastes?

MR. MONTGOMERY: Yes. First of all, with regard to interstate transport, Malone Trucking Company is an intrastate carrier. We aren't engaged in interstate transportation at all. Related to that, I can't speak for Texas, but I know of two neighboring states, Oklahoma and Arkansas, that don't care to take interstate waste shipments. Oklahoma for sure, I hope I am not speaking out of turn here, but we were involved in a disposal site in southern California which some state agency decided that they didn't need any waste from Texas. They had enough of their own. The same thing I think is true in Arkansas, though that might be by local agreement rather than state.

Now as far as the Department of Transportation regulations concerning paper moving with the load, under the new public law for that sort of thing there will be a shipper's certification with the material. The certification will state that the material on board has been properly classified and it has the proper Department of Transportation chemical name and the proper labeling and the proper classification, and that will be signed by the shipper. The carrier will keep this with him all the time he is transporting the load. The truck that the stuff is moving in will be placarded either "flammable", "hazardous", "corrosive", "explosive" or whatever it may be. This certification and this record of classification and the placarding will be kept in the carrier's records for inspection by the DOT. This has not been done in the past. This is relatively new. The law became effective January 1st of '75, I believe, and it is just now finally being implemented.

MR. KOVALICK: If I could add just a little bit more to that. As I understand those regulations the label that you would receive at your disposal site might say "corrosive", or it might say "organic", not otherwise specified, or something like that. Is that information sufficient for you to deal with that waste at the disposal site as opposed to on board the truck? Is there sufficient data there to deal with mixing that with other wastes by calling it a "corrosive", "organic", or not otherwise specified?

MR. MONTGOMERY: I believe I understand your question, but as far as the Department of Transportation is concerned, as near as I can determine they are interested only in transportation, shipping and transportation. When it gets to the destination, to the consignee, they are through.

We know what the material is before we get it because we just don't send a truck after it until we know just exactly what it is that we are getting and whether we can take it or not. So we already have that information. The reference I made to the DOT regs was so that the public would be protected in case of an accident or some sort of incident or spill of the material during transportation.

MR. LEHMAN: Mr. Lazar.

MR. Lazar: Mr. Montgomery, I have two questions. Could you elaborate a little bit more why your company has to comply with the regulations of the Texas Air Control Commission while many of your less responsible competitors don't have to do that. I didn't quite understand that.

MR. MONTGOMERY: Yes, sir, I will be glad to. That is my department.

All trucking intercity, anything that crosses a public highway or leaves a town in Texas, is regulated by the Railroad Commission. Now in order to legally transport any materials, I don't care whether it is cardboard boxes, or chemicals, or gasoline, or diesel fuel, or household goods, you have to be granted authority by the Railroad Commission. You have to go through a rather expensive process to do that and any more you just about have to buy somebody else out to get that type of authority.

If you have it you are then subject to all the rates, regulations, and all forms of compliance that the Railroad Commission has. One the other hand if you don't have that authority the Railroad Commission flatly has washed their hands of it. They will not enforce any action against anyone that is not a Railroad Commission regulated hauler. So, if you are a dumping John Doe, or a "Cheap John Doe" going down the road in your vacuum truck with no door signs on it, as long as you don't have a Railroad Commission of Texas plate they have nothing to say to you. You can go on about your business.

Now, the Department of Public Safety, I believe, is supposed to take care of that sort of supervision. That is sort of important, but they are rather short-handed in that department it has been our experience.

MR. Lazar: My other question concerns, or is based on shipments you receive. You mentioned at one point you will make a decision as to what to do with it based on whether to spread it on roads or whether to reject it and so forth. Obviously, it is quite complicated to do a thorough chemical analysis of everything that comes in of this nature, but do you check the sources of where these orders come from? I have a good reason why I am asking this question. You know, we know of one serious incident happening in Missouri where oil was spread on the roads and it happened to have dioxide in it which is an extremely toxic chemical substance, or it may have poly-chlorinated minerals, so do you check your sources before you decide what to do with it?

MR. MONTGOMERY: Yes, sir, we do. The disposal business in Texas is non-regulated. Unlike the trucking industry, it is not a public utility so you can charge whatever you want for disposal. Obviously, if we were taking on a hard-to-handle material that is of no commercial value or a negative value, it will be disposed of finally and this is going to cost us more and we have to pass this charge along to the customer. In the case of an oil, we can charge less for that oil. At that point in determining how much to charge, we would try to make some determination of how clean the oil was, how good it was, what the level of contamination was, because we don't want to -- in other words, we may have something that looks like oil, and if we know it is poisonous or hazardous or it is tremendously aromatic, we can't use it for road oil. So, in determining that the material we are getting is good and clean, we can get a lesser rate so our shippers, our customers, will be glad to work with us on that.

MR. LEHMAN: I'll just say for the benefit of the audience that we have had a couple of other questions brought up to the panel which are addressed to the panel, and I just want to remind everyone that we are here not to speak, but to listen, so if you do have questions please don't address them to us, address them to the speaker.

Are there any other questions of the speaker?

(No response.)

Evidently not.

Thank you very much, Mr. Montgomery.

