P R O C E E D I N G S

1975 Public Meetings on Hazardous Waste Management

Volume II

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

For sale by the Superintendent of Documents, U.S. Government Printing Office,
Vol. I and Vol. II Washington, D.C. 20402 - Price $14.00

PUBLIC MEETINGS

held at the

SHERATON MOTOR INN
FISHERMAN'S WHARF
SAN FRANCISCO, CALIFORNIA

Thursday, December 11, 1975
8:30 A.M.

PANEL MEMBERS

.n P. Lehman, Director
:ardous Waste Management Division (HWMD)
'ice of Solid Waste Management Programs, EPA

.ter W. Kovalick, Jr., Chief
.delines Branch, HWMD
'ice of Solid Waste Management Programs, EPA

.ald B. Mausshardt, Chief
›lementation Branch, HWMD
'ice of Solid Waste Management Programs, EPA

:ry Lazar, Program Manager
'ironmental Damage Assessment, Technology Branch, HWMD
ice of Solid Waste Management Programs, EPA

:red W. Lindsey, Program Manager
:hnology Assessment, Technology Branch, HWMD
:ice of Solid Waste Management Programs, EPA

.rles Bourns, Chief
.id Waste Management Program
. Region IX

---o0o---

THE CHAIRMAN: I call this public meeting to order.

Good morning, ladies and gentlemen. My name is John P. Lehman of the Hazardous Waste Management Division, Office of Solid Waste Management Programs of the United States Environmental Protection Agency in Washington, D.C.

I would like to introduce Mr. Russ Freeman, Deputy Regional Administrator of Region 9 of the United States Environmental Protection Agency.

Mr. Freeman, please.

MR. FREEMAN: Thank you.

I have been asked or assigned the responsibility for welcoming you to the meeting and making a few introductory remarks to set the stage for this meeting this morning.

So I welcome you all to San Francisco. It is a great city. It is a beautiful city. I hope you enjoy your stay here.

I don't know if the city is best known for its Golden Gate Bridge or its cable cars or whether it is because it has the tallest pyramid on the North American continent or because it dumps raw sewage in the San Francisco Bay, but for whatever reason it might be famous, it is a beautiful city, and I hope you enjoy your stay.

I also wanted to take the opportunity, however, to give you a little introduction to the Environmental Protection Agency, because it is an agency that reaches far beyond the

scope of the hearings in the hope that that will give you some context for the type of hearings that we are having here today and the purpose of such a meeting.

Our agency is perhaps best known to some of you because of its air pollution efforts.

They seem to be highly publicized, our efforts to control the automobile in Detroit or the way it is used on the street. Some of you may know us for our efforts in water pollution control, because we are indeed required to license every discharge of water in navigable waters, and, indeed, we are getting into the area of regulating discharge to ground waters

We run the largest capital construction programs, and some of you may know us because of the amount of dollars we spread around.

Here in California, for example, we spend $400 million a year in sewage treatment plant construction.

Some of you may know us best for our pesticide regulations, because we get a great deal of publicity when we ban DDT or when we tell people they cannot use certain things for certain things, again, without a registration or license.

And some of you may know us well because of our drinking water regulations. As you know, we have had a new bill passed that puts us in the business of insuring that everyone who gets drinking water from a public system gets drinking water that meets certain federally established standards.

In addition to some of these very popular programs, however, we also have programs in noise abatement, and you may have run into us there.

We have programs in radiation control, and you may have heard of us because of that. And we have an emerging and long-standing program in solid waste management that may well be emerging under new legislation to join these other programs in terms of publicity, stature, and so on.

Perhaps, however, some of you best know us as the agency that can't seem to do anything right. And that is a little bit what I would like to talk about this morning.

Part of the problem is that we are a regulatory agency by design. That means we are charged with trying to find some middle ground between the environmentalists who would like to have nature in its pristine and pure state and the industrialists who would like to have absolutely no control over his use of hazardous substances, chemicals and so on in the environment. And it seems that a person who is caught in the middle, even if he comes to a conclusion with the wisdom of Solomon and chooses exactly the right balance between these two interests, finds himself in the following position:

That is, that the industrialist who wants to sell his chemicals will indeed probably fall into line behind the center position, because it does indeed let him keep his business, and he is not banned altogether from the world.

On the other hand, the environmentalist who would like to keep the world pure and clean really does not tend to fall in line, but tends to stick with that position of advocacy for a pure and clean environment.

And so you find us oftentimes, once the decision has been reached, seemingly in the camp of the enemy.

And there are textbooks written and a great deal said about the fact that regulatory agencies are captured and get into bed with those they try to regulate.

I would merely like to point out that that is the nature of the regulatory process, that you essentially, after a debate is made in good faith and a decision is reached and the position is taken, the regulatory agency tends to find itself in the same railroad and on the same train with the group regulated.

I think we should not be surprised by that. We should just accept it as a part of the facts of life.

Another part of the problem, however, has been our approach in trying to do things. This is something that has recently emerged in EPA as something which requires very serious attention.

This is really complicated by two things that are in all of our enabling legislation. One of those things is state primacy -- that is, the Federal regulatory laws work to have the Federal government set standards and then direct the state

government to see that those standards are carried out.

Now, many state governments, especially here in the Western part of the United States, think that approach to a problem is in fact unconstitutional, that if the Feds are going to do something they may well be able to see that they are carried out, but they have no mandate to direct and order the states to see that they are carried out.

Well, indeed, the constitutionality of that approach has been tested, and the courts have upheld it, but suffice it to say that it does create a couple of problems for the administrator of such a program. First you require a great deal of diplomacy to walk in as a Fed to a state office and tell those people what they can and cannot or should or should not do, because there is nothing out of priority that makes a state person very interested in taking orders from some Federal person who does not pay his salary and does not fill out his performance criteria at the end of the month.

The second part of that problem, however, is that when there is a real tough question, one that in fact seems to have no answer, the state oftentimes will indeed say so: His problem has no answer.

Very interestingly, however, under environmental law, EPA does not have the same discretion or latitude. The laws very generally mandate that we carry things out. And in Los Angeles we have to achieve air quality standards by the year

1977 under the law, whether it is reasonable or not. The law directs us to do it.

Indeed, there are citizens' rights under the law. If we fail to do it, we can be taken to court by any citizen, including any person sitting in this audience. And the courts indeed -- as history has shown us -- will direct us to implement enforceable regulations to achieve the mandate of law, because, they tell us quite pointedly, that the business of changing unworkable laws is the business of Congress, of the legislature; and the business of interpreting interpretable law is the business of the courts. And the agency is indeed charged with carrying out the law.

Well, what that really means under state primacy is that whenever you see EPA out in front on an issue, it is generally a very controversial issue. It is an issue that seemingly has no answers, because if there were answers, the states probably would have taken the responsibility on and the problem would have been solved.

So that is, again, just part of the facts of life when you are talking about EPA.

The second and very real part of the problem, however, has been our approach to rule making. In the past when we have had an idea, whether it was our own idea or an idea mandated on us by the courts through the process of civil citizen suits, we essentially have said this is our idea. This is what we are

going to do. We publish it in the Federal Register. We give you a few days to think about it and comment on it. We listen to your comments. And then we promolgate it in the Federal Register, and that becomes the rule of the day.

If we have learned anything from the process of trying to implement laws with citizens' rights in difficult requirements, it is that this is really not a sufficient way to go about dealing with the hard environmental problems. And so the agency in the past year has tried very hard to turn this process around and begin to have the dialogue before the citizens are so incensed that they believe they have to take us to court in order to get some action on an issue, and to begin to bring the responsible parties into the dialogue before anything gets in the Federal Register so that you have had a chance to think about it before it is laid on you with 30 days for a deadline to comment on it. And so that we have had a chance to hear what you have said before we ever put pen to paper or to write what goes into the Register in the first place.

That is the type of meeting we have here today. Under the Solid Waste Disposal Act, EPA is authorized to gather and disseminate information, to designate sites for hazardous waste disposals, should that become necessary, and to develop guidelines regarding hazardous waste disposal.

This is one of four meetings to gain a perspective on the need for guidance for the proper management of hazardous

waste.

We are interested in information that you may have on a number of issues: what things ought to be classified as hazardous waste; what responsibilities should rest with the person who generates, the person who uses, and the person who disposes of that; any information on the technical processes for recycling or disposal of the waste; cost data; safety precautions; monitoring and record keeping; insurance; methods for insuring the long-term integrity of disposal sites; and any of a number of other things which you may believe to be important to this issue of regulating hazardous waste disposal.

A list of 16 specific areas of inquiry were included in this notice of the meeting, as published in the Federal Register of Wednesday, September 17th, 1975.

A transcript of the meeting today will be made, and written comments may be submitted for the record up until January 31st, 1976. The transcript will be made available for public review.

It is my pleasure at this time to introduce the chairman of today's panel, who will set the ground rules for presentation and who will introduce other members of the hearing panel.

Our chairman this morning is Director of the Hazardous Waste Management Division of the Office of Solid Waste Management Programs for the Environmental Protection Agency.

He graduated cum laude in engineering physics from

our own university here in Berkeley, the University of California. He has over 12 years' experience in industry in the areas of toxic and hazardous waste management, and he has over five years' experience with the Environmental Protection Agency in the programs that he has managed.

Mr. John P. Lehman, panel chairman, Director of Hazardous Waste Management.

John.

THE CHAIRMAN: Thank you, Mr. Freeman. Let me add my welcome to that of Mr. Freeman.

The purpose of this public meeting, as announced in the Federal Register, 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 defined as the non-radioactive discards of our technology based society.

They include the toxic, chemical, biological, flammable and explosive by-products of the nation's extractive and conversion and process industries. Discussion of radioactive wastes is outside the scope of this meeting.

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 other members of the public as to the extent of the mismanagement of hazardous waste and the available or anticipated systems and technologies to abate the problem.

In order to provide a framework for the 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 other related topics are what we are interested in today.

Copies of this Federal Register notice are available at the table marked "Publications" at the entrance to this room.

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 and EPA's Region IX Office here in San Francisco who specialize in certain subject areas related to these issues.

They are from your left, Mr. Charles Bourns, Chief of the Solid Waste Management Program of EPA's Region IX

Mr. Donald Mausshardt, Chief of the Implementation Branch of the Hazardous Waste Management Division.

Mr. Walter Kovalick, Chief of the Guidelines Branch of

the division.

Mr. Fred Lindsey, Program Manager for Technology Assessment in the Division.

And Mr. Emery Lazar, Program Manager for the Environmental Damage Assessment for the Division.

Also with us today, although not in the room at this moment, are Mr. Alan Corson and Mr. Cam Metcalf of our staff in Washington.

In addition to this meeting in San Francisco today, three other identical sessions were held in Newark, Chicago and Houston during the first two weeks of December.

Persons not wishing to deliver a statement here 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 possible use of all of our time.

Persons wishing to make an oral statement who have not made an advance request either 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.

At the beginning of the statement, I will inquire as to whether the speaker will be 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 are 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, 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 their hands, members of the audience may obtain a three-by-five 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.

As Mr. Freeman indicated, a transcript of this meeting

is being taken, and 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 made available for public inspection by March 30th, 1976 at the United States Environmental Protection Agency, Public Information Reference Unit, Room 2404, 401 M Street, Southwest, in Washington, D.C.

Finally, I would like to describe the day's activities as we currently see them.

We will recess for a 15-minute break at about 10:15 a.m., and a one and one-half hour lunch break at 12:00 noon, and then reconvene at 1:30. Another 15-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, based on the number of people who have indicated an interest in speaking, we plan to conclude this meeting today.

This concludes my opening remarks. And I would now call upon Dr. Harvey Collins of the State of California to deliver the first statement.

Dr. Collins, please.

DR. HARVEY COLLINS: Mr. Chairman, members of the panel, ladies and gentlemen, my name is Harvey F. Collins.

And in answer to your question, Mr. Chairman, I will

be willing to answer questions if I can.

I am in charge of the Waste Management Unit, California Department of Health in Sacramento.

The Department is mandated by law to develop and enforce regulations governing hazardous waste to protect against hazards to the public health, domestic livestock, and wildlife.

In developing and administering this program, the Department has been very involved over the past few years in addressing the many complex problems and issues concerned with hazardous waste management.

Most of the concerns expressed by EPA in the list of Discussion Topics for this meeting have also been of interest to us. Today I would like to briefly summarzie the policies and opinions of our staff on some of these topics.

What is a hazardous waste? In the written document which I will submit I have quoted California law defining a hazardous waste and an extremely hazardous waste. And I will not go into the details of those definitions.

The California Hazardous Substances Act is tied in with Federal Regulations as published in the Code of Federal Regulations, Title 16, Chapter 11 for hazardous substances, which detail criteria and testing methods for toxic, corrosive, flammable and irritating substances.

The criteria, unfortunately, are aimed primarily at pure substances. Wastes are seldom pure substances, but rather

they are usually mixtures of many chemicals and are often made up of several physical phases. A mixture of hazardous substances may be more or less hazardous than the pure substances because of synergistic and antagonistic effects which are not well understood. There are presently insufficient data available to set concentration limits for most hazardous substances. In view of these data gaps, the waste mixtures themselves must be tested if their hazardous properties are to be fully elucidated.

In most cases hazardous waste producers are hesitant to conduct detailed tests on their waste mixtures in order to determine their hazardous properties because of the large expense involved. There are approximately 500 to 1,000 loads of potentially hazardous wastes being delivered to disposal sites in California each day. Few of these loads are identical; yet, it would be very expensive to test each individual load.

Our approach to determine which wastes may be hazardous has been to establish two lists. The first is a list of hazardous chemicals and the second a list of extremely hazardous chemicals.

I will not go into the criteria to show how those lists were established, but I have summarized them in the written statement which will be presented. It goes into the LD50's, acute inhalation, acute skin contact, et cetera, et cetera.

Our position, therefore, in the absence of other data has been that any waste mixture that contains a hazardous or extremely hazardous component will be considered hazardous by the State of California.

Now, in order to aid persons in the field who have to safely and legally handle and dispose of hazardous wastes, we have also prepared lists of wastes according to their generic names with probable chemical components. This enables these persons to spot loads of wastes which are potentially hazardous.

This approach admittedly is not the most technically satisfactory one. It does not take into account dilution of the components nor synergistic or antagonistic effects.

We believe,however, that in the absence of substantial data on the hazardous properties of mixtures, this is one of the few approaches that can be reasonably taken. Our regulations contain a section which provides an alternative for those waste generators who may believe that their particular waste should not be considered as hazardous even though it may contain hazardous substances. In these cases the generator may test his mixture directly and present the data on the waste to the Department for review and possible reclassification as non-hazardous.

In regards to sampling and analysis of hazardous wastes, ideally, samples of every waste material would be analyzed to determine if it contains hazardous substances. We

feel that this can best be done by the generator or the producer of the waste. However, regulatory agencies like ourselves are also concerned. We are very active in developing approaches to characterizing waste streams for purposes of enforcement and surveillance. Under the auspices of the Federal EPA, we are conducting an intensive sampling and analysis effort of potentially hazardous wastes which are produced in California.