MR. LEHMAN: At this time, I would like to call Mr. John F. Erdmann of the Texas Chemical Council in Austin.

MR. ERDMANN: Members of the hearing panel and assembled parties, before I begin I would like to mention something about Mr. Montgomery's discussion. I am from Union Carbide in Texas City and the Malone facility is not too far from one of our solid waste facilities. The question was asked about the clay and the lining of pits and I would like to speak to that because I feel that it is important to your understanding of the need to be sure that local solid waste sites are evaluated on the basis of their suitability, and that individual sites are very individual and this is a very particular case.

About four years ago , we contracted with the Gulf Coast Waste Disposal Authority to build a liquid waste water treatment plant and it was a plant which would involve the use of large lagoons, and before we did the engineering work we had to find out the suitability of the site. Numerous core samples were taken and permeability studies were made and it so happens the clay in that area along the western shore of Galveston Bay, right across from Pelican Island and so forth, and in the Texas City area, is so impermeable to the passage of water that we couldn't even get a test result. It came out less than one gallon per acre per year which was hardly believable. Then just recently we took some core samples from some other pits that we have had in operation for about 20 years containing a wide variety of organic materials and we analyzed by the leaching process, the percolation with water to determine how much material would go into the solution from the clay. We tested it for all sorts of metals and organics and we found that it had no more material in it than some materials which had been dredged out of the Bay and piled over on another site at about the same time that our pits were dug 20 years ago, so we couldn't tell the difference. I just wanted to bring that to your attention that certain sites do have peculiar characteristics and this is one that we feel is very important that liners aren't necessary.

Now back to what I came up here for in the first place.

I am substituting for Harry Whitworth of the Texas Chemical Council. He had to return to Austin and I helped him at one of the subcommittees in preparing this statement and some of the background for it.

My name is John E. Erdmann. I am the Environmental Protection Coordinator for Union Carbide Corporation at the Texas City plant, and a member of one of the Texas Chemical Council subcommittees.

The Texas Chemical Council is made up of 71 companies, all having one or more plants in Texas. These plants produce materials necessary for the health and well-being of the people of the State of Texas, the nation and the world. Member companies employ 54,000 Texans and have payrolls of over $500 million per year. We appreciate this opportunity to comment here at this hearing.

The philosopher, Alfred North Whitehead, once observed that before answering a question, you need to find out what use was to be made of it. He was concerned that words and statements have different meanings in different contexts. We are similarly concerned today.

From the Environmental Information Sheet and slick paper booklet "Hazardous Wastes" which was sent out to the public by the EPA in preparation for this meeting, we gather that the EPA has already concluded that ederal regulatory legislation is needed. We specifically disagree with this conclusion.

The State of Texas and the Environmental Protection Agency in combination already have adequate control of all discharges. Therefore, before commenting on the suggested discussion topics, we would like to make the context of our remarks as clear as possible lest they be misinterpreted. Since these hearings are being held under Section 204 of the Solid Waste Disposal Act, we will confine our remarks to those solids, semisolids, and liquids which are disposed of by solid waste technology although hazardous wastes can be in the form of either solids, liquids, or gases.

First, the Texas Chemical Council supports the safe and proper disposal of all solid wastes, both hazardous and non-hazardous.

Second, we believe this can be accomplished best by local and state regulations. Differences in disposal site characteristics and the large variety of solid wastes make the number of possible interactions so complex that solid waste disposal can be handled best on a case-by-case basis. This means control and flexibility at the local level.

In Texas, we already have the necessary regulatory mechanisms to do this. For those states that don't yet have control programs we commend to them the recently adopted solid waste regulations by the Texas Water Quality Board. These are specific enough to provide for control while still allowing consideration of the best methods on an individual basis.

Further regulation would probably conflict with existing legislation in at least some respects.

The Section 208 areawide planning portion of Public Law 92-500, which are the 1972 amendments to the Federal Water Pollution Control Act, already mandates in paragraph 208b2J and 208b2K processes for the control of the disposition of all residual waste generated in such an area which could affect water quality and the control of disposal of pollutants on land or in subsurface excavations within such an area to protect ground and surface water quality.

Under this plan, state and local bodies are already working out waste management plans tailored to the needs of specific areas. Let's give existing laws a chance to work before passing new ones. Incidentally, there was a hearing this last Saturday in the Houston-Galveston area, Council of Work Shops for that very purpose.

Third, we believe solid waste should be disposed of in a technically sound and feasible manner, and that these technical aspects should be given precedence over legal simplicity. There is a strong tendency by rule makers to write regulations that are easy to administer and to enforce even though they may be costly and inefficient.

Fourth, in regard to costs, we believe solid waste regulations should be cost and energy effective. Although we do not have the data in hand, we suspect that solid waste disposal costs will follow a curve similar to those for air and water. That is to say, solid wastes can be disposed of in a manner safe to humans and most organisms, at reasonable cost and with reasonable expenditures of energy. But super-safe disposal to protect all organisms against all conceivable contingencies will require expenditures of both money and energy that are disproportionate to the benefits gained. All costs must eventually be borne by the public in the form of increased prices, taxes, defaults, or inflation. Thus no law or rule that requires either unnecessary or foolish expenditures is in the public interest.