We have designed and tested a sampling apparatus which allows us to sample wastes in a truck. We are also developing prescreening techniques for wastes and are preparing a decision tree approach to aid in the sequence of steps necessary in the analysis of various waste mixtures. Procedures that are being developed include the, quote, "gunk to standard analysis," quote, methods -- those approaches needed to convert what may often be a hard-to-handle sludge, tar, or emulsion into a form that is compatible with standard chemical analyses.

Many of the wastes that we recover or sample at hazardous waste disposal sites have very little documentation data accompanying them, such as source and probable components.

In these cases the analyses must start from scratch. We are presently investigating rapid screening, general analyses using such instrumental approaches as gas chromatography coupled with mass spectroscopy, emmission spectroscopy, and X-ray flourescence in order to rapidly obtain information on the general sorts of organic and inorganic constituents in the

wastes.

With regard to legal responsibilities, our position is that the producer of a waste also has the legal responsibili to provide reliable data on the composition of his waste and on any potential hazards that may be associated with it.

This is required of hazardous waste generators by California law. The information must be provided on a state-established hazardous waste manifest, and the manifest must accompany the waste load to the disposal site so as to aid and alert handlers and disposers of its proper handling and disposal.

Current guidelines, soon to be adopted as regulations, require that all generators or producers of hazardous wastes notify our agency in writing with this hazardous waste manifest in regards to each load of hazardous wastes which has been picked up at his facility.

In addition, the waste disposal site operator is also required to send us these manifests at the end of the month.

In regard to treatment or reuse of hazardous wastes, we feel that prior to the application of many hazards wastes to land, we feel that this would be desirable. However, it is an extremely complicated area in which economic, environmental and social tradeoffs are often necessary. Variables that must be considered are: economics; hazard or environmental pollution potential of the waste; the geology, the geography,

the climate and the local regulations and restrictions, to name a few.

It is the general belief of our staff that most hazardous wastes,however, can and should be recovered and reused, or they should be treated to less hazardous forms prior to final application to the land. Most large volume, untreated liquid wastes should not be dumped directly onto the land because of the severe hazard they can present to public health and the environment.

Hazardous components of such wastes should be recovered, destroyed, or neutralized prior to ultimate disposal. In certain areas the most economical and safest method of disposing of highly treated, large volume aqueous wastes is solar evaporation. In some cases large volumes of untreated organic and oily wastes may be deposited directly onto the land, whereupon soil microorganisms will consume organic constituents. Persons practicing this method, however, should make certain that the wastes contain no persistent components such as heavy metals that may present long-term environmental pollution problems.

Many tons of relatively pure chemicals are buried in California landfills each year. Although these materials often have considerable value, burial by landfill has been the traditional fate for many off-specification or old chemical stockpiles accumulated by industries, laboratories, and

universities.

In many cases these materials present the most severe threats to personnel involved in handling them and to the environment because of their concentrated forms and often deteriorating containers. It is our position, therefore, that whenever possible these materials should be diverted back into the market.

With regard to safety and security in handling of hazardous wastes, we feel that the most important precaution that can be instituted to protect personnel, the public, and the environment is proper characterization and identification of hazardous wastes. All safety precautions at any hazardous waste facility including containerization, fire prevention, site security, employee training, et cetera, hinge on a complete knowledge of what kinds of wastes are being handled, as methods and precautions will vary with different kinds of wastes.

At any hazardous waste facility, therefore, effective screening and inspection of all wastes coming into the site is the first stage in an effective safety program.

Other considersations in a safey program are: training, proper fire fighting equipment, et cetera.

In regards to enforcement, in view of the vast geographical size of California and the diversity of its industries, control of hazardous wastes on a statewide basis requires a

major surveillance and enforcement program. The limited number of approved hazardous waste disposal sites in California and the fees charged for disposal of hazardous wastes have encouraged illegal disposal.

Recent evidence, verified in part by the Department and other state agencies, indicates that appreciable quantities of hazardous wastes have been deposited in unapproved areas. Therefore, one of the primary goals of the Department is to immediately expand its surveillance and enforcement program to ensure proper management of hazardous wastes.

Fortunately, we recently obtained approval to employ six additional persons using state funds. We also recently received an EPA grant for $200,000 to increase our enforcement activity. This will allow the Department to hire enforcement teams in both the Los Angeles and Berkeley offices.

Hopefully, this expanded effort, as well as the enforcement efforts of other state and local agencies, will help minimize illegal activities.

In summary, I have attempted in the short time period allowed to express some of our approaches in dealing with hazardous wastes in California and to express some of our opinions on the topics which we have found to be the most perplexing.

EPA is to be commended for its active leadership in the field of hazardous waste management. Results of these

meetings should allow EPA to provide even further guidance to state programs. Strong Federal leadership, hopefully to be strengthened with pending Federal hazardous waste management legislation, combined with strong state programs, is absolutely mandatory if we are to truly manage hazardous wastes.

THE CHAIRMAN: Thank you, Dr. Collins.

I would like to remind the audience that if you wish to address questions to Dr. Collins or any of the speakers, merely raise your hand and members of our staff will give you three-by-five cards upon which you may write questions.

Do we have questions?

Yes, Mr. Lindsey.

MR. LINDSEY: Dr. Collins, could you comment for us a little bit further on the effectiveness of your three-part ticket or manifest in eliminating the disposal problems that you have.

DR. COLLINS: We have high hopes, Mr. Lindsey, that the manifest system will do more for us than any 50 inspectors in the field.

Now, I was telling some fellows yesterday that the day of grace is about over. By that I mean that thus far we have only been able to analyze those manifests manually, and we have merely roughly screened them. However, we do have a computer program that has been written. It has been debugged, and we are in the process of recruiting a chemist that will take

the data from those manifests, get them into keypunch form, and we are contracting with the University of California at Berkeley to provide us with a keypunch operator and the computer time.

We hope to have that program on-line by February 1. We will then hopefully keep up and then work back in our stockpile of manifests. I am sure there will be many problems in getting industry representatives to fill those manifests out correctly. But if correctly filled out, it will work.

THE CHAIRMAN: Mr. Lindsey, do you have a question?

MR. LINDSEY: This comes from the audience.

Are waste manifests required on the same site where they are generated?

On-site disposal, is a manifest required there?

DR. COLLINS: No. If they are not hauled on the roadways they are not required. However, there will be reporting systems required later. But at this time, no manifests are inquired unless they are transported on the highways, railroads, et cetera.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: Dr. Collins, it is a pleasure to ask questions of someone who has to face the reality of the program.

We have had testimony in three other locations pointing to the California program, so I would like to ask you several questions relating to your experience which should be very

valuable for us.

One of the comments we received most recently in Houston was that the way in which one ought to define our hazardous waste is to not only know what hazards, that is, acute hazards it has, but also know how it would be disposed of. If you know both those things, many,many things would not be hazardous, because you would be sure of the way in which it was disposed. And there was encouragement from several speakers that that was the way it should be done, to take into account its immediate, acute hazards, and if you have knowledge of its disposal, then you call it a hazardous waste.

I gather from your testimony that that is not the system you have chosen, that things are labeled potentially hazardous wastes first, and then that leads them into a management system where you then see how they are ultimately disposed.

Would you comment on the desirability of the approach you have chosen versus one where you have to know both the hazards and its destination in order to call it a hazardous waste.

Am I asking a feasible question?

DR. COLLINS: I think so, Mr. Kovalick.

In California the law specified what would be considered a hazardous waste. So we, therefore, were required to define hazardous wastes in terms of their constituents.

It is true that you need to know the ultimate disposal method. And when we issue permits for the disposal of extremely hazardous wastes, then certainly we evaluate that waste from the time it is picked up, how it will be picked up, how it is hauled, and its ultimate fate.

And so ideally, I think they have a point, legally and practically, we could not do this.

MR. KOVALICK: Could I ask a couple more questions, Mr. Chairman?

THE CHAIRMAN: Yes.

MR. KOVALICK: I was very interested also in other testimony we have had that speculated about the effect of good regulations in one state and their effect on neighboring states led

Have your relationships with neighboring states led you to any conclusions about the net inflow or outflow of waste to those states because you have a certainly well-defined and apparently more effective system than they might have?

DR. COLLINS: Yes, we are very concerned with that, Mr. Kovalick.

In fact, I have chatted with agencies from other states and told them when they got a program going we would be more than glad to share information and even trade manifests, if you will.

And this is one of the main reasons we would like to see Federal input here, so that the states would have a fairly

uniform system. Otherwise, as California develops it program, it merely will allow more exportation or lead to more exportation of those wastes to other states.

So we would like to see this program fairly uniform nationwide.

And I think also reputable businesses would endorse such a philosophy.

THE CHAIRMAN: Mr. Bourns, you had a question?

MR. BOURNS: In fact, I have two questions. One has several parts, if you don't mind.

The first, Dr. Collins, relates to a remark you made about the limited number of sites in California and their capacity.

Would you care to comment as to the need for more of new sites first, and second, the environmental acceptability of the present sites and whether or not they should be privately owned and publicly regulated or publicly owned.

DR. COLLINS: Let me take your last questions first, Mr. Bourns.

My personal philosophy is that all site operators should be treated equitably regardless of whether they are privately or publicly owned. And I think that industry in this state has played a vital role in the waste management statewide. So in fact, we are very pleased with some of our private operators. So I would say that government and private industry

both have a role, and any regulatory agency must deal with both private and public entities on an equitable basis and treat them both alike.

In regards to the other part of your question, as to whether or not there are enough sites, Chairman Dave Baker is here. He chaired a liquid waste committee for the State Solid Waste Management Board. I served on that committee as did a representative from the State Water Resources Control Board, and I believe he will address that this afternoon.

The results of that committee's findings were that, no, there are not enough sites. And he will speak to that further.

In regards to whether or not the current capacities of those sites -- is that correct -- what was the other question?

MR. BOURNS: The environmental acceptability of present sites and their capacity.

DR. COLLINS: Well, Mr. Baker will speak to the capacity issue. As far as the environmental acceptability of those sites, I would hate to say off the cuff yes or no, they are not environmentally acceptable.

I think that the concept of a Class One site in California, as you know, is that theoretically they are a contained site. If indeed that is true, then the sites are the most economical solution to deposit these hazardous residues. And before we say that they are all bad, I would hope that there

would be a real technical study made of each site including drillings, et cetera, and if indeed this data shows that those sites are not environmentally safe, then they should be closed down.

But I do not think the decision should be made without a thorough engineering study of each site.

MR. BOURNS: You think the sites should be reevaluated?

DR. COLLINS: Oh, I think we are all in the process of evolution. I think we need to constantly monitor and evaluate these sites. And in fact, some sites have been closed in California in recent months because they were found that they did not meet the criteria. And certainly as we get more information we may tighten up on others.

MR. BOURNS: One other question.

A question was asked concerning waste imported to California. And you spoke to the area of cooperation with other states. But is the volume of hazardous wastes now importec to California a sizable amount?

DR. COLLINS: Without having our computer on-line, I cannot answer that. We know by the grapevine that some wastes are imported from clear across the nation.

My personal philosophy, and I think -- well, in fact, the staff of the Department, our contention is that we should not restrict the flow of waste across county boundaries or even state boundaries, because if we are going to truly manage

it, we have got to look at the nation as a whole. And so, therefore, we do not object to importation of waste as long as they are managed according to state regulations.

THE CHAIRMAN: Mr. Mausshardt, do you have a question?

MR. MAUSSHARDT: I have a question from the floor, Dr. Collins.

The question is stated: "How does California distinguish between hazardous materials and hazardous substances?"

DR. COLLINS: Mr. Mausshardt, the California law listed by tying it into this Hazardous Substance Act, we were to define hazardous waste in such a way that technically we almost had to tie it into hazardous substances.

We realize that even though that may meet the legal requirements, it leaves much to be desired technically and from a practical viewpoint.

Therefore, we were forced in essence to develop our guidelines in which we listed those wastes in accordance with generic terms so that the common man handling those wastes would know what we were talking about.

So I agree, it leaves much to be desired, but legally we had to go this route.

THE CHAIRMAN: Mr. Lazar.

MR. LAZAR: Dr. Collins, a question from the audience.

How does a rendering company maintain traceability when wastes from more than one source are hauled in the same truck?

How complicated does it get when a truck picks up waste from several sources, and how do you handle that?

DR. COLLINS: As long as those wastes are compatible, this is common.

We have had problems in which incompatible wastes were mixed in the same truck which, of course, must be avoided.

Our guidelines document, which I will provide to the gentleman if he will see me, speaks to that, -- if they will take the information and attach those to the common liquid waste hauler's record and that is filled out, how to handle the trucks that are picking up the various loads from different lots. And different generators.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: Yes. I have one from the audience.

This is in several parts. To what extent will the state carry out enforcement with its personnel? In other words, will the surveillance be directed primarily at the disposal site, the producers, or the haulers? And is local authority to carry out additional enforcement being delegated?

DR. COLLINS: Mr. Lindsey, yes. The enforcement at the state level will address not only the disposer, but it will address the trucking industry. It will also address the generator. In our manifest system every industry will be catalogued statewide. And if we are not getting manifests from those industries, then we will ask why, what are you doing with

your waste, are you recycling it, et cetera.

In regards to the enforcement, at the state level we hope in the Department that -- well, let me back up. Legally the director can delegate the enforcement of the state regulations to the local health department or other local entities.

Now, we had thought that perhaps the enforcement agency that is delegated in the county solid waste management plans, that that would be the logical agency to enforce the hazardous waste regulations.

There are problems with that approach, however, if that local enforcement agency is not countywide.

Also, it will depend on the philosophy of that local agency, the expertise that that local agency has, et cetera.

And we have taken the position in the Department that any local agency wanting to enforce the hazardous waste regulations should submit said proposal to the Department. We in turn would take it to our Hazardous Waste Technical Advisory Committee and handle it on a case-by-case basis.

THE CHAIRMAN: I think Mr. Mausshardt has a related question.

MR. MAUSSHARDT: I have another question from the floor, Dr. Collins.

In the case of an improperly operated or illegal Class One site, how long is required to enforce compliance? How could the enforcement process be improved? That is a two-part question.

DR. COLLINS: Well, I am sure that the audience realizes as well as I, Mr. Mausshardt, the problems you get into when you get into litigation.

The Hazardous Waste Act merely states that if there is a violator you shall gather the facts and certify said facts to the District Attorney in the county. If the District Attorney does not act, then we are required to certify the facts to the Attorney General.

How long this takes would no doubt vary from case to case.

In regards to the fact that if a site is not meeting criteria or -- I believe it was worded as an "illegal site" -- here again, usually there are several agencies involved. Most of these sites, many of the sites, also have solid wastes deposited at those sites. So here you have got the Solid Waste Management Board. Also in California the Regional Water Quality Control Board sets discharge requirements on each site.

So it is usually a time-consuming process. The various agencies get together to see whether or not their regulations are being violated; what should be done to improve the site. In our philosophy in the Department, and I am sure in the State Solid Waste Management Board, our philosophy has been we will work with industry to try -- or government -- to try to get the needed improvement.

Then if we cannot, the last step would be legal action.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: Dr. Collins, we have heard across the country of the extreme difficulties in obtaining public acceptance of hazardous waste sites, whether they be treatment sites or disposal sites or both.

Can you comment on your experience in this regard and how you see getting around this problem in California in future.

DR. COLLINS: Mr. Lindsey, yes. It is a very, very controversial subject. It has been a joke, in fact, in the technical field for years that the best place for a site is over the hill. And now people live over the hill.

And in California there were two occasions in the last year in which proposed sites went down to defeat as a result of local political opposition. And here again, the Liquid Chemical Waste Committee that I referred to earlier which Mr. Baker chaired, we asked that same question in hearings we held last summer statewide. And we asked the question in view of the local opposition, might not the state be required or should not the state have the authority of eminent domain.

We realize this sort of conflict with local control, but on the other hand, many local officials testified that they would welcome the state to have authority to come in and take that pressure off them.

Now, right now, there is an assembly concurrent resolution that has been passed, No. 79 in the state, that directs

the State Solid Waste Management Board, the Health Department, the Department of Food and Agriculture, the State Water Resources Control Board to do a statewide study on the need for additional Class One sites, on the problems involved, and the role that the state must play.

So the results of that committee could well plot a path that California will go in the future. Whether it will involve eminent domain or the recommendation for legislation for that, I do not know. But certainly something has to be done. Otherwise good sites that are perfectly acceptable from every technical viewpoint will never be accepted due to political opposition.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: Dr. Collins, with regard to the manifest system again, are Federal agencies or Federal facilities themselves or government-owned, contractor-operated facilities currently users of the manifest system?

And, if so, what percentage of your business, if you will, do they represent? Do you have any idea?

DR. COLLINS: In regard to the latter portion, Mr. Kovalick, I do not know the percentage of the business. It is my understanding, some of them are using it. I have had a few rumbles that perhaps not all of them, and in fact, I have had the comment tossed out that maybe they are exempt.

I think that Mr. Bourns sort of convinced a certain

individual last week at Reno that maybe they weren't exempt, that maybe EPA could help influence them to cooperate.

Certainly, we feel that in the state that all Federal entities should cooperate in the spirit of cooperation to insure that the wastes are really managed. And unless they do, they will not be managed. So we would hope that this will be prevalent throughout, whether private or state or Federal.

MR. KOVALICK: I have one other unrelated question.

We had a comment at a couple of the other meetings about the training needed for a person working both a treatment facility as well as a person working in a disposal, straight disposal facility. And there were those who pointed out that there were sufficient training materials available from the chemical industry, for example, to provide for the training of those persons and that there did not seem to be much additional need for -- not necessarily not need for training -- but need for training materials or some kind of assurance that some training has been given.

What is your current approach to that issue, since you mentioned it in your remarks?

DR. COLLINS: I personally feel that the training material available is probably of too technical a nature. It is written mainly for the chemists, et cetera, and I feel it is of too technical a nature for the operator of those sites to understand; so I feel that there is need of a statewide training

program, hopefully with leadership from EPA, in which the available information will be gathered from every source, condensed, and simplified, if possible, so that you can go out and explain to the truck drivers and to the operators of the equipment in language that they can relate to and they can go away feeling that, yes, I learned something other than they tried to snow us.

So I disagree with that philosophy that, yes, there is enough information available. It has got to be assembled and simplified. And we do hope to get into this area, but it is a matter of priorities, and thus far we have not been able to put out enough fires to get to it.

THE CHAIRMAN: Mr. Bourns.

MR. BOURNS: Dr. Collins, I have a question from the floor, and the person who wrote this question emphasizes certain words, and I will try to do likewise.

He says we all are for private enterprise, but -- capitalized -- how is the private waste site operator receiving waste from many sources protected from local citizens' harrassment, resulting in politcal discussion to shut down. Witness Riverside County Class One site.

In short, is there really a future for private site operators?

DR. COLLINS: Yes. I think so. And I think that in our complex world, there are too many of us. And I feel that

regardless of whether you are a government operator of a site or a private operator of a site, you are going to be subjected to the same type of criticism. And therefore it behooves each operator to put his shop or his site in order and try to minimize said criticism.

And here again, I think it is a matter of educating the public. You cannot overnight in my opinion shut down that site. Industry will find a way. Technology, in my opinion, is not here yet to completely reclaim or detoxify, perhaps, many of these wastes. So I think it is a matter of educating the public, doing our best to minimize the problem so that we minimize that criticism.

But this should not apply to just private sites. This same opposition is directed at governmental entities operating the sites. For example, LA County Sanitation District, Ventura and others have come under the same public criticism as have private operators.

THE CHAIRMAN: All right, Dr. Collins. I have one last question from the audience, and I think it should be a short answer.

Is a producer of waste material required to fill out a waste manifest if the waste is not hazardous?

DR. COLLINS: If it is a liquid waste, the answer is yes.

If it is a hazardous waste, the answer is no.

And I will clarify it briefly, then I will sit down.

The Porter-Colon Act administered by the State Water Resources Control Board requires that a California liquid waste hauler's record be filled out by every liquid waste hauler.

Now, in order to cut down paperwork, we adopted that liquid waste hauler's record, and we specified that all haulers of hazardous waste would have that manifest in his possession.

So, consequently, you have to fill it out in order to satisfy the State Water Resources Control Board whether or not it is hazardous.

If it is not hazardous, though, do not send it to us. If it is hazardous, send us a copy, and then we will get the copy from the disposer.

So it was not quite a "yes" or "no" question.

THE CHAIRMAN: Dr. Collins, thank you very much.

I think we are running a little short of time. I appreciate very much your remarks, and obviously they have stimulated a lot of questions. And I think it was time well spent, because I would just say the State of California does have, I think, the most advanced program in hazardous waste management in the country, so obviously we have a lot to learn from you.

Thank you very much.

DR. COLLINS: Thank you very much, Mr. Chairman.

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G BROWN JR., Governor

DEPARTMENT OF HEALTH
4 P STREET
SACRAMENTO, CALIFORNIA 95814
(916) 322-2337

January 28, 1976

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
U.S. Environmental Protection Agency
1835 K Street, N.W.
Washington, D.C. 20460

Dear Mr. Lehman:

At the December 11, 1975 meeting in San Francisco regarding hazardous waste, Mr. Alfred Lindsey of your staff asked that we: (1) identify the concerns of the California State Department of Health regarding the long-term disposal of large amounts of untreated liquid wastes to land in spite of favorable hydrogeologic conditions; and (2) what safeguards are practiced at hazardous waste disposal sites in California to protect personnel from accidents resulting from mixing incompatible wastes? We developed the following statements about these two subjects in collaboration with Mr. Lawrence A. Burch, Deputy Executive Officer, California State Solid Waste Management Board.

1. Department Concerns

The Department is concerned with disposal methods which involve the deposition of large volumes of untreated liquid wastes to the land. The reasons for this concern are discussed below:

a. Evaporation/infiltration Ponds

The deposition of certain untreated liquid wastes directly into evaporation/infiltration ponds is undesirable from a safety, public health, and environmental standpoint. Many untreated liquid wastes contain materials that are odoriferous and that are potential air pollutants, such as acids, sulfides, and volatile organic solvents. The mixing of untreated wastes together in ponds in a random, uncontrolled manner can result in undesirable interactions which can cause fires, violent chemical reactions, and discharge of toxic substances. Generally, volatile, odoriferous, and potentially reactive components of liquid wastes should be destroyed, removed, or neutralized before the wastes are placed in evaporation ponds.

b. Land Spreading

For most of the reasons that ponding of certain untreated liquid wastes is undesirable, so is landspreading. In the landspreading operation, liquid waste is allowed to flow over a prepared area of land, whereupon the volatile components evaporate and the remainder of the waste soaks into the soil. Certain materials in wastes, e.g., oils and sodium, can lower the absorptive capacity or the permeability of the soil and, as a result, highly limit the applicability of the method to large volumes of wastes.

c. Landfill and Trench Burial

These methods involve the preparation each day of a basin in a solid waste landfill or a trench in the soil. Untreated liquid waste is unloaded directly from trucks into the basin or trench. The waste is then mixed with solid waste or soil and covered. These methods probably offer the greatest potential for untreated incompatible wastes to interact unless the site operator is very careful in screening incoming wastes. In addition, the vapors and mists produced during the unloading, mixing, and burial of untreated hazardous wastes pose an acute and chronic threat to the health and safety of workers involved in these operations and to the health of the public in the vicinity of the site.

d. Security at Filled Disposal Sites

Filled disposal sites that received untreated liquid wastes might contain persistent hazardous contaminants at the surface or in the shallow subsurface layers of the soil. When such sites are closed, it might be necessary to seal off the contaminated soil for long periods of time to prevent humans or animals from encountering the contaminants and to prevent erosion of those contaminants. Which individuals or government agencies will be held responsible for maintaining disposal sites after closure and for monitoring them for possible problems has not been settled yet in California, but corrective legislation will be introduced soon.

e. Unknown Hazards

The site classification system used in California may impart a false sense of security to the site operator, the waste producer and the regulatory agencies. That is, they

may assume that the site would automatically handle the liquid wastes and that Mother Nature would be forgiving. It must be acknowledged that geophysical examination of a parcel of land proposed for disposal of dangerous chemicals faces limitations of financial resources and there are practical limitations on testing procedures and evaluations. In other words, we really do not have complete knowledge of what exists underground and what future situations are yet to be encountered.

f. Site Operation

The operation of a disposal site must follow a reasonable plan. Designers, operators and regulators of these sites have to acknowledge that the disposal site has finite limits regarding the storage capacity either in the landfill sponge or in the underlying deposits and formations. If the storage or field capacity is exceeded then an overflow or surface discharge will occur following the laws of science.

On the other hand, a properly managed landfill that is indeed "secure" is the most cost-effective method of hazardous waste disposal. Recently, core samples were obtained from a Class II-1 site in California from depths up to 88 feet. Surprisingly the refuse at the greater depths was dry even though the site had been accepting large volumes of liquid wastes for years. Evidently, the field capacity of the buried material had not been exceeded.

g. Loss of Resources

After untreated liquid wastes have been deposited on land, any valuable constituents they contain are usually lost. Strenuous efforts directed toward resource recovery could substantially reduce the impact of the Department's concerns discussed above.

. Safety Precautions

The operations at hazardous waste disposal facilities in California vary considerably from site to site. At some sites there is little or no control of what kind of wastes are accepted and how they are mixed. Minimal effort is expended to properly identify the wastes and to prevent the mixing of incompatible wastes. As a result, numerous accidents have occurred from the mixing of incompatible wastes. Haphazard

mixing of chemicals may occur due to either unknowledgeable personnel operating the site and/or poor knowledge of the content or characteristics of incoming wastes and their interaction with wastes already present in the site.

At several sites, on the other hand, the operators maintain staffs of chemists and engineers who thoroughly review each waste load that arrives at their sites with regard to its composition, properties, and compatibilities. At three sites in California, on-site screening laboratories are maintained to check the chemical and gross properties of waste loads before they arrive at the gate or prior to deposition in the site.

Based on these evaluations waste loads are assigned to specific ponds, trenches, wells, or receiving tanks to prevent their being mixed with incompatible wastes.

There are presently very little data available to operators on the compatibility of hazardous wastes. Much of the compatibility information available to operators is that which they have learned by trial and error (often spectacularly) or by use of common chemical sense (e.g., don't mix acids and cyanides; acids and sulfides; oxidizers and solvents; water-reactives and water; etc.).

The single most important deterrent to more effective control of incompatible wastes is the lack of compatibility lists compiled specifically for hazardous wastes which also list potential interactions under normal disposal conditions.

Hopefully, the above lengthy discussion has answered the two questions. Please let us know if we can be of further help.

Sincerely,

VECTOR CONTROL SECTION

Harvey F. Collins

Harvey F. Collins, Ph.D.
Supervising Engineer
Waste Management Unit

HFC:b
cc: Richard F. Peters, Chief VCS
Charles T. Bourns
Earl Margitan
David L. Storm, Ph.D.
Lawrence A. Burch

THE CHAIRMAN: Next I would like to call Mr. Sidney Howard of the EIMCO BSP Division of Envirotech Corporation.

Will you take questions?

MR. F. SIDNEY HOWARD: Yes, we will.

Mr. Chairman, panel, ladies and gentlemen, we appreciate the opportunity to speak before this group. And our concern is that of an industry manufacturing equipment used in solid waste disposal.

We hope to bring before the group a little background information.

My name is F. Sidney Howard, and I am Marketing Manager of the EIMCO BSP Division of Envirotech. We are one of the leading manufacturers in sludge processing and disposal equipment including multiple hearth furnaces and other thermal devices.

We have in the last 13 years built over 100 units for municipal sludge disposal for sewage treament plants.

In regard to the control and detoxification of wastes, we believe our developments in multiple hearth furnace technology are of considerable importance. Although this hearing is primarily concerned with hazardous waste management, I would like to take a few minutes to update the often misunderstood aspects of sludge incerineration/reclamation furnaces to show that slude incineration/reclamation is an environmentally viable and energy efficient means of hazardous waste disposal.

Thanks to both EPA and industry sponsored research and

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

development efforts in the analysis of exhaust gases, the heretofore unknown environmental benefits of sludge incineration have been discovered.

Now, I might comment here that I have 20 copies of the support information and graphs which we will give to you at the break. I believe that will be more expeditious.

Aside from the decomposing of hazardous wastes, which I will be discussing later, five points worthy of mention are:

One. These units will meet the new air quality standards under the Clean Air Act.

Two. In connection with an NO_x restricted area, their exhaust gases have been ruled by one of the most stringent air pollution control agencies in the United States, the San Francisco Bay Area Air Pollution Control District, to have an insignificant impact on air quality.

To illustrate how incinerators perform in terms of air pollution standards, I quote from the June, 1975 EPA Technology Transfer Publication, "Air Pollution Aspects of Sludge Incineration," which states:

> ". . . The newly promulgated Federal NSPS are based on demonstrated performance of an operating facility, indicates that use of proper emission controls and proper operation of the inceration system will enable a facility to meet all existing particulate matter regulations."

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Multiple hearth furnace operations have also been demonstrated to comply well within existing emission standards.

Figure One illustrates the margin between the actual emissions standards and the much lower emissions characteristic of operating multiple hearth furnaces.

Three. MHF controls heavy metals contained in sludge. Mercury, in the EPA proposed toxic substances list, was found, contrary to conventional thinking, to be controlled. I should point out here that in the Technology Transfer publication mentioned above, there is a statement citing mercury as disproportionately appearing in the stack gases.

However, this statement was based on information prior to the Proposed Amendments to Standards for Asbestos and Mercury. These new data show that 68 percent to 96 percent of the mercury in the exhaust gases are actually removed in the scrubber system.

Our installations have shown removals from 83 percent to 96 percent of trace amounts of mercury.

I have included an annotated supplment to the Technology Transfer Publication, which contains this new information on mercury, plus updated supplements to other parts of the document where new data have become available.

These studies were sponsored by the EPA air quality group at Research Triangle Park. According to the above-mentioned Technology Transfer publication, lead, which is also a potential emission problem, has been found to be more than

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

99 percent controlled in the multiple hearth furnace, with only .84 percent entering the atmosphere.

This report also states that most potentially hazardous and hazardous metals will not be significantly found in the stack gases, but instead will be converted to oxides in the incineration process and consequently removed either as particulates by the scrubbers or in the ash.

Four. In this conservation-minded society, where reclamation is all important, multiple hearth furnace systems offer an advantage in recovering lime and recycling carbon dioxide during the normal operating procedures in advanced physical chemical treatment plants.