Turning now to the suggested discussion topics.

The Texas Chemical Council in general endorses the statement made by the Manufacturing Chemists Association at the December 4, 1975 hearing in Chicago. We also offer the following comments:

Under Topic 1: The word "hazardous" in ordinary usage means a combination of some thing and some circumstance such as to produce a danger or risk. All materials are hazardous in some circumstances and thus, the attempt to define a hazardous material without regard to location or exposure has inherent difficulties. Several definitions have been proposed and we believe the one proposed by the Manufacturing Chemists Association is as good as any. What is needed most is a common sense interpretation of whatever definition is adopted.

Sampling and analysis should follow standard works on these subjects such as "Standard Methods" used by the ASTM. We specifically request that the EPA not introduce additional analytical methods without a truly compelling need, and that, insofar as possible, existing analytical methods be used.

Topic No. 2: In trying to assess responsibility and liability, legislators and rule makers can largely determine the mechanisms by which solid wastes will be disposed of, even though these may not at all enhance environmental protection. For example, holding the generator solely accountable for the ultimate disposal of his waste will doom contract commercial waste disposal operations. No generator could afford the risk of having someone else do it for him. A number of rational divisions of responsibility can be made and some of these are discussed in the MCA statement. We believe the divisions and procedures of the Texas Water Quality Board regulations are reasonable ones.

Topic 3: As we indicated earlier these matters are so complicated by specific waste and disposal site factors that no general answer is possible. Each case should be handled individually and each should be a technically sound compromise between the possible and the affordable. Thus, we believe it is futile to say that this or that waste should be incinerated, biotreated, or whatever.

Rather we recommend that reasonable, attainable end-results should be defined and that the decision be left to the generator as to the best treatment and disposal means. In short, we do not believe that as a blanket rule, any specific treatment should be either required or prohibited, only that the material be safely disposed of.

There is a great need which the EPA could fill for the collection, organization, and dissemination of information on waste disposal treatment, site factors, costs, et cetera. Considering the volume of solid waste generated only a small fraction is receiving improper disposal and probably much of this because of lack of information.

Topic 4: Where means of detoxification exist these are generally known to the larger operators. The EPA could perform a service by publishing a description of detoxification reactions along with realistic cost requirements. This information would be of value to smaller operators and would set a rational framework for discussion of the whole subject. We suggest the EPA work through trade and professional associations to prepare such a publication.

Topic 5: Very little cost data are available in useable form and we suggest the EPA set about collecting such information from published literature and from both industries and municipalities by working through trade and professional organizations.

Topics 6, 7, 9 and 10: We recommend that the methods and procedures set forth in the recently reviewed solid waste regulations of the Texas Water Quality Board be used as a guideline for these.

Topic 8: We have no comment.

Topics 11 and 12: We believe that shipping and labeling of wastes should follow the same requirements as those required by other products having similar physical and chemical characteristics. Again, we recommend the Texas solid waste regulations as a guide to recordkeeping requirements.

Topics 13, 14, 15 and 16: We would hope that the EPA would provide the answers to these questions on damages from improper solid waste disposal, of citizen acceptance of hazardous waste disposal facilities, and of waste generation and disposal by Federal facilities.

In summary and in conclusion, we believe that solid waste disposal is best regulated at the state and local level and that sufficient legislation already exists for this purpose. We urge the Environmental Protection Agency to stay its regulatory efforts and to redouble its other solid waste functions as listed on the last page of their Hazardous Waste booklet. These include:

1. Supporting research on the health and safety effects of land disposal of those wastes that cannot be recycled.

2. Working with State and local governments to improve solid waste disposal practices; and,

3. Providing technical assistance and information to State and local governments, and to industry, to speed the application of new technology and environmentally sound waste disposal practices.

Thank you very much.

MR. LEHMAN: I have one question.

Certainly your statement indicated it was your belief that -- I believe you used the words -- only a small fraction of wastes is being disposed of improperly, and yet we heard earlier from Dr. Brown that it was his estimate that at least in his locality that there was a significant percentage of, I believe he used the term something like greater than 60 percent of the waste was being disposed of improperly.

I was wondering if you had any comment on that, some guide as to how you might resolve that discrepancy?

MR. ERDMANN: First of all, in our area we have in the past had a little bit of that. I don't know of any now. I know all of the people that we use for truck hauling, and Malone is one of them and there are several others, are reputable and in fact quite as concerned about the problem as we are. We dispose of all of our waste on site. It is on our own property, and so they don't have to worry about it. They are not concerned with anything but hauling it.

However, in the Dallas area I am sure that the situation is different. The industry up there is quite different than it is in Texas City and the Houston ship channel, and I feel that it is quite diversified. There are a lot more smaller operators, and the land situation is quite different.

As to how to prevent it, I would suggest that a couple of State Troopers can stop that practice very quickly. I am sure that it is against almost any ordinance and with the proper show of diligence most people know where these places are, where these dumps are occurring. It is not hard to find them and I should think that a little patroling would certainly help the situation, and maybe you have to string somebody up a little bit to get some attention, but I think it would profit pretty quickly.

MR. LEHMAN: Any other questions?