Five. The multiple hearth furnace creates a product, an ash, that is potentially useful as a quasi-fertilizer as it normally contains 6 to 15 percent phosphate. Over 50,000 tons of sludge ash have been used experimentally in Japan as a quasi-fertilizer and deserve more R & D consideration, at least consideration equal to that given to land use disposal of wet sludge, which has been found to contain toxic materials that would otherwise be destroyed in the incineration process.

Ash has more concentrated nutrients compared to sludge. Ash from a primary and secondary treatment system has a potential value of $48 per ton -- four times that of sludge, whereas ash from a tertiary treatment plant may be worth $80 per ton.

In regard to the handling of toxic substances such as

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

pesticides, the furnace performs efficiently at normal operating temperatures to remove and control toxic pesticides from sludge.

Pesticide removal and decomposition rates during co-incineration with sludge were tested by Curtis and Tomkins. The data was gathered from ash, sludge, exhaust fumes and scrubber water samples at the Monterey Sewage Treatment Plant in California.

Although some slight problems were involved with some of the data, the results are generally indicative of multiple hearth furnace performance in the controlling and decomposing of toxic substances during incineration.

The removal efficiencies for eight pesticides listed exceeded 99 percent.

And I would comment here just on the side that in testing any of these furnaces for the decomposition or removal of such products, the first problem we experienced was there was not enough in the sludge itself, and therefore, we had to increase or dose the sludge in order to obtain a measurable fraction.

We believe this near complete removal of toxic substances from waste streams by multiple hearth furnace has particular significance in conjunction with the industrial cost recovery under Public Law 92-500 due to the relatively insignificant incremental cost in removing these substances while co-incinerated with municipal sludge.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Besides controlling toxic substances, the multiple hearth furnace removes many toxic materials from the environment by the decomposition process occurring simultaneously in the standard incineration procedure.

And again, we list eight pesticides and the percentages of decomposition, many of which are over 99 percent.

With the exception of the PCB decomposition, the preceding data was derived from Exhibit 5 and was performed using a furnace exhaust gas temperature of 900 degrees Fahrenheit. This is a normal operating range. In the case of PCB's, the temperature was elevated to 920 degrees Fahrenheit.

While it is known that PCB's and the majority of pesticides mentioned are more than 99 percent decomposed during incineration, the fate of such toxic materials with land disposal of sludge is still unknown.

Certainly more research is required to determine the density of these hazardous materials once they are applied to land in the form of sludge. The fate of potential carcinogenic viruses, which are destroyed during incineration, also pose a serious environmental and health hazard for sludge disposal.

PCB's are appearing in the natural environment in increasing quantities. However, the problems associated with PCB's can be reduced through sound technological practices. And in our presentation we review the work done in that.

Yet the problems of PCB's requires careful review. For

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

example, a recent statement attributed to Thomas Kopp in the November 24th issue of "Air Water Pollution Report," arrives at the conclusion that PCB's are not removed by any known sewage treatment process and are assumed to remain in the effluent.

However, other data shows that PCB's from a primary secondary treatment process are more than 70 percent removed from waste waters.

Since the sampled Cedarburg, Wisconsin sludges contained ,000 times larger PCB concentrations than those found in the outgoing waters, the treatment process must have removed most of the PCB's from the incoming wastes.

Accordingly, we see that PCB's tend to remain in the sludge rather than the effluent. Therefore, because PCB's under- o near total destruction via incineration, the conditions are more favorable for PCB destruction through incineration.

In conclusion, incineration as demonstrated by the multiple hearth furnace has proven to be of negligible environmental impact and offers substantial benefits in the handling, disposal and elimination of hazardous wastes. The advantages of using incineration in the disposal of hazardous materials are:

The process meets new air quality standards under the Clean Air Act;

The San Francisco Bay Area Air Pollution Control

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

District has ruled the multiple hearth furnace to have an insignificant impact on air quality within a NO_x restricted area;

Controls heavy metals;

It recovers resources;

It creates a useful product;

Decomposes pesticides which are listed as toxic substances to be controlled under the proposed EPA water quality criteria during the normal incineration procedure at no extra cost;

Near total destruction of PCB's at no additional expense at the normal operating exhaust gas temperature ranges with conventional equipment currently in use.

We feel that the problem of hazardous wastes is going to require the concern and efforts of all those people in industry and the manufacturers as well.

We do feel that we must review all of the processes available to arrive at the best solutions for a given waste. We do not propose that we have the answer for all wastes. But we just wanted to present what we have learned working with specific wastes.

Thank you very much.

STATEMENT

BEFORE THE ENVIRONMENTAL PROTECTION AGENCY

PUBLIC MEETING ON HAZARDOUS WASTE MANAGEMENT

BY

F. SIDNEY HOWARD
MARKETING MANAGER
EIMCO BSP DIVISION
ENVIROTECH CORPORATION

DECEMBER 11, 1975

1013

STATEMENT: HAZARDOUS WASTE MANAGEMENT

MY NAME IS F. SIDNEY HOWARD, MARKETING MANAGER OF THE EIMCO BSP DIVISION, ENVIROTECH CORPORATION. WE ARE ONE OF THE LEADING MANUFACTURERS IN SLUDGE PROCESSING AND DISPOSAL EQUIPMENT INCLUDING MULTIPLE HEARTH FURNACES FOR SLUDGE PROCESSING AND DISPOSAL IN CONNECTION WITH OUR INSTALLATION OF OVER 100 UNITS FROM MUNICIPAL SEWAGE TREATMENT PLANTS OVER THE LAST 13 YEARS.

IN REGARD TO CONTROL AND DETOXIFICATION OF WASTES, WE BELIEVE OUR DEVELOPMENTS IN MULTIPLE HEARTH FURNACE TECHNOLOGY ARE OF CONSIDERABLE IMPORTANCE. ALTHOUGH THIS HEARING IS PRIMARILY CONCERNED WITH HAZARDOUS WASTE MANAGEMENT, I WOULD LIKE TO TAKE A FEW MINUTES TO UPDATE THE OFTEN MISUNDERSTOOD ASPECTS OF SLUDGE INCINERATION/RECLAMATION FURNACES TO SHOW THAT SLUDGE INCINERATION/RECLAMATION IS AN ENVIRONMENTALLY VIABLE AND ENERGY EFFICIENT MEANS OF HAZARDOUS WASTE DISPOSAL.

THANKS TO BOTH EPA AND INDUSTRY SPONSORED RESEARCH AND DEVELOPMENT EFFORTS IN THE ANALYSIS OF EXHAUST GASES, THE HERETOFORE UNKNOWN ENVIRONMENTAL BENEFITS OF SLUDGE INCINERATION HAVE BEEN DISCOVERED (EXHIBIT 1). ASIDE FROM THE DECOMPOSING OF HAZARDOUS WASTES, WHICH I WILL BE DISCUSSING LATER, FIVE POINTS WORTHY OF MENTION ARE:

1. THESE UNITS WILL MEET THE NEW AIR QUALITY STANDARDS UNDER THE CLEAN AIR ACT.

2. IN CONNECTION WITH AN NO_X RESTRICTED AREA, THEIR EXHAUST GASES HAVE BEEN RULED BY ONE OF THE MOST STRINGENT AIR POLLUTION CONTROL AGENCIES IN THE UNITED STATES, THE SAN FRANCISCO BAY AREA AIR POLLUTION CONTROL DISTRICT, TO HAVE AN INSIGNIFICANT IMPACT ON AIR QUALITY.

TO ILLUSTRATE HOW INCINERATORS PERFORM IN TERMS OF AIR POLLUTION STANDARDS, I QUOTE FROM THE JUNE 1975 EPA TECHNOLOGY TRANSFER PUBLICATION (EXHIBIT 2), "AIR POLLUTION ASPECTS OF SLUDGE INCINERATION," WHICH STATES:

"...THE NEWLY PROMULGATED FEDERAL NSPS (NEW SOURCE PERFORMANCE STANDARDS) ARE BASED ON DEMONSTRATED PERFORMANCE OF AN OPERATING FACILITY, INDICATES THAT USE OF PROPER EMISSION CONTROLS AND PROPER OPERATION OF THE INCINERATION SYSTEM WILL ENABLE A FACILITY TO MEET ALL EXISTING PARTICULATE MATTER REGULATIONS."

MULTIPLE HEARTH FURNACE OPERATIONS HAVE ALSO BEEN DEMONSTRATED TO COMPLY WELL WITHIN EXISTING EMISSION STANDARDS. FIGURE 1 ILLUSTRATES THE MARGIN BETWEEN THE ACTUAL EMISSIONS STANDARDS AND THE MUCH LOWER EMISSIONS CHARACTERISTIC OF OPERATING MULTIPLE HEARTH FURNACES (HEREAFTER REFERRED TO AS MHF).

3. MHF CONTROL HEAVY METALS CONTAINED IN SLUDGE. MERCURY, IN THE EPA PROPOSED TOXIC SUBSTANCES LIST, WAS FOUND, CONTRARY TO CONVENTIONAL THINKING, TO BE CONTROLLED. I SHOULD POINT OUT HERE THAT IN THE TECHNOLOGY TRANSFER PUBLICATION, "AIR ASPECTS OF SLUDGE INCINERATION," (EXHIBIT 2), MENTIONED ABOVE IS A STATEMENT CITING MERCURY AS DISPROPORTIONATELY APPEARING IN THE STACK GASES. HOWEVER, THIS STATEMENT WAS BASED ON INFORMATION PRIOR TO THE (BACKGROUND INFORMATION FOR NEW SOURCE PERFORMANCE STANDARDS) PROPOSED AMENDMENTS TO STANDARDS FOR ASBESTOS AND MERCURY, EPA 450/2-74-009A, OCTOBER 1974. THESE NEW DATA, WHICH ARE REPORTED IN THE DOCUMENT REFERENCED ABOVE, SHOW THAT 68% - 96% OF THE MERCURY IN THE EXHAUST GASES ARE ACTUALLY REMOVED IN THE SCRUBBERS, WHILE ENVIROTECH

INSTALLATIONS WERE SHOWN TO REMOVE FROM 83% TO 96% OF TRACE AMOUNTS OF MERCURY. I HAVE INCLUDED AN ANNOTATED SUPPLEMENT (EXHIBIT 3) TO THE TECHNOLOGY TRANSFER PUBLICATION, WHICH CONTAINS THIS NEW INFORMATION ON MERCURY PLUS UPDATED SUPPLEMENTS TO OTHER PARTS OF THE DOCUMENT WHERE NEW DATA HAS BECOME AVAILABLE.

THESE STUDIES WERE SPONSORED BY THE EPA AIR QUALITY GROUP AT RESEARCH TRIANGLE PARK. ACCORDING TO THE ABOVE MENTIONED TECHNOLOGY TRANSFER PUBLICATION (EXHIBIT 2), LEAD, WHICH IS ALSO A POTENTIAL EMISSION PROBLEM, HAS BEEN FOUND TO BE MORE THAN 99% CONTROLLED IN THE MULTIPLE HEARTH FURNACE, WITH ONLY .34% ENTERING THE ATMOSPHERE.

THIS REPORT ALSO STATES THAT MOST POTENTIALLY HAZARDOUS AND HAZARDOUS METALS WILL NOT BE SIGNIFICANTLY FOUND IN THE STACK GASES, BUT INSTEAD WILL BE CONVERTED TO OXIDES IN THE INCINERATION PROCESS AND CONSEQUENTLY REMOVED EITHER AS PARTICULATES BY THE SCRUBBERS OR IN THE ASH.

4. IN A CONSERVATION MINDED SOCIETY WHERE RECLAMATION IS ALL IMPORTANT, MULTIPLE HEARTH FURNACE SYSTEMS OFFER THE ADVANTAGE OF RECOVERING LIME AND RECYCLING CARBON DIOXIDE DURING THE NORMAL OPERATING PROCEDURES IN ADVANCED PHYSICAL CHEMICAL TREATMENT PLANTS (EXHIBIT 4).

5. MHF CREATE A PRODUCT - ASH - THAT IS POTENTIALLY USEFUL AS A QUASI-FERTILIZER AS IT NORMALLY CONTAINS 6% TO 15% PHOSPHATE (FIGURE 2). OVER 50,000 TONS OF SLUDGE ASH HAVE BEEN USED EXPERIMENTALLY IN JAPAN

AS A QUASI-FERTILIZER AND DESERVE MORE R&D CONSIDERATION - AT LEAST CONSIDERATION EQUAL TO THAT BEING GIVEN TO LAND USE OF WET SLUDGE, WHICH HAS BEEN FOUND TO CONTAIN TOXIC MATERIALS THAT WOULD OTHERWISE BE DESTROYED IN THE INCINERATION PROCESS. ASH HAS MORE CONCENTRATED NUTRIENTS COMPARED TO SLUDGE. ASH FROM A PRIMARY AND SECONDARY TREATMENT SYSTEM HAS A POTENTIAL VALUE OF $48.00 PER TON - FOUR TIMES THAT OF SLUDGE (FIGURE 3), WHILE ASH FROM A TERTIARY TREATMENT PLANT IS WORTH $80.50 PER TON.

N REGARD TO THE HANDLING OF TOXIC SUBSTANCES SUCH AS PESTICIDES, 'HE MHF PERFORMS EFFICIENTLY AT NORMAL OPERATING TEMPERATURES 'O REMOVE AND CONTROL TOXIC PESTICIDES FROM SLUDGE. PESTICIDE EMOVAL AND DECOMPOSITION RATES DURING CO-INCINERATION WITH LUDGE WERE TESTED BY CURTIS AND TOMKINS, LTD. OF SAN FRANCISCO EXHIBIT 5). DATA WAS GATHERED FROM ASH, SLUDGE, EXHAUST UMES AND SCRUBBER WATER SAMPLES TAKEN IN APRIL 1972 AT THE ONTEREY, CALIFORNIA SEWAGE TREATMENT PLANT. ALTHOUGH SOME LIGHT PROBLEMS WERE INVOLVED WITH SOME OF THE DATA, THE ESULTS ARE GENERALLY INDICATIVE OF MHF PERFORMANCE IN THE ONTROLLING AND DECOMPOSING OF TOXIC SUBSTANCES DURING ININERATION. THE REMOVAL EFFICIENCIES FOR EIGHT PESTICIDES, OST OF WHICH EXCEED 99%, ARE AS FOLLOWS (FIGURE 4):

	% REMOVAL
ALDRIN	99.64
DIELDRIN	>99.99
DDD	98.59
DDE	>99.99
DDT	>99.99
ENDRIN	>99.99
HEPTACHLOR	98.99
2,4,5-T	99.99

MOST OF THE PESTICIDES ABOVE, WHICH ARE ALL MORE THAN 98% REMOVED FROM THE ENVIRONMENT, ARE ALSO LISTED AS TOXIC SUBSTANCES REQUIRING CONTROLS UNDER THE PROPOSED EPA WATER CRITERIA.

WE BELIEVE THIS NEAR COMPLETE REMOVAL OF TOXIC SUBSTANCES FROM WASTE STREAMS BY MHF HAS PARTICULAR SIGNIFICANCE IN CONJUNCTION WITH THE INDUSTRIAL COST RECOVERY UNDER PUBLIC LAW 92-500 DUE TO THE RELATIVELY INSIGNIFICANT INCREMENTAL COST IN REMOVING THESE SUBSTANCES WHILE CO-INCINERATED WITH MUNICIPAL SLUDGE.

BESIDES CONTROLLING TOXIC SUBSTANCES, THE MHF REMOVES MANY TOXIC MATERIALS FROM THE ENVIRONMENT BY THE DECOMPOSITION PROCESS OCCURRING SIMULTANEOUSLY IN THE STANDARD INCINERATION PROCEDURE. THE FOLLOWING TOXIC SUBSTANCES, WHICH ARE ALSO LISTED ON THE LIST OF TOXIC SUBSTANCES PROPOSED IN THE EPA WATER CRITERIA MENTIONED ABOVE, WERE DECOMPOSED IN A MHF AS FOLLOWS:

	% DECOMPOSED
ALDRIN	62.6
DIEALDRIN	>99.99
DDT	99.19
DDD	75.2
DDE	> 99.99
ENDRIN	> 99.99
HEPTACHLOR	82.9
PCB	99.91

WITH THE EXCEPTION OF THE PCB DECOMPOSITION, THE PRECEDING DATA WAS DERIVED FROM EXHIBIT 5 AND WAS PERFORMED USING A FURNACE EXHAUST GAS TEMPERATURE OF 900°F WITH A 0.1 SECOND RETENTION TIME. THE PCB TEST DATA WAS TAKEN FROM EXHIBIT 6, WHICH TESTED THE DECOMPOSITION OF PCBs USING A 0.1 SECOND RETENTION PERIOD WITH A 920°F EXHAUST GAS TEMPERATURE.

WHILE IT IS KNOWN THAT PCBs AND THE MAJORITY OF PESTICIDES MENTIONED ARE MORE THAN 99% DECOMPOSED DURING INCINERATION, THE FATE OF SUCH TOXIC MATERIALS WITH LAND DISPOSAL OF SLUDGE IS STILL UNKNOWN. CERTAINLY MORE RESEARCH IS REQUIRED TO DETERMINE THE DESTINY OF THESE HAZARDOUS MATERIALS ONCE THEY ARE APPLIED TO LAND IN SLUDGE. THE FATE OF POTENTIAL CARCINOGENIC VIRUSES, WHICH ARE DESTROYED DURING INCINERATION, ALSO POSE A SERIOUS ENVIRONMENTAL AND HEALTH HAZARD FOR SLUDGE DISPOSAL.

PCBs ARE APPEARING IN THE NATURAL ENVIRONMENT IN INCREASING QUANTITIES. HOWEVER, THE PROBLEMS ASSOCIATED WITH PCBs CAN BE REDUCED THROUGH SOUND TECHNOLOGICAL PRACTICES. ONE OF THE BEST ECONOMICAL METHODS FOR DISPOSING OF PCBs IS THROUGH THE NORMAL INCINERATION PROCEDURE IN MULTIPLE HEARTH FURNACES. TESTS SHOW THAT 99.9% OF PCBs ARE DECOMPOSED IN THE MULTIPLE HEARTH FURNACE AT 593°C (1100°F) USING A 0.1 SECOND EXHAUST GAS DETENTION TIME (EXHIBIT 6). ACCORDING TO A UNITED STATES GEOLOGICAL SERVICE SURVEY, THERE APPEARS TO BE NO OTHER WAY IN WHICH THESE HIGHLY PERSISTENT MATERIALS ARE BEING REMOVED FROM THE NATURAL ENVIRONMENT. ONE OF THE RECENTLY DETERMINED BENEFITS OF THE TOTAL OXIDATION OF SLUDGE IN THE MULTIPLE HEARTH FURNACE IS THAT 95% OF THE PCBs ARE DESTROYED IN THE NORMAL OPERATION TEMPERATURE OF THE SLUDGE FURNACE - WHICH IS ONLY 371°C (700°F) USING A 0.1 SECOND EXHAUST GAS RETENTION TIME. AS PREVIOUSLY MENTIONED, THIS LOWERED TEMPERATURE REPRESENTS A SUBSTANTIAL FUEL SAVINGS COMPARED TO ALTERNATE METHODS, AND WHILE DESTROYING 95% OF PCB POLLUTANTS AT NO ADDITIONAL EXPENSE IT ALSO COMPLIES WITH EPA RECOMMENDED STANDARDS FOR SLUDGES FOUND TO CONTAIN PCBs.

YET, THE PROBLEMS OF PCBs REQUIRES CAREFUL REVIEW. FOR EXAMPLE A RECENT STATEMENT ATTRIBUTED TO THOMAS E. KOPP IN THE NOVEMBER 24, 1975 ISSUE OF AIR/WATER POLLUTION REPORT, ARRIVES AT THE CONCLUSION THAT PCBs ARE NOT REMOVED BY ANY KNOWN

SEWAGE TREATMENT PROCESS AND ARE ASSUMED TO REMAIN IN THE EFFLUENT. HOWEVER, OTHER DATA (EXHIBIT 7) SHOWS THAT PCBs FROM A PRIMARY SECONDARY TREATMENT PROCESS ARE MORE THAN 70% REMOVED FROM WASTE WATERS. SINCE THE SAMPLED CEDARBURG, WISCONSIN SLUDGES CONTAINED 1,000 TIMES LARGER PCB CONCENTRATION THAN THOSE FOUND IN THE OUTGOING WATERS, THE TREATMENT PROCESS MUST HAVE REMOVED MOST OF THE PCBs FROM THE INCOMING WASTES. ACCORDINGLY, WE SEE THAT PCBs TEND TO REMAIN IN THE SLUDGE RATHER THAN THE EFFLUENT. THEREFORE, BECAUSE PCBs UNDERGO NEAR TOTAL DESTRUCTION VIA INCINERATION, THE CONDITIONS ARE MOST FAVORABLE FOR PCB DESTRUCTION THROUGH INCINERATION.

IN CONCLUSION, INCINERATION AS DEMONSTRATED BY THE MHF HAS PROVEN TO BE OF NEGLIGIBLE ENVIRONMENTAL IMPACT AND OFFERS SUBSTANTIAL BENEFITS IN THE HANDLING, DISPOSAL AND ELIMINATION OF HAZARDOUS WASTES. THE ADVANTAGES OF USING INCINERATION IN THE DISPOSAL OF HAZARDOUS MATERIALS ARE:

1) PROCESS MEETS NEW AIR QUALITY STANDARDS UNDER THE CLEAN AIR ACT.
2) THE SAN FRANCISCO BAY AREA AIR POLLUTION CONTROL DISTRICT HAS RULED THE MHF TO HAVE AN INSIGNIFICANT IMPACT ON AIR QUALITY WITHIN A NO_x RESTRICTED AREA.
3) CONTROLS HEAVY METALS
4) RECOVERS RESOURCES - CO_2, LIME
5) CREATES A USEFUL PRODUCT - ASH
6) DECOMPOSES PESTICIDES, WHICH ARE LISTED AS TOXIC SUBSTANCES TO BE CONTROLLED UNDER THE PROPOSED EPA WATER QUALITY CRITERIA, DURING THE NORMAL INCINERATION PROCEDURE AT NO EXTRA COST.
7) NEAR TOTAL DESTRUCTION OF PCBs AT NO ADDITIONAL EXPENSE AT THE NORMAL OPERATING EXHAUST GAS TEMPERATUR OF 700°F WITH A 0.1 SECOND RETENTION TIME.

Figure 1

PALO ALTO EMISSIONS

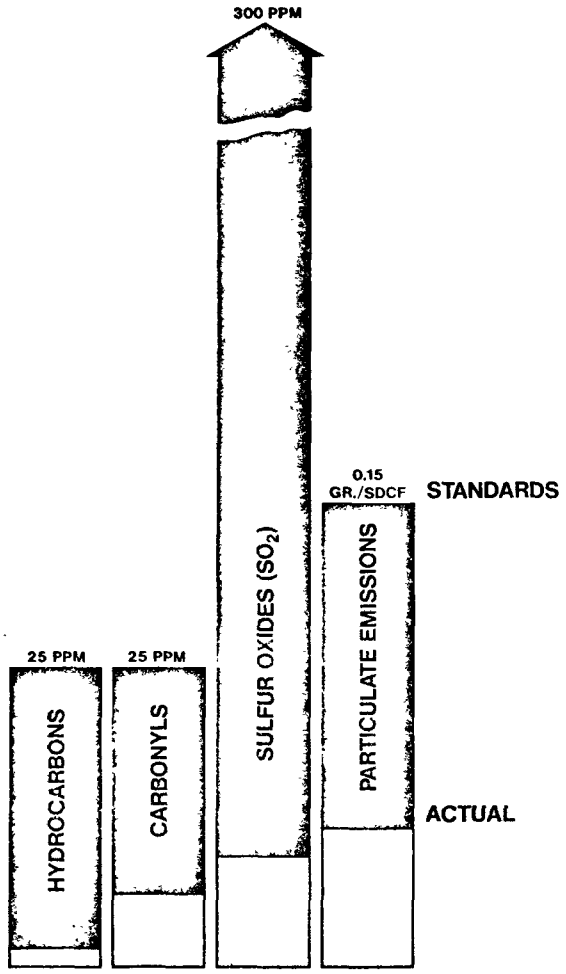


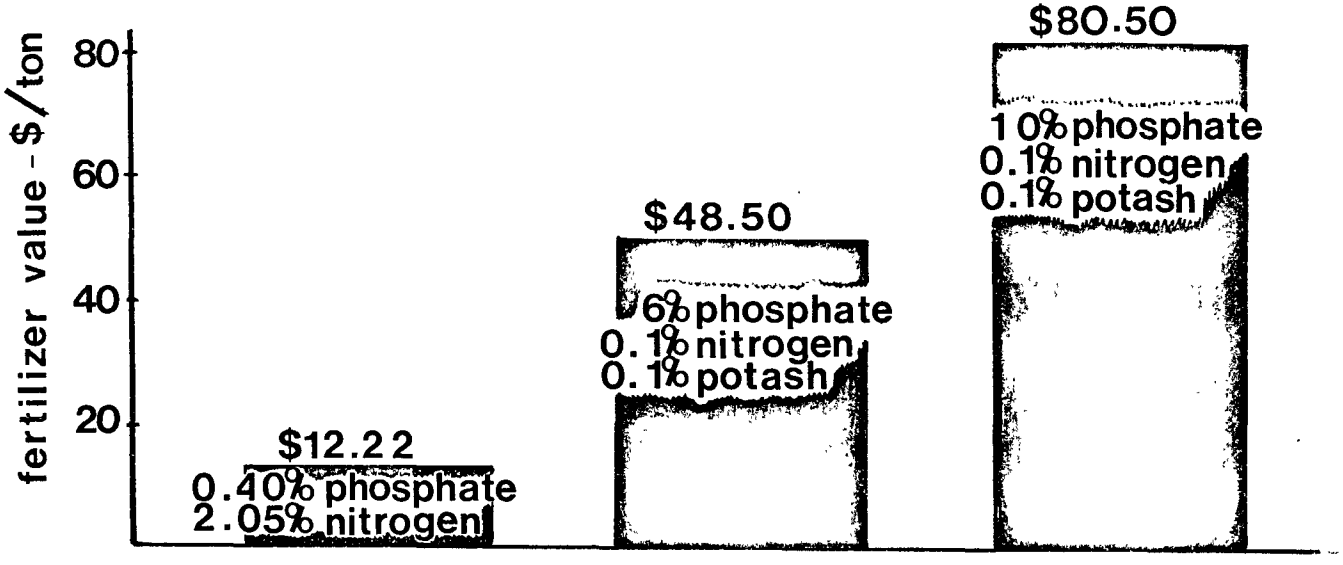
Figure 2

TYPICAL ANALYSIS OF ASH FROM SEWAGE TREATMENT SYSTEMS

Content	Percent of Total	
	Sample 1 Lake Tahoe 11/19/69	Sample 2 Lake Tahoe 11/25/69
Silica (SiO_2)	23.85	23.72
Alumina (Al_2O_3)	16.34	22.10
Iron oxide (Fe_2O_3)	3.44	2.65
Magnesium oxide (MgO)	2.12	2.17
Total calcium oxide (CaO)	29.76	24.47
Available (free) calcium oxide (CaO)	1.16	1.37
Sodium (Na)	0.73	0.35
Potassium (K)	0.14	0.11
Boron (B)	0.02	0.02
Phosphorus pentoxide (P_2O_5)	6.87	15.35
Sulfate ion (SO_4)	2.79	2.84
Loss on ignition	2.59	2.24
	Minn.-St Paul 9/30/69	Cleveland 3/2/70
Silica (SiO_2)	24.87	28.85
Alumina (Al_2O_3)	13.48	10.20
Iron oxide (Fe_2O_3)	10.81	14.37
Magnesium oxide (MgO)	2.61	2.13
Total calcium oxide (CaO)	33.35	27.37
Available (free) calcium oxide (CaO)	1.06	0.29
Sodium (Na)	0.26	0.18
Potassium (K)	0.12	0.25
Boron (B)	0.006	0.01
Phosphorus pentoxide (P_2O_5)	9.88	9.22
Sulfate ion (SO_4)	2.71	5.04
Loss on ignition	1.62	1.94

ENVIROTECH

VALUE OF STP RESIDUAL SOLID MATTER WHEN USED AS FERTILIZER



product:	sludge	ash	ash
process:	land disposal	incineration	incineration
location:	Denver, Colorado	Palo Alto, Calif.	Lake Tahoe, Calif.

sources: Water & Waste Engr. Magazine, Wall Street Journal, Envirotech Corp.

Exhibit 1

FISCAL YEAR 1976 EPA R. & D. AUTHORIZATION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON THE ENVIRONMENT AND THE ATMOSPHERE

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

NINETY-FOURTH CONGRESS

FIRST SESSION

MARCH 4, 5, 6, 1975

[No. 7]

Printed for the use of the Committee on Science and Technology

U.S. GOVERNMENT PRINTING OFFICE

50-275 O WASHINGTON : 1975

1024

Conference on Human Environment in Stockholm where Mr. Sebastian was also an observer. He was a member of the first Executive Level trade mission to Moscow in November 1973 and is a member of the Working Group for Pollution Prevention from Municipal and Industrial Sources under the U.S./U.S.S.R. Environmental Agreement.

Mr. Sebastian has been a member of the District Export Council and predecessor organization of the U.S. Department of Commerce since 1970 and has served as a consultant to the EPA National Air Pollution Control Techniques Advisory Committee. He also served as a panelist on the National Forum on "Growth with Environmental Quality?" held in Tulsa, Oklahoma September 23rd to 26th, 1973.

Mr. Sebastian holds degrees from the Stanford Graduate School of Business (MBA) and the University of Texas (BSME). He lives in Atherton, California. He is a director and vice president/treasurer of the California Council for International Trade; vice chairman of the board of directors of the Educational Development Corporation; was recently a director of the Stanford Business School Association; is a director and 2nd vice president of the Water and Wastewater Equipment Manufacturers Association. He is a member of the Water Pollution Control Federation, the American Institute of Chemical Engineering and the American Water Resources Association. He is the author of several chapters of engineering books and of more than 50 presentations and publications, one of the latest of which appeared in the Journal of the Water Pollution Control Federation in February of 1974, having been presented originally at Subcommittee Hearings on Development and Environment before the Secretary of State's Advisory Committee on the 1972 United Nation's Conference on the Human Environment, March 6, 1972.