Mr. Lazar.

MR. LAZAR: Mr. Erdmann, you expressed the hope in your comments that those states that do not have regulations yet that they will innovate the Texas Water Quality Board. I would like to ask you how you envision this would come about without Federal regulations. How do we encourage those states to effectively have regulations which have not acted up to now?

MR. ERDMANN: I think that the Federal government can set standards and in this way help promote that, but there are other ways which are I believe more effective and that is that our agency people meet with agency people of other states. In fact, the head of our Air Control Board, our Executive Director Charles Barden, is the chairman of a nationwide group of similar directors of Air Control Boards in other states, and Mr. Yandis is represented on some, also, I believe, and we do have representation and we do discuss these things back and forth.

What it boils down to, I think, is which states are doing the job most effectively at the least cost, and, really, then other people will be attracted to use those methods. Frankly, I think the recent regulation that was written by the Water Quality Board took a step in that direction, because it provides very definite, definitely the use of the individual discretion in how things can be best done in a technical manner. And I think we all realize that you cannot legislate technology.

I hope that is helpful. Did I answer what you wanted?

MR. LAZAR: Yes.

Another question, please. You mentioned that it would be very desirable to have flexible state and local regulations on hazardous waste and, therefore, no Federal legislation or regulations within those guidelines would be desirable. Why are the two mutually exclusive?

In other words, is it not conceivable to have Federal legislation and guidelines or regulations and still have local flexible control of a situation?

MR. ERDMANN: The problem is when we are dealing with the waste, none of which are pure materials in many cases, and what you would have as in a still bottom from a location in Texas City would not correspond to one from a similar process in Oklahoma City, and would not analyze the same and it might not be able to be handled the same way. You might be able to deep-well dispose of it there, but you might be able to do it here, and we feel in general that if Federal regulations are imposed that they would have to be so general that they might exclude the possibilities of doing things which would be most practical in certain locations. This is what we are looking for, is the flexibility to do the job technically and safely, and not have to worry about the letter of some regulation which was not proposed other than to be uniform but which may not fit the need.

MR. LEHMAN: Mr. Kovalick.

MR. KOVALICK: If I could explore that last point, I was wondering if you would also agree that it is possible for a state that is innovated like Texas to adopt a set of regulations for the protection of its citizens, and then for neighboring states to become concerned about, shall we say, the waste flow for their area and, therefore, adopt either more or less stringent regulations for the protection of their citizens. It would seem -- at least that is perplexing to us. Do you have an observation on that dilemma, that the waste end up being a waste flow because of variances between and among the states?

MR. ERDMANN: I don't think that we worry too much about whether the lettuce grown in California is sold in Dallas, or Santa Fe, or Chicago. It meets certain needs, and I think that we can do the same thing with waste. If we can dispose of them properly, it doesn't make any difference whether there is a state line there or not, as far as I am concerned because the technology is determined and the site location and the conditions under which it is being done, and also the economics. You are not going to transport things from Dallas down to the Rio Grande, for example. It costs too much to move. It seems more convenient to go across state lines to another area and if it can be done more properly there, I see no reason why it can't be done that way. If somebody complains, "Well, you are bringing your garbage over into my neighborhood," I don't think it makes a whole lot of difference. It could have been coming from another town in his own state 30 miles away and he would still have the same complaint.

MR. KOVALICK: So you acknowledge there would be some confusion if, for example, Oklahoma were to prohibit land disposal of waste that would originate in Texas.

MR. ERDMANN: That could possibly pose a problem, but I think that it could be handled intelligently if people would look at the facts and not at the political consideration.

MR. LEHMAN: Mr. Mausshardt.

MR. MAUSSHARDT: I have a question from the floor here. The question is stated: Hasn't the Federal Safe Water Drinking Act provision had an effect upon state waste disposal operations? Do you care to comment?

MR. ERDMANN: Yes. I believe they have, but I haven't been working too closely with that drinking water situation and, frankly, I don't feel comfortable in commenting on that.

You know that there are provisions in that Act which will make deep-well disposal in some cases difficult. In our particular area in Texas City it does not apply too well, because the drinking water that they bring up is from such deep levels, and the permeability aspects are such that no surface water gets in it.

MR. LEHMAN: Mr. Lindsey.

MR. LINDSEY: I have a question from the audience. Would you comment on the relative hazards of land disposal versus properly conducted deep ocean dumping?

MR. ERDMANN: Again, I think it depends to a great extent upon what you are dumping. Each case should be taken into proper perspective. I don't believe you should dump chlorinated hydrocarbons on either land or in the sea, and the burning of it on the Vulcanus as was described earlier this morning is a very feasible and a logical way to handle a problem like that. But you could take sewage sludge from the City of Houston and dump it out at sea and it probably wouldn't hurt a thing because it would just be a drop in the bucket compared to what is coming down the Mississippi River.

MR. LEHMAN: All right. Are there any other questions?

Mr. Kovalick.