STATEMENT OF FRANK P. SEBASTIAN, JR., SENIOR VICE PRESIDENT, ENVIROTECH CORP.

Mr. SEBASTIAN. I appreciate the opportunity to discuss with you the research and development programs relative to the Clean Water Act of 1972 amendments, and particularly to present information about a frequently overlooked reservoir of technology, the wastewater equipment industry, which in fact is perhaps the broadest area of environmental technology that is ahead of Federal standards and requirements for water pollution and control.

I have with me the GAO report, and perhaps it would help set the stage to note that there was no reference to this segment of technology that I will speak about this morning.

Mr. BROWN. Is there any chance we can get you to merge with General Motors or anything of that sort? I would like to see them ahead of Federal regulations also.

Mr. SEBASTIAN. Well, this is a very proud part of our industry, that we keep pace or a little ahead wherever possible.

Before I begin, perhaps it would be helpful to give the subcommittee some background on my company and myself.

Envirotech Corp. is a publicly owned company that was formed by combining two existing companies, Eimco Corp. and BSP Corp., in 1969. It now employs 8,000 people and does $300 million worth of business annually, principally in water quality control equipment, air quality control equipment, and mining machinery. In the water quality area we offer one of the broadest lines of equipment available. We are frequently listed as the company doing the largest sales volume in waste water treatment equipment. In the interest of time perhaps I could skip over portions of my statement.

Mr. BROWN. Without objection your complete statement will be included in the record, Mr. Sebastian, and you may proceed summarizing and skipping any portion of it that you feel appropriate.

[The complete prepared statement of Mr. Sebastian follows:]

Mr. SEBASTIAN. Prior to becoming senior vice-president of Envirotech, I was president of BSP Corp., one of the founding divisions of Envirotech, and managed the BSP operation from 1961 to 1970. During this period, BSP provided the solids handling and reclamation systems for the most advanced wastewater treatment plant in the United States at South Lake Tahoe, Calif.

I am an officer and director of the Water and Wastewater Equipment Manufacturing Association, WWEMA, and also serve as chairman of its Legislative Oversight Committee on Public Law 92-500 and liaison with EPA for WWEMA and for Envirotech. I have organized and led four U.S. trade missions to Europe and Asia and have participated in several other trade missions abroad.

I was also co-leader of the San Francisco delegation to the People's Republic of China in May 1972 where I made presentations to the PRC corporations on the status of water and air quality control technology in the United States. Currently I am a member of the EPA's Working Party on the Prevention of Pollution from Municipal and Industrial Sources under the Environmental Agreement between the United States and the Soviets.

In the brief time available this morning I believe I can best contribute to the subcommittee's purpose by imparting the viewpoint of an equipment manufacturer and supplement the record with information that I feel is often overlooked when considering R. & D. needs—that of the technology developed by the equipment manufacturers and which underlays the EPA R. & D. programs. My comments relate principally to (1) proven existing technology in municipal water pollution control, (2) new developments in sludge processing technology, (3) treatment costs, (4) need for more EPA R. & D. in (a) health effects and other damages caused by pollution, (b) health effects and damages eliminated by cleanup and (c) utilization of sludge as a quasi-fertilizer.

Before getting into the R. & D. technology, however, I would reques. the subcommittee's permission to comment on a few aspects from the equipment manufacturer's point of view on the largest single item in the EPA budget for 1975 onward, that of Construction Grants funding.

The largest sums of money in the history of water pollution control in America have been released in the past few days, to be added to already record-breaking levels of funding backlogs for treatment plant construction. None of the R. & D., State or regional plans, or sewage collection plans removes any pollution from wastewater until the actual eqiupment is installed and operating.

There is a recent but severe impediment to getting greater quantities of equipment bid and installed—lack of capital and high interest costs. I am happy to report, however, that on November 7 Mr. Train announced as a part of EPA's speed-up program that both a reduction of retainage held from contracts and equipment manufacturers' payments and progress payments on work performed were being actively considered.

Only 2 weeks later, on November 24, the first of these two programs, reduction of retainage, was issued in the form of a program guidance memorandum. The even more vital progress payments guideline is now, I understand, in the final stages of review. At this

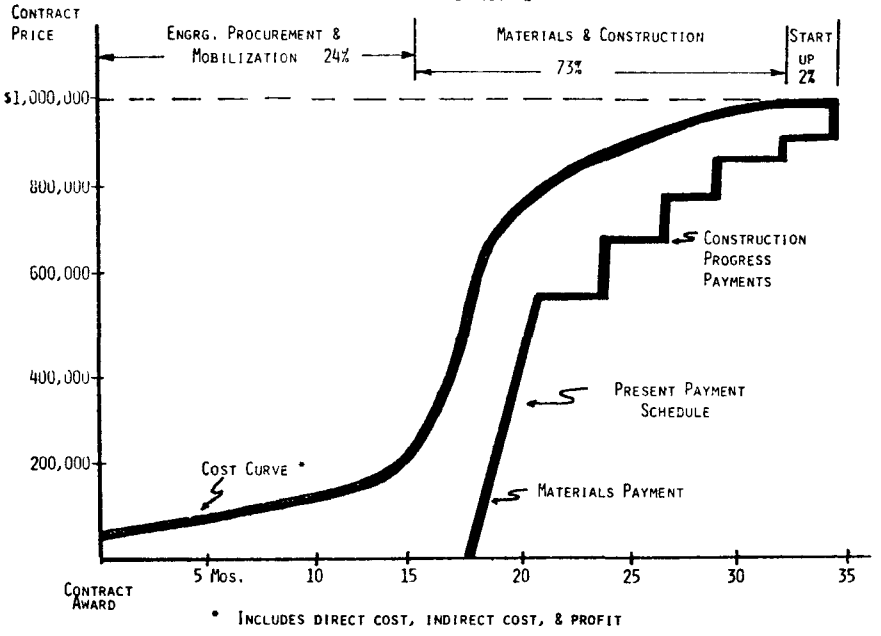
point, even with the new impetus from the recently released funds, the full capacity of equipment manufacturing industry to bid on or produce equipment cannot be brought to bear on this enormous program—until progress payments are fully extended to major equipment manufacturers. The present and the proposed payments schedules are shown on exhibit No. 1 and exhibit No. 2.

If I may, I will move to the view graph to project these on the wall [exhibit 1].

The present payment schedule for a typical million-dollar contract under the EPA construction program shows a cost curve of a cumulative cost along these lines; but the manufacturers have not normally been eligible for getting progress payments until they delivered their equipment on the site, and this meant a time delay and followed this bottom line [indicating] (exhibit 2).

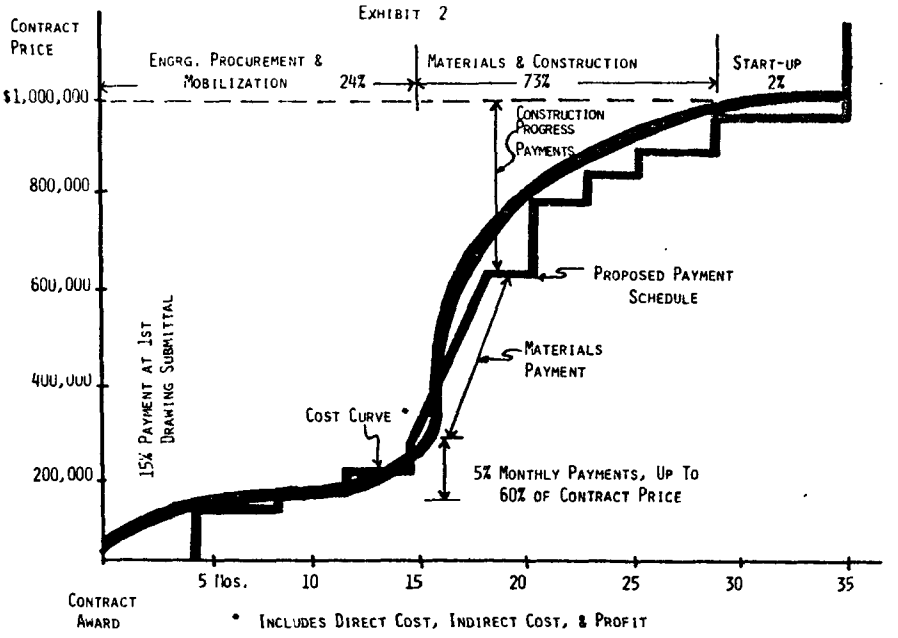
PRESENT PAYMENT SCHEDULE

EXHIBIT 1



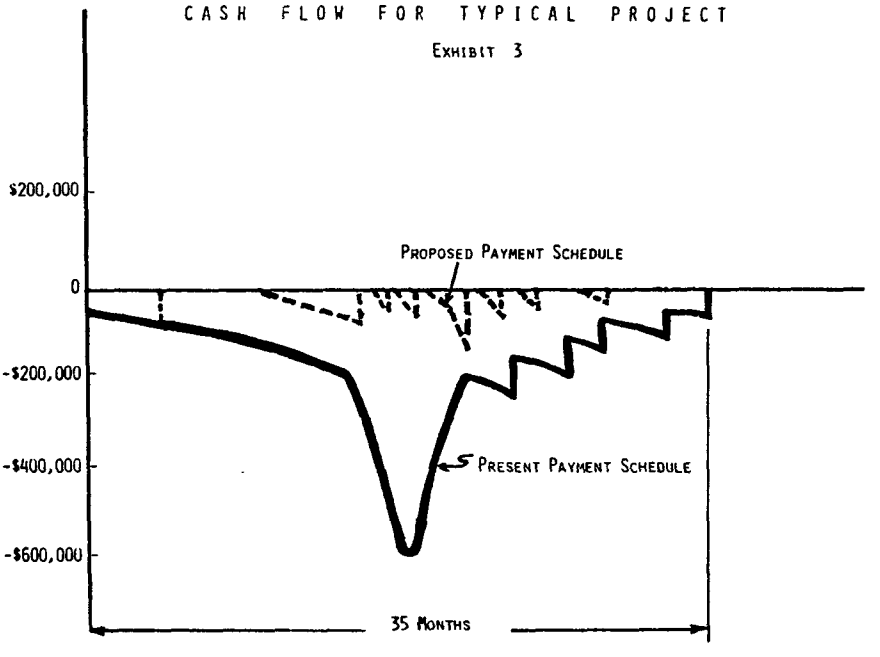
PROPOSED PAYMENT SCHEDULE

EXHIBIT 2



CASH FLOW FOR TYPICAL PROJECT

EXHIBIT 3



The proposed plan that we have under consideration with the EPA would be to match the payment schedule so that receipts would be put into industries' hands to closely follow the cost curve (exhibit 3). This would eliminate a tremendous burden on the financial market to provide funds at a time when there is virtually no additional capital available by having the money flow through currently.

Mr. BROWN. Mr. Sebastian, I think this is a very important point, and I would like to ask that you keep the committee informed, in the event that we are not properly informed from the EPA, as to the progress that is made in regard to your discussions with them on this point.

It seems to me that this would be a tremendous cost saving to the taxpayer, as well as a way of expediting the putting in place of the pollution control equipment that our national policy requires and which the Congress very strongly supports.

It seems to me that an expedited payment schedule in the fashion that you have indicated here is a much better procedure than perhaps trying to underwrite or develop low-cost loan programs or some other things of that sort which might be alternative ways of going about it.

Mr. BROWN. I think the committee would be interested in what happens as a result of your presentations.

Mr. SEBASTIAN. Thank you very much, Mr. Chairman. I will do so.

The EPA's leadership through its immediate response to these problems is greatly appreciated by the equipment manufacturers, and as we have asked of the staffs of both the Senate Public Works Subcommittee on Environmental Pollution and the House Public Works Subcommittee, we seek the support of this subcommittee in not only endorsement of the EPA's action but to add the additional strength necessary to rapidly effect change in traditions built up over many years of practice at far lower levels of activity.

In the past the financial demands of providing 60 percent of the face amount of the contract, plus normal time lags between billing and receipt of funds, could be accommodated because the level of activity was relatively low, particularly in comparison to other businesses in which many of the companies were also involved.

Under today's financial market conditions and the size of the construction program, this is no longer possible.

Now to the technology area, which is the principal reason for my being here today. I would like to comment on the advanced state of industry-developed technology which, as I said earlier, is all too frequently overlooked when assessing the construction grants program and the R. & D. activities needed.

Last year there were reports to Congress analyzing the EPA's R. & D. programs that did not include any mention or recognize the existence of any equipment industry technology. The sense of the GAO report on R. & D. to Congress last year seemed to be that "Historically, all municipal (wastewater treatment) technology has been developed by the government. There is no large (significant) industrial research and development activity." Fortunately for the success of the Clean Water Act program to date and for whatever success may be achieved in the immediate future, this is not the case.

As chairman of the WWEMA committee relative to oversight legislation on Public Law 92-500, I polled our 280 member companies on their R. & D. efforts and obtained the following results:

Seventy-four firms responded and indicated an annual industry expenditure of $570,000. This results in an annual industry expenditure of at least $42.75 million.

As a percent of total sales, this amounts to an average of 5.44 percent—the sales generated by all of the responding firms totaled $350 million.

And 93 percent responded that equipment manufacturers and industrial equipment users funded the largest share of current municipal wastewater treatment technology.

I would like to give some specific examples of the state of the technology; that is, the technology that the equipment manufacturers are bidding, and indeed guaranteeing, today without waiting for any additional R. & D. output from their own companies or other research development organizations, including the EPA.

I referred earlier to the South Lake Tahoe Water Reclamation Plant as one of the most advanced plants in the United States. This 7.5 MGD plant, as you undoubtedly know, has been operating since 1967 and has been converting municipal sewage to a water that will meet laboratory tests for drinking water; it has not failed to meet its standard for the full period of its operation.

Further, this plant is a key stop for many foreign water quality and environmental visitors. For example, it has been included in virtually every visit of the Soviet scientists involved in water quality since the Environmental Agreement was signed, and in July 1973 it was my pleasure to host Dr. Yury Izrael, Mr. Train's Soviet counterpart, on a visit to the plant where he and his delegation drank what we call "Tahoe champagne" from the effluent pipes at the plant.

[Exhibit 4.]

EXHIBIT 4

Team tours STPUD

Russians lift glasses, gulp reclaimed Tahoe wastewater

By JEFF COHEN
Tribune Staff Writer

Lake Tahoe is a paradise for scientists as well as tourists so it came as no surprise Monday when it was announced that a group of Russian scientists will come here in the fall to study Tahoe's environment

The news came during a one-day visit to South Tahoe by three Russian scientists who took time in a two week tour of the United States to see the pioneering advanced wastewater treatment plant operated by the South Tahoe Public Utility District and to drink its purified water

The study of Tahoe is part of the US USSR agreement on environmental protection, which will also involve research by American scientists at mile-deep Lake Baikal in the Soviet Union Baikal contains 25 per cent of the world's fresh water supply

Dr Yury Izrael coordinator of the US-USSR Committee on Environmental Protection said Tahoe is similar to Baikal in water quality and in the special protective laws adopted to thwart pollution

Izrael, Dr Yury Kasakov, the permanent secretary of the environmental committee, and Leonty Miridonov, a committee member, went to the South Tahoe reclamation plant, which has been hailed as the first in the world to treat sewage to drinking water standards

They took long draughts of the water that pours from an oversized champagne bottle constructed by plant workers

Dr Izrael learned of the Tahoe plant recently and changed the group's itinerary They had been to several national parks and are going to a pulp and paper treatment plant in Wisconsin

Izrael commented on the export of treated water out of the Tahoe Basin to a reservoir 26 miles away, saying "some means ought to be worked out to permit the return of the water" for use He said this is being worked on in the Soviet Union

Izrael said there are similar treatment plants at Lake Baikal but they are treating industrial rather than municipal wastes

The Baikal treated water can be drunk Izrael said, noting that Russell Train chairman of the US Council on Environmental Quality had partaken of some on a recent trip to Russia

A dinner for the Russians, California state environmental officials and directors of the South Tahoe Public Utility District was held on the cruise ship M S Dixie which enabled the visitors to see the Tahoe scenery Aboard were state Resources Secretary Norman Livermore and Win Adams, chairman of the Water Quality Control Board

I brought samples. I can't put them on the record, Mr. Chairman, but I have certified samples of the water from the plant.