MR. KOVALICK: I wanted to clarify your comment. I don't know if I can find it in your statement on a moment's notice. As I recall, you made a distinction between what I would call the process kind of standards that have been typical of the water pollution permit discharge at a certain level, or perhaps I should say best practical treatment is what I call a process standard, and I thought you were making a distinction between that and what I would call a performance standard where there is some level of performance that is up to the person providing that treatment to meet that level whether it is certain parts per land, and so forth. If I heard that distinction correctly, did you advocate the latter as opposed --

MR. ERDMANN: Well, it depends --

MR. KOVALICK: With regard to waste treatment.

MR. ERDMANN: With regard to waste treatment I think you ought to look at waste water treatment a little bit differently than you have to look at solid waste treatment. And if I get the gist of your question correctly, and I am not quite sure that I said that, but I will try to answer it anyway.

The original work on water ocean control, we were most concerned with the receiving water, and the qualities of the receiving water, and I think in the ultimate end of things that is really what we are concerned with, but the practicalities of trying to determine whether the receiving water is or is not meeting certain standards is rather difficult.

I think that Galveston Bay is a good example of that. I have followed a number of surveys on Galveston Bay ever since 1967, and from the data you certainly cannot tell if it was polluted then nor is it any more polluted along the way. There is really no way you can analyze the data to say this, but we all know that there has been tremendous changes in the Bay because of the work that has been done around here.

So to use the criteria of the receiving water is very difficult, because it is hard to assess the changes. That water is moving all the time. If you get on a land spill and you can see the effects, and it doesn't get around too well, and I think that performance there is a little easier to establish than perhaps --

MR. KOVALICK: I found this sentence. Maybe this will help. "We recommend that reasonable, attainable end-results should be defined and that the decision be left to the generator as to the best treatment and disposal means. I was trying to get an elaboration on what you mean by "end-results" with regard to waste disposal.

MR. ERDMANN: In the case of solids we would certainly hope that they would have no effect on the surface waters or the sub-surface waters, and keep the odors down, and disease, and flies, and all the rest of it in a sanitary landfill or its reasonable equivalent without any sub-surface disturbances.

MR. LEHMAN: One last question, Mr. Lazar.

MR. LAZAR: Mr. Erdmann, in your statement you have referred to two specific paragraphs of the Water Pollution Control Act of 1972, and I was wondering would you elaborate on these two paragraphs. You cited 208b2J and 208b2K. Do they have any enforcement provisions, and if yes what do they consist of?

MR. ERDMANN: I will have to decline on that, because I, frankly, wouldn't be able to tell you. I would have to go back and look at some of the reasons. As you know the Act is quite lengthy and we worked on this some time ago and it was a committee action. I don't know why that was put in in that manner, other than to be specific on the statement about the fact that these things were already being regulated by this Act in terms of area planning.

MR. LEHMAN: All right. Any other questions?

(No response.)

I don't believe so. Thank you very much.

Is Mr. Gartner in the audience now?

(No response.)

Next I would like to call upon Mr. H. H. Meredith of the Exxon Corporation. Mr. Meredith, please.

MR. MEREDITH: Mr. Lehman, members of the panel, ladies and gentlemen.

My name is H. H. Meredith, Jr. I am Coordinator, Environmental Conservation for Exxon Company, U.S.A. on whose behalf this statement is presented, as well as the Exxon Chemical Company, U.S.A.

We do appreciate the opportunity to disucss our response to the topic in the Federal Register of September 17, 1975. My comments present Exxon's general views on the subject of waste management.

Exxon believes that protection of the public health is an essential national objective, and should be the primary focus of all environmental laws and regulations.

A second, but appropriate national objective is conservation of the nation's resources to promote the public welfare to the extent of achieving a reasonable balance between the nation's economic and social needs and aspirations.

These objectives, obviously, require the commitment and cooperative efforts of government, industry, and the public. This meeting indicates commitment and cooperation by EPA which is commendable. Exxon stands ready to assist in the development of waste management systems which may be necessary to protect public health or promote the public welfare.

In responding to the subject of this meeting, we must all keep in mind the numerous existing regulations that control the discharge, the transport, the manufacture and the handling of materials which may be significant constituents of wastes. These developed regulations are basically adequate and, further, they are constantly being modified to meet changing needs and circumstances.

Regulatory guidelines and controls may also be needed for the disposal of wastes to our nation's land. Municipal wastes and industrial wastes may require additional regulation in some locations. As a matter of fact, the problems associated with each are inseparable.

It should be noted at the outset that our manufacturing plants use land emplacement as the primary waste management tool. Therefore, most of our remarks will concentrate on this procedure.

Any needed guidance for waste management should provide a balanced program for land use and should be site specific. Potential leachate and/or surface runoff should not contaminate potable waters nor render other waters unsuitable for their intended use. However, a land emplacement site overlying nonpotable ground waters and situated where leachate in surface water would go to a nonpotable water body should have different requirements than one where potable water is involved.

Now while controls may be needed for the land disposal of domestic and industrial wastes, this does not mean that properly sited, engineered, and controlled landfill operations should be regulated out of business. Further, resource recovery programs should be given every opportunity to develop such that cost competitive, energy conservative, alternate techniques will become available.

Any guidance for waste management should allow a reasonable time period for the implementation of new waste disposal practices. With reasonable time private competitive industry can respond by modifying current waste generating processes and/or by instituting new, environmentally acceptable disposal techniques.

In general, any regulatory approach should not require specific techniques to be utilized for the disposal of any waste. The regulatory criteria should be strictly aimed at controlling the environmental impact of the disposal operation. For most wastes there will be several environmentally acceptable disposal techniques, and the generator will naturally select the best combination of efficient, acceptable procedures on the basis of local physical and economic factors. We recognize there may be a limited number of wastes which are so specific and unusual that only one method of disposal, such as encapsulation, is environmentally acceptable.

The proper definition of the term "hazardous waste" is critical to the development of hazardous waste management. As inferred previously, the basic criterion which should be considered is the impact of the waste on the environment. The fact that a waste material destined for land emplacement may require specific precautions in handling is not, in our opinion, in itself a valid criterion to define as a "hazardous waste" requiring specific disposal precautions.

For instance, certain waste materials may become environmentally inert upon land disposal. Since existing regulations provide the basis for controlling air and point source water emissions from disposal operations, the major concern of hazardous waste management should be the control of ground water pollution from leachate and nonpoint source runoff from landfills.

Many leachate tests have been suggested to help in determining what is "hazardous" and what is not.

However, no generalized criteria can be applied to the leachate test results. If the leachate could flow into a potable water supply, it should be judged against a very stringent standard. However, application of this standard to all leachate would be inappropriate and wasteful. The criteria should be the protection of the designated use of the water resource, and should therefore be site specific.

Any waste management guidance should call for defining the responsibilities of the generator, the transporter, and disposer of hazardous wastes. In this regard records must be maintained by each party so that the generation, transportation, and disposal of the waste is documented. In addition, the generator should be required to accurately characterize the waste and to contract with an approved hauler and disposer.

Existing OSHA and Department of Transportation regulations regarding handling and transport of materials we believe are adequate and should not be duplicated.

In the development of waste management regulations, many industrial wastes are being considered "hazardous." It should be pointed out that many petroleum industry wastes readily respond to biological oxidation processes, such as land farming. Exxon's position is that these materials are not hazardous to public health or welfare unless treated in an irresponsible manner. It is not necessary that these wastes be disposed of in completely enclosed systems, as has been suggested by some.

Finally, and I would like to comment on the subject we should always keep in mind when generating guidelines, and that is who pays for a cleaner environment. Each dollar required to establish and achieve environmental goals must be paid for either in additional taxes or in the higher cost of products. Both of these revenue sources must come ultimately from the citizens. The primary objective of both industry and the government should be for each citizen to receive the most benefit for his dollar. Therefore it is important that all controls be realistic and encourage low cost, efficient solutions to waste management problems.

That concludes my presentation.

MR. LEHMAN: Thank you, Mr. Meredith. Will you accept questions?

MR. MEREDITH: Yes.

MR. LEHMAN: I have one. You mentioned in your statement that if there were to be any waste management controls or regulations that a reasonable time for implementation be allowed for these. Would you care to expand on that and give us some feeling of what you consider to be a reasonable time for these circumstances?

MR. MEREDITH: Only in general terms, if you will, Mr. Lehman.

So often we encounter regulations which become effective so quickly such that we have to come down on a solution immediately and spend all of our energies and time on the working out of the details of that one method instead of spending some time trying to figure out what is the best method. So I am simply entering a plea here to consider the fact that you may not have a solution worked out for a regulation ahead of time, since you don't know what the regulation is going to be. So if there can be a period, you know, we fool around with a problem for twenty or thirty years and then we feel like we have to solve it in six months. So sometimes we just fall all over ourselves in shortening the time period for implementation such that we, as the problem solver on the other end, feel like we could have done a lot better job if we had had a little bit more time.

So, you know, we are just asking for reasonableness as you people think about guidelines for people to use in developing regulations you ought to think about this point, too.

MR. LEHMAN: Thank you.

Mr. Kovalick.

MR. KOVALICK: A sentence out of your statement--you said in general any regulatory approach should not require specific techniques to be utilized for the disposal of any waste. The regulatory criteria should be strictly aimed at controlling the environmental impact of disposal operations. Is my reading of that similar to my question of the gentleman from the Association preceding you.

MR. MEREDITH: Yes.

MR. KOVALICK: I make a distinction at least as in those two sentences between the concept of process standards versus performance type standards, and I take it you are endorsing the latter.

MR. MEREDITH: Yes, but even more than Mr. Erdmann did. Considering the local conditions which exist; I mean to repeat, if you have got a potable water table right below you there are very few things that you can do with the landfill operation, but to say that a specific waste should always be incinerated or should always be treated in some particular manner I think probably in some cases cuts off maybe a better and certainly cuts off all innovative solutions to the problem. Yes, I think you have assessed it correctly, sir.

MR. KOVALICK: My second question, Mr. Chairman, one of your points -- Why don't I come back to that.

MR. LEHMAN: Mr. Crowe.

MR. CROWE: Have you had a chance yet to look into what you think the increased cost of your hazardous waste approach will be in view of the new Texas Water Quality rules and regs and are they going to be that much more stringent to where you feel this is going to increase your costs?

MR. MEREDITH: No, sir.