Please note that I am not saying that this water can be connected directly to the water tap supply, but it will meet laboratory tests for drinking water, and, as we all know now from recent reports, much of the surface water in our tap supplies today does contain elements of sewage effluent that has not been anywhere near as highly treated as the Tahoe wastewater.

A key aspect of this most advanced plant is the sludge processing and handling, for as you increase the level of pollutants removed you increase the amount of sludge generated. The Tahoe plant received a generous amount of Federal funding for the liquid stage, but it was not until the Clean Water Restoration Act of 1966 was passed in December

of that year, providing R. & D. funds, that sufficient money was available to install the solids handling and processing system.

Tahoe received one of the very first R. & D. grants under the 1966 act for over $1 million to demonstrate an incineration/reclamation process that would reclaim the treatment chemicals—lime, in this case—for on-site reuse and convert all other waste residuals to a sterile, innocuous ash.

It is pertinent to my point that although this sludge project was fully funded by the Federal Government as research and development, it was my company as the successful equipment bidder that had to guarantee the performance of this equipment, thus in effect guaranteeing the results of an R. & D. program.

I am happy to say that we did achieve the result specified. Thus, for the first time there was demonstrated to the United States and the world a complete wastewater treatment plant making a drinkable quality water from sewage, reclaiming chemicals onsite and converting all residue to a sterile ash that, as I will mention later, has some other resource reclamation potentials.

You may be wondering. "What about the impact of the incineration/thermal reclamation process on the pristine air quality in the Lake Tahoe area?"

In fact, I have received calls from the head of a State water resources board in this area in the past saying that at a meeting the night before someone said the plant was causing the trees in the area to die. We checked it out, and fortunately that is not the case.

Those myths seem to travel fast when they are on the negative side.

Mr. BROWN. They are confusing Tahoe with southern California, I think.

Mr. SEBASTIAN. The environmental impact on the air quality was n..., because there is no visible plume and the highly cleansed exhaust gases are recirculated through partially treated waters at one stage of the process to reclaim the carbon dioxide for reuse in the process.

To obtain further verification outside of laboratory tests on the suitability of such reclaimed water for direct use in tap water, one must go outside the United States to Windhoek Namibia, southwest Africa, where there is a 1-million-gallon-per-day treatment plant that is patterned along lines similar to the Tahoe plant.

The most significant thing about the Windhoek plant is that it has been supplying reclaimed water directly for the tap supply in Windhoek since it became operational in 1967. Researchers have conducted complete viral and epidemiological tests at the plant, and there have been no health problems associated with its use. Of equal significance, there has not been any citizen resistance.

I visited there in 1969. We brought some water samples home. I was to give testimony before one of the subcommittees dealing with pollution, estuary pollution, and my Congressman asked my daughter who was carrying the 1 gallon of the reclaimed water what she thought about it. I think that she focused on the issue—she was 8 years old—that, "the water tastes better before you see the plant."

I have the reports on virus, which is frequently a concern expressed in reviews of this use of this resource. If the committee would like it for the record, I would be happy to submit it.

Both U.S. technology and manufacturers were involved in equipment and processes used in this facility. Another advanced treatment plant at Colorado Springs, Colo., has been operating since 1971 where a tertiary treatment plant was added to an existing secondary treatment plant to produce an effluent of quality almost equal to that of Tahoe, with a plan to supply this highly treated effluent to an electric utility located adjacent to the treatment plant for use as cooling water makeup.

It is worthwhile noting that the reclaimed water is priced at about 26 cents to 28 cents per thousand gallons, as compared to the local wholesale value of tap water of 38 cents per thousand gallons.

All of these facilities mentioned involve biological conventional treatment with a tertiary physical-chemical treatment facility added. Since these plants were built, there have also been other industry and Government developments in physical-chemical treatment, commonly called PCT processes, which are of great significance. In July 1971 the EPA announced its lime/activated carbon physical-chemical process, including on-site lime and carbon reclamation through high temperature thermal processes.

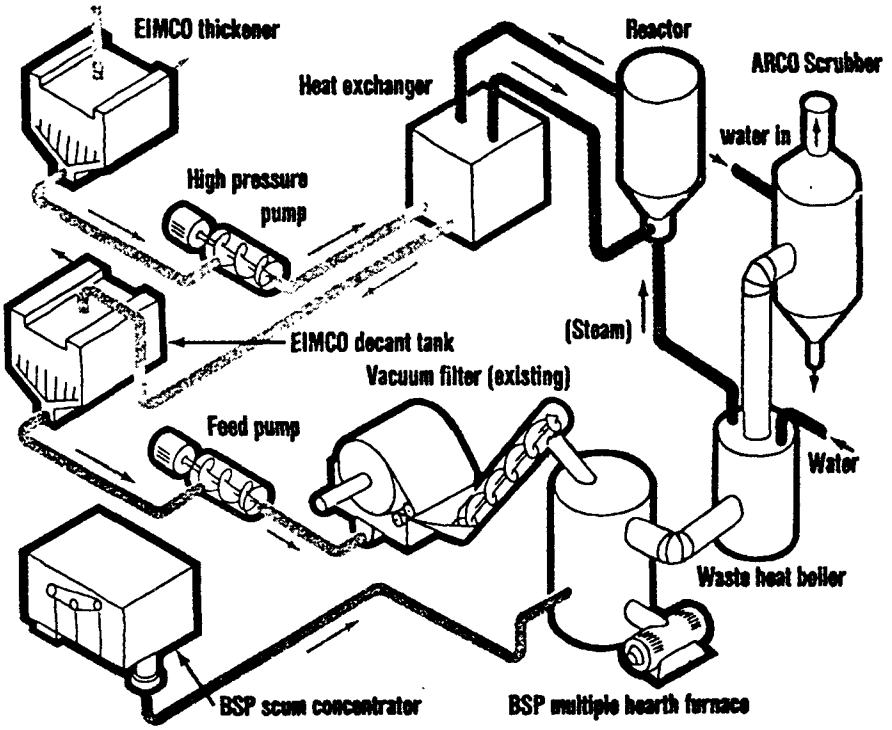
Envirotech also has developed somewhat similar PCT processes that produce a product water comparable to Tahoe quality water, but which are sufficiently different from or prior to EPA developments to be the basis for issued U.S. patents, both in the liquid treatment sector and in the sludge processing and reclamation area. The latter we call the Plural Purpose Furnace, which is a further step of development beyond that achieved at Tahoe and combines the two steps of lime recovery and incineration into one step utilizing the fuel value of the sludge as a partial source of fuel to reclaim the lime for on-site reuse.

Several plants utilizing these PCT processes are currently under construction by my company in widespread areas of the United States today involving many millions of dollars of EPA construction grant support.

A further industry development which I believe is also indicated as a similar project in the 1975 EPA R. & D. budget is that of energy reclamation from sewage plants. Although I have already mentioned reclamation of the fuel value of sewage sludge to reclaim chemicals on site, this has been taken a step further in three EPA funded municipal plants currently under construction by our company, here again funded under the Construction Grants program, involving use of our third generation multiple hearth furnace systems which we call Closed Loop Energy Systems.

EXHIBIT 5

Closed energy loop, sludge handling systems incorporates heat treatment, incineration, and heat recovery



I won't take the time to describe it (exhibit 5). It is available in the material that I have already presented to the committee.

In these Closed Loop Energy Systems a sludge heat treatment step is installed to break loose the water bound in the biological cells to enable normal dewatering equipment [vacuum filters or centrifuges] to be used to obtain a 250-percent increase in the normal solids contents of the sludge which brings the sludge to a fuel value approximately equal that of soft coal.

The heat-treated sludge is then processed through a similar but differently designed furnace to convert itself to a sterile but, again, potentially useful ash without the need for auxiliary operating fuels and with sufficient excess heat reclaimed to provide process heat and steam at the treatment plant. Further details of this new process are shown in the May 1974 issue of Environmental Science & Technology. [Copies available.]

Considering the general view of need for more sludge processing technology, I am sure you must be wondering about the impact upon air quality of these incineration/reclamation units. Thanks to both EPA and industry-sponsored research and development activities in detailed analyses of the exhaust gases, the heretofore unknown environmental benefits of these processes have been discovered.

There was about $50 million worth of this processing equipment purchased under EPA grant funds in 1973.

EXHIBIT 6

SLUDGE INCINERATION/RECLAMATION BENEFITS

- MEETS EPA AIR STANDARDS — PARTICULATES
- RULED INSIGNIFICANT SOURCE OF EMISSIONS
- DECOMPOSES PESTICIDES — DDT, 2,4,5-T
- DECOMPOSES PCBS
- CONTROLS HEAVY METALS
- RECOVERS RESOURCES — CO_2, LIME
- PRODUCES ASH PRODUCT — QUASI - FERTILIZER

Seven points are worth noting: (exhibit 6).

(1) These units will meet the new air quality standards under the Clean Air Act.

(2) Their exhaust gases have been ruled by one of the most stringent air pollution control agencies in the United States, the San Francisco Bay Area Air Pollution Control District, to have an insignificant impact on air quality.

(3) Incineration decomposes worrisome pesticides such as DDT, 2, 4,5-T, that may be contained in the sludge, at normal operating temperatures at no extra cost and such materials are not contained in the exhaust air nor in the ash product.

(4) They destroy polychlorinated biphenyls or PCB's which have been determined by the EPA to be the most persistent of the chlorinated hydrocarbon group found in sludge.

In fact, based on a search of the literature, it would appear that the only way the PCB's are being removed from our environment once they are introduced is when modern sludge incineration equipment is employed at wastewater treatment plants.

Although EPA research efforts of 1971 and 1972 were uncertain as to the fate of PCB's when incinerated, independent laboratory tests sponsored by Envirotech showed that PCB's and most of the other substances on EPA's proposed toxic chemicals list were all destroyed under normal operating temperatures. EPA-sponsored tests in 1974 confirmed Envirotech's 1972 data showing the complete decomposition of DDT and 2, 4, 5-T.

(5) These systems control heavy metals contained in sludge. For example, both lead and mercury, can now be removed from any air quality list of concern. EPA-sponsored tests show that over 99 per-

cent of the lead contained in sludge is processed in the multiple hearth furnace to the ash and not exhausted to the atmosphere.

Mercury, another item in the EPA proposed toxic substances list, was found, contrary to conventional thinking, to also be controlled. Over 90 percent of the trace amounts of mercury normally found in sludge is removed through the process. Separate studies by the EPA air quality group at Research Triangle Park corroborate these figures.

(6) These systems employ recovery processes to reclaim both lime and carbon dioxide in advanced PCT plants.

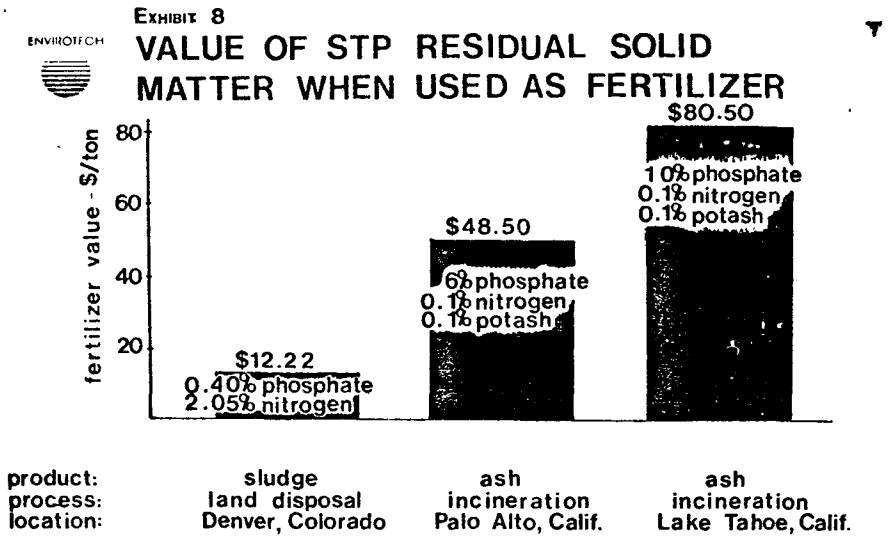
(7) They create a product—ash—that is potentially useful as a quasi-fertilizer because it normally contains 6 to 15 percent phosphate (exhibit 7). Over 50,000 tons of sludge ash has been used experimentally in Japan as a quasi-fertilizer and deserves more R. & D. consideration—at least consideration equal to that being given to land use of wet sludge under EPA R. & D. programs.

EXHIBIT 7

TYPICAL ANALYSIS OF ASH FROM TERTIARY QUALITY ADVANCED WASTE TREATMENT SYSTEM

Content	Percent of Total	
	Sample 1 Lake Tahoe 11/19/69	Sample 2 Lake Tahoe 11/25/69
Silica (SiO_2)	23.85	23.72
Alumina (Al_2O_3)	16.34	22.10
Iron oxide (Fe_2O_3)	3.44	2.65
Magnesium oxide (MgO)	2.12	2.17
Total calcium oxide (CaO)	29.76	24.47
Available (free) calcium oxide (CaO)	1.16	1
Sodium (Na)	0.73	0.35
Potassium (K)	0.14	0.11
Boron (B)	0.02	0.02
Phosphorus pentoxide (P_2O_5)	6.87	15.35
Sulfate ion (SO_4)	2.79	2.84
Loss on ignition	2.59	2.24
	Minn.-St. Paul 9/30/69	Cleveland 3/2/70
Silica (SiO_2)	24.87	28.85
Alumina (Al_2O_3)	13.48	10.20
Iron oxide (Fe_2O_3)	10.81	14.37
Magnesium oxide (MgO)	2.61	2.13
Total calcium oxide (CaO)	33.35	27.37
Available (free) calcium oxide (CaO)	1.06	0.29
Sodium (Na)	0.26	0.18
Potassium (K)	0.12	0.25
Boron (B)	0.006	0.01
Phosphorus pentoxide (P_2O_5)	9.88	9.22
Sulfate ion (SO_4)	2.71	5.04
Loss on ignition	1.62	1.94

Sludge ash is purified of PCB and pesticides and, because the nutrients are more concentrated, has a potential value of $48 per ton—four times that of wet sludge (exhibit 8).



sources: Water & Waste Engr. Magazine, Wall Street Journal, Envirotech Corp.