MR. LEHMAN: Could I clarify that, Mr. Meredith? The "no" meaning no you haven't looked into it, or "no" it is not going to increase your costs?

MR. MEREDITH: The procedures which are required are being followed anyway, so it is not going to increase our costs.

MR. LEHMAN: Mr. Mausshardt.

MR. MAUSSHARDT: The question is do you feel that the best system could be one in which EPA would write guidelines to the states to establish state solid waste regulations and have a compliance schedule similar to the air pollution regulations?

MR. MEREDITH: You lost me on the last part of that question.

MR. MAUSSHARDT: Possibly I could restate it. The question was, I believe, should EPA follow the Clean Air Act type approach where nationwide guidelines were written for the states to implement at a state level, and this being a regulatory guideline approach is this what you are essentially stating or making in your statement?

MR. MEREDITH: Who am I to say what the best solution is? We have no particular objection to EPA bringing uniformity to the state's handling of the wastes management problem. So there is no objection on our part to an overall set of guidelines which would be followed by regulatory agencies.

Now this doesn't deal with the Clean Air Act. I am frankly in the dark as to how it would relate to the procedures of the Clean Air Act.

MR. LEHMAN: I think it is just the basic philosphy and pattern used here. That is the implication.

MR. MEREDITH: To which I can't resist saying, Mr. Lehman, that may have been the original idea of the Clean Air Act, but it has gone considerably further than that today. (Laughter and Applause.)

MR. LEHMAN: Do we have other questions?

Mr. Lazar.

MR. LAZAR: Mr. Meredith, has your company performed any research on the health safety of land farming? You mentioned land farming of certain petrochemical wastes is harmless. We would appreciate it if you could send any documentation you might have available.

MR. MEREDITH: Let me answer that in two parts We have a separate research organization. We have our own medical department. There is continual interplay between our medical department and the research organization to determine if any of our products or any of our emissions or any of our effluents contain elements which may be carcinogenic which may cause trouble in any manner as far as health is concerned, and if such is ever found the product will be changed immediately.

Now as regards to research on land farming, we have conducted it for a considerable period of time. All of our tests indicate that in time the sludges which we have land farmed have been oxidized and the lands have recovered or as oxidized is insofar as we can tell equal to or better than it was before the sludge was farmed into it.

MR. LAZAR: Do you have any information specifically on potential update of metals by the crop?

MR. MEREDITH: No, I do not, but I will certainly make a note of that and answer.

MR. LEHMAN: Do we have any other questions? Mr. Kovalick.

MR. KOVALICK: In your statement you recognize the problem that has puzzled us as we think about defining hazardous waste. There is probably a body of things one would not label hazardous if you had a certain degree of certainty about the way in which it would be managed.

MR. MEREDITH: Yes.

MR. KOVALICK: You have in reality in some of your statements this morning presented the difficulty in trying to think about definitions of hazardous waste at the same time thinking about how it is managed, but suggesting we separate it into two questions. In other words, thinking about a little more catholic definition of what is hazardous and then if you had confidence about the way that waste is managed that is of course no longer hazardous. Do you care to comment on that?

MR. MEREDITH: I guess the sentence in the statement is rather a frustration and a striking out against all of us getting very strict and restrictive rules and regulations because of irresponsibility which is exhibited by a small percentage of industry, and we simply, well, you know, if you don't break the speed limit you hate to see real restrictive limits set on things. So I simply say this is a philosophical approach in which it would seem to me that the assumption should be made that responsible following of the intent of regulations will be the rule rather than irresponsibly trying to get around it.

MR. LEHMAN: Do we have any other questions?

(No response.)

Evidently not. Thank you very much, Mr. Meredith.

**EXXON** COMPANY, U.S.A.
POST OFFICE BOX 2180 • HOUSTON, TEXAS 77001

PUBLIC AFFAIRS DEPARTMENT
ENVIRONMENTAL CONSERVATION
H H MEREDITH JR
COORDINATOR

December 11, 1975

Mr. Emery C. Lazar, Program Manager
Hazardous Waste Management Division
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lazar:

At the conclusion of my presentation to the Environmental Protection Agency Panel on Hazardous Waste Management on December 9 here in Houston, you requested that I send you, for the record, results of any scientific studies on land farming of oily substances. Attached is a copy of a 1975 API paper, "Assimilation of Oil by Soil Bacteria" (Preprint No. 24-75) by R. L. Raymond, J. O. Hudson, and V. W. Jamison. The land farming of six oils at three geographic locations was investigated to determine the magnitude of the stimulation of the specific hydrocarbon-utilizing flora. In addition, residues, leachate water and runoff water were analyzed and the data are presented in this report.

The EPA report I mentioned to you after the meeting is titled "Oily Waste Disposal by Soil Cultivation Process" by Buford C. Kincannon and has a report number EPA-R2-72-100 (1972). A copy of this report should be available in Washington.

I believe these two reports will give you very good background information on land farming of oily waste materials.

Yours very truly,

H. H. Meredith, Jr.

HHM-WLL:F
Attachment
c wo/a: John P. Lehmann, Director, HWMD

REPORT DETACHED AND RETAINED
IN HWMD FILES

Ladies and gentlemen, we are very close to the time we announced to take a break. On the other hand, we have remaining on our list of candidate speakers a number of people we have called in the past and who have not been present. I think it might be worthwhile, if you will bear with us just for a bit, if we could perhaps one last time call for these speakers and if they are not here then there is really no reason to continue the meeting.

I would like at this time to call a representative from the National Barrel and Drum Association. Is there a representative of the National Barrel and Drum Association in the audience?

(No response.)

Let the record show that such representative was not in the audience.

I might call at this time W. A. Quebedeaux, Harris County Texas Pollution Control Department. Is Dr. Quebedeaux in the audience?

(No response.)

Let the record show that Dr. Quebedeaux was not in the audience when called.

I would like to call next Mr. Robert Gartner of the Sierra Club, Houston, Texas. Mr. Gartner, please.

(No response.)

Let the record show Mr. Gartner was not in the audience when called.

Ladies and gentlemen that, according to my list, ends the people who have asked to be allowed to speak at this meeting. Let me say one last time is there anyone in the audience who does desire to make a statement at this time?

(No response.)

Let the record show there were no further requests for time to make statements.

I would like to remind you, as we said at the beginning of the meeting, that we are accepting written statements for the record up until January 31, 1976, so if as a result of this meeting you have some thoughts that you would like to leave with us I would urge you by all means to please submit those in writing and submit them to us for the record.

I would like to express our thanks from our headquarters office to EPA's Region 6 in Dallas which took care of all of the arrangements for these meetings, and I hope that you have gotten as much out of these discussions and statements as we have. I know many of these statements were very carefully thought out and presented and we appreciate the amount of effort that was put into them.

Before closing I would like to remind you all once again that there is an EPA Town Meeting at which Mr. John Quarles, the Deputy Administrator of EPA, will appear to be held this evening at 7:30 p.m., 301 Sewell Hall at Rice University. Perhaps some of you would be interested in attending those sessions scheduled from 7:30 to 10:00 o'clock this evening.

There being no further business I would like to take this opportunity to once again thank you for coming, and I declare the meeting adjourned. Thank you.

(Whereupon, at3:30 p.m., the proceedings in the above-entitled matter were closed.)

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STATEMENT
OF THE
DOW CHEMICAL COMPANY
TEXAS DIVISION

PRESENTED BY
GLEN WESSELS

BEFORE THE
ENVIRONMENTAL PROTECTION AGENCY
HAZARDOUS WASTE MANAGEMENT DIVISION
OFFICE OF SOLID WASTE MANAGEMENT PROGRAMS

MEDICAL CENTER HOLIDAY INN
HOUSTON, TEXAS

DECEMBER 9, 1975

PRESENTATION

Good morning. My name is Glen Wessels, I am Supt. of Waste Control of the Dow Chemical U.S. Area Texas Division at Freeport, Texas. Our Company, as others, was invited to participate in this open hearing concerning environmentally safe management of Hazardous Waste.

Since all our waste is handled, treated, and disposed of on site, I will limit my remarks to topics that are of direct concern with our operation.

My presentation will be in narrative form to the discussion topics rather than question by question.

We subscribe to the classification of waste as established by the Texas Water Quality Board. We suggest that Hazardous Waste as it relates to Waste Disposal Means "any waste or mixture of waste which is toxic, corrosive, flammable, a strong sensitizer or irritant, generates sudden pressure by decomposition, heat or other means and would therefore be likely to cause substantial personal injury, serious illness, or harm to human and other living organisms." Hazardous substances are already defined by other Governmental Agencies including the Department of Transportation. We suggest no additional regulations or procedures are needed.

We endorse the proposal that the generator of waste should have the option to dispose of their waste on site or utilize a private or public operated system, provided the system selected satisfies governmental regulations and is environmentally safe.

We subscribe to the provisions that governing agencies establish practical and environmentally acceptable regulations for handling and disposal of waste.

All of our waste is handled by us on site. We are responsible for the cost and environmentally safe disposal of all waste we generate. This includes selection of disposal site, disposal methods, transportation methods, packaging and labeling, maintaining adequate records and adherence to an acceptable performance in all phases of the operation.

Every plant waste should first be considered a raw material for recovery and reuse not only for in-plant use, but for others. Beyond this, disposal methods will vary due to location, facilities, cost and environmental impact of disposal methods. An acceptable environmentally safe disposal method should be required--with the method of disposal the responsibility of the generator.

Safety and security precautions for handling and disposal of Hazardous Waste are much the same as for the manufacturing facility that created the waste. Existing regulations already available would apply to the disposal operation.

The State of Texas passed the Clean Air Act, Solid Waste Act, and the Water Quality Act which created agencies to establish guidelines and regulations concerning operations, waste handling, and disposal. Included in these regulations are provisions for site monitoring, record keeping, reporting, performance and closing of storage and disposal sites. We suggest no additional regulations or procedures are needed.

Environmental Protection Agency, Department of Transportation, State and Federal Health Departments, Texas Water Quality Board, and Air Control Board, Occupational Safety and Health Adm., and other federal, state, and local agencies now have regulations which are already adequate within their area of responsibility.