This chart shows in three columns the value of residual: (left) the sludge value going into land disposal projects in Denver, Colorado, based on the values for nitrogen (N) and phosphate (K); (center) ash from a conventional treatment plant in Palo Alto, California, using the same values of N and K; and (right) ash from Lake Tahoe's advanced treatment plant.

You get $12.22 a ton value for the wet sludge at a land disposal operation, whereas using the same values with the higher phosphate content, you get $48.50 per ton potential value, and in an advanced waste treatment plant, again because of the higher levels of phosphate, you get an even higher value $80.50 per ton.

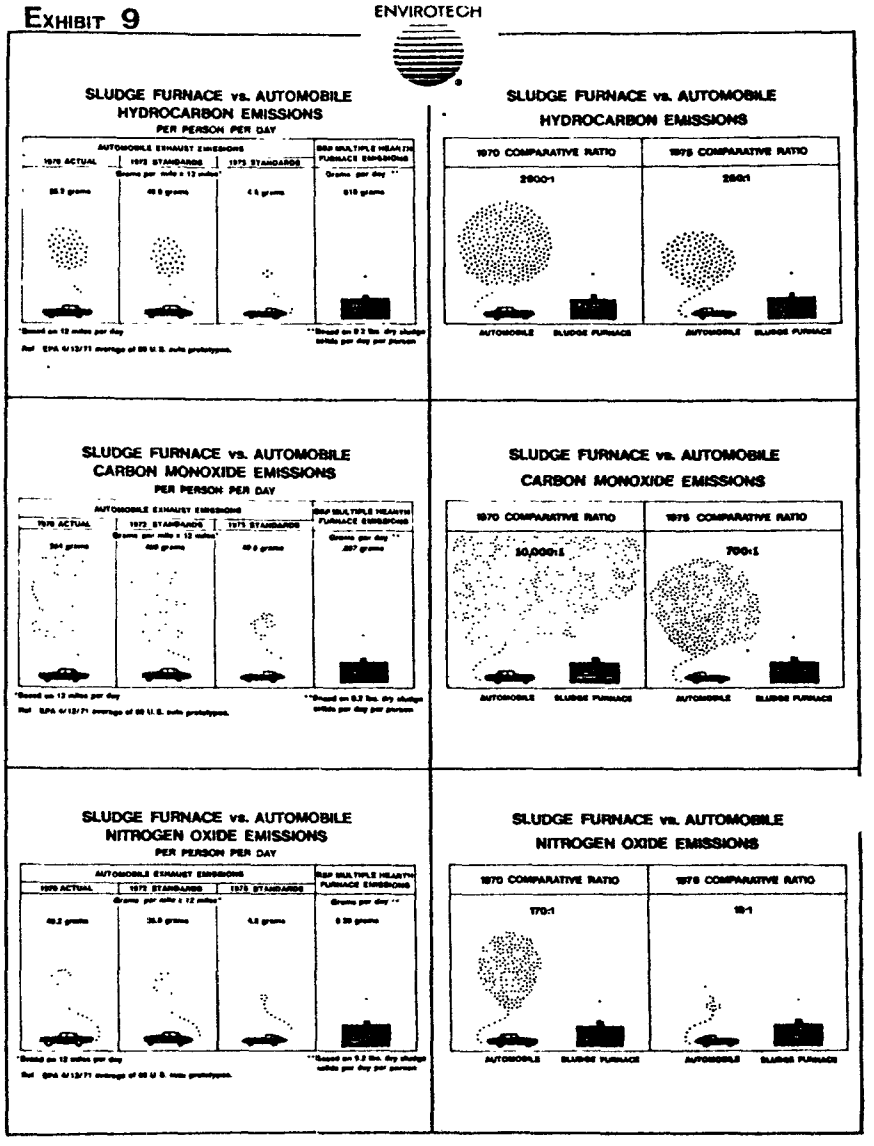
So far this is an area of reclamation that the Japanese have sought and found as a potential area of value, and it should get more consideration here in the United States.

To bring the air quality impact of advanced sludge incineration into perspective, I think it would be helpful to compare the automobile pollution emissions with exhaust emissions from sludge thermal equipment.

When comparing one average automobile, which reportedly travels 12 miles per day, against the air quality impact of the incineration of sludge on a per capita basis, we find that sludge incineration is about equivalent to burning 1 ounce of gasoline in an automobile. With sludge incineration, however, we are removing harmful chemicals from the environment and reclaiming increasingly precious resources, water, lime, carbon, et cetera. A detailed comparison of these emissions is shown in exhibit 9.

EXHIBIT 9

ENVIROTECH



I might just quickly point out that the clean hydrocarbon emissions based on the 1975 standard are about one two hundred-fiftieths of the air impact from the sludge furnace per person, per capita; and carbon monoxide is about one seven-hundredths; and nitrogen oxide emission, which is the closest comparison, is about one-sixteenth.

I should interject here that in the Livermore Valley, just east of San Francisco, a sewage treatment plant could not be permitted to proceed 2 years ago. Because of the impact of the NO_x emission in the valley they couldn't get a construction permit.

Our company worked on the construction project at the invitation of the municipal consulting engineer and reported the air quality data to the Bay Area Air Pollution Control Board. They got the permit to proceed because there was an insignificant impact on air quality and that is what enabled the construction to proceed.

What about the costs of this treatment technology? In the GAO report to Congress on EPA R. & D. last year it was stated that "The high cost of sludge handling and disposal is well recognized." Well, let's take a look at those costs. The just published Environmental Engineers' Handbook chapter on incinerator economics shows a cost of $1.05 per capita per year for multiple hearth sludge incineration for cities of 50,000 population.

For cities of 100,000 population it is 64 cents per capita per year and down to only 14 cents per capita per year for cities of 1 million population.

At the Tahoe plant sludge incineration costs amount to one-sixth of the total plant operating and amortization costs, or about $1.74 per capita per year.

Fuel costs and labor and material costs have gone up sharply since these data were developed, but, as mentioned earlier, the new Closed Loop Energy Systems furnaces eliminate the need for auxiliary operating fuel. For cities of 1 million population Closed Loop Energy Systems cost about 38 cents per capita per year. Recent studies for the Boston metropolitan area show that incinceration reclamation is the lowest cost and lowest energy use alternative including land disposal.

Systems have been operating in Europe for some years that also use shredded waste paper as an auxiliary support source of fuel. However, when the price of waste paper recently went up, the source of this material dried up and created problems for those units that were depending upon this scrap waste paper as a fuel resource. A more reliable source of fuel is obviously that of the sludge itself since he is literally converting a "sow's ear into a silk purse" on site; i.e., using the integral fuel value in the sludge to purify itself.

In the industrial sector, I would like to draw on a pulp and paper industry example to illustrate the advanced technology available. In the already mentioned GAO report to Congress last year it was estimated that only 5 percent to 20 percent of the technology needed for zero discharge was available as of June 1973. As an indication of either technology overlooked or the progress made since that time. I would like to use an example from the bleached pulp industry to show what can be done on zero discharge.

Our firm, through its joint venture with a Canadian firm, has successfully conducted pilot demonstration of a process for bleached kraft mills which produces no contaminated liquid effluent from the plant. We are working with a Canadian paper company toward the installation of this system on a possible new 700 ton per day bleached kraft mill planned in Ontario Province by 1976.

This brings me to treatment costs and benefits. According to a survey of 81 municipalities conducted for the R. & D. report by the

GAO, all but one cited the lack of funds or high cost of treatment technology as an impediment to solving its water pollution problems. Certainly the actions toward the freeing of funds that have taken place during the first 2 months of this year have removed the bottlenecks on funds for a half decade or more. With regard to the second aspect of the answer as to whether technology is available but too expensive, the survey showed that most municipalities responding believe that the technology is available but too expensive.

Obviously, I would heartily concur that the technology is available but what about the expense? For example, 75 percent of responding municipalities indicated technology available but too expensive for physical-chemical treatment processes. I have already commented on sludge handling and sludge disposal which were included by 64 percent and 58 percent respectively of the respondents as being too expensive, and I am certain that the hidden benefits that I have presented here, PCB removal and using the fuel value in the sludge, were likely unknown to these respondents.

I would like to select one physical-chemical treatment process to give an indication of a posssible, even likely, misassessment by the respondents of the costs versus the benefits of this technology. It has long been my feeling that it is the benefit side of the cleanup that all too often misses the view of the person commenting on the cost. One of the hidden benefits of the water pollution control program has been accelerating the construction of systems toward that of producing a product water with a near term industrial reuse and a long-term water supply use potential.

EXHIBIT 10 COST OF CONVENTIONAL AND ADVANCED TREATMENT OF WASTEWATER

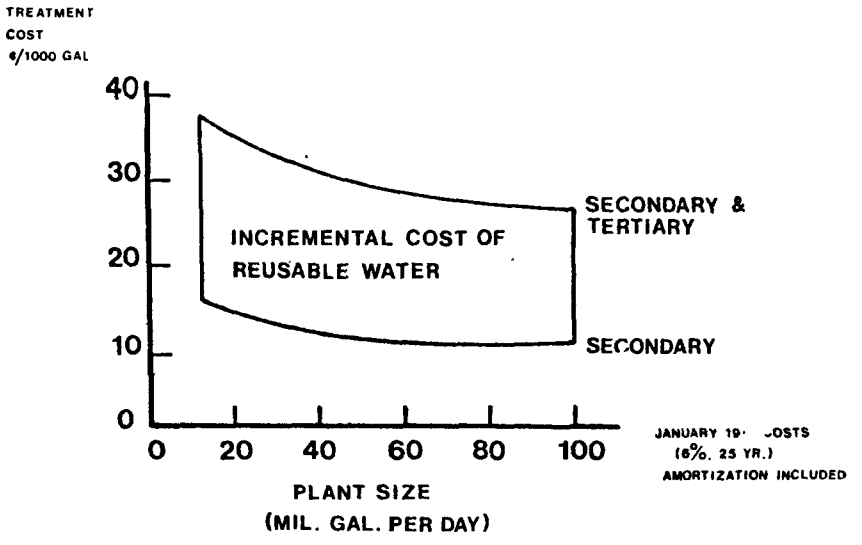
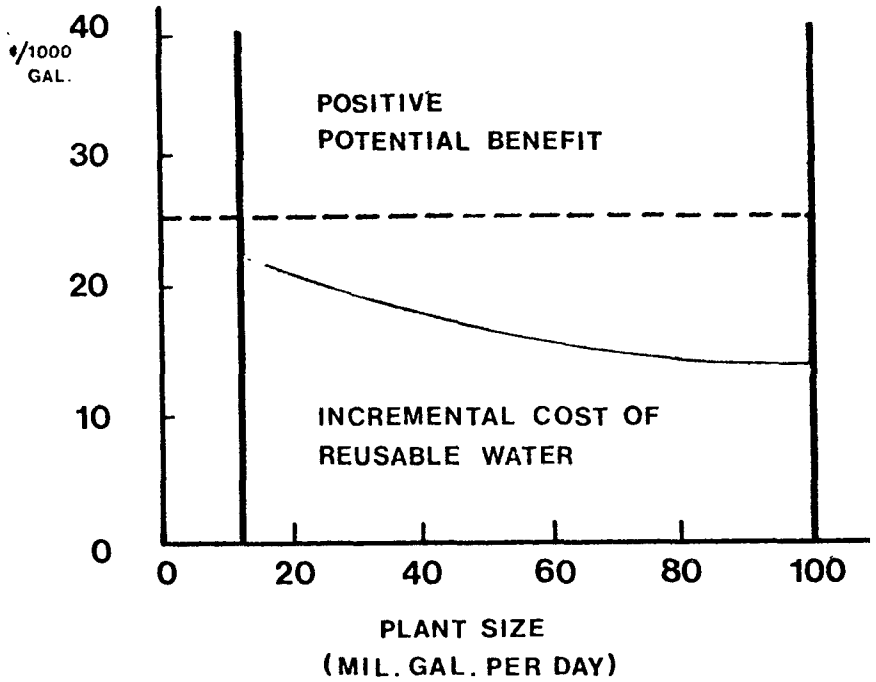


EXHIBIT 11 POTENTIAL BENEFIT OF WATER REUSE



Exhibits 10 and 11 show that the incremental cost of tertiary treatment over secondary treatment could be recovered when the cost of new water supply exceeded 13 cents per thousand gallons for cities of 1 million population or more and exceeded 22 cents per thousand gallons for cities of only 15,000 population.

In the San Francisco area the average cost of tap water ranges from 18 cents to 38 cents per thousand gallons. Additional water supply sources would cost much more than the current charge. Water reuse offers not only an opportunity to eliminate pollution but to use a finite resource economically.

Two of our major cities in the West, by the way, have plans underway for extensive water reuse. Denver is the most advanced and the city of Los Angles is also undertaking extensive studies in this direction.

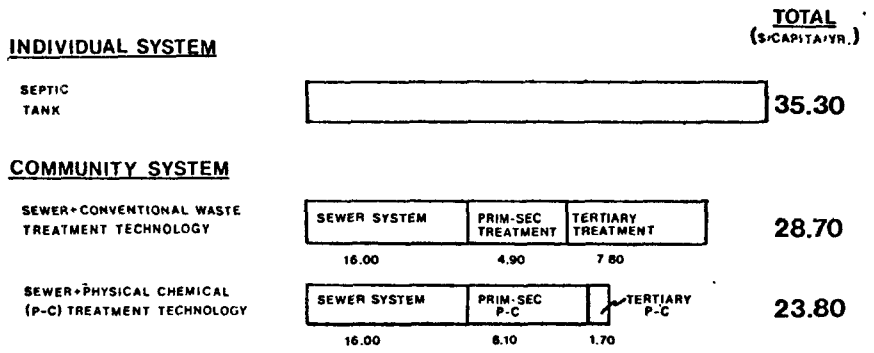
In addition to creating a usable product, there are other indirect benefits from water reuse: First, the elimination of damage. The 1972 damages from water pollution throughout the United States were projected at $12.8 billion; the savings from clean-up were estimated at $11.5 billion. The costs to achieve the savings were estimated to be $6.3 billion, providing a net savings of $5.2 billion or about $87 per family in the United States.

Similar savings were estimated from the elimination of air pollution damages. Certainly, increased EPA R. & D. in health effects is essential, and determination of savings from elimination of damage should also be increased. Elimination of damages, then, must be considered in

evaluating cost to clean up, particularly when the Federal Government is to pay a 75-percent share.

And, I believe that the record shows that the costs themselves are really not that high. To support that contention, I would like to look quickly at some overall waste treatment costs for individual systems and community systems, or both biological and physical-chemical treatment systems (exhibit 12).

EXHIBIT 12 WASTEWATER TREATMENT COSTS



BASIS: CAPITAL COSTS ADJUSTED TO JUNE, 1968; 6% AMORTIZATION: SEWERS-50 YRS., SEPTIC TANKS-35 YRS., SEWAGE TREATMENT PLANTS-25 YRS.

I see my time is running short, Mr. Chairman.

Mr. BROWN. Go ahead, Mr. Sebastian. If we have to run this afternoon, why, we will do that.

Mr. SEBASTIAN. Thank you, Mr. Chairman.

First, an individual system similar to a septic tank. One very rarely hears of any opposition to the request on the part of a community to require septic tanks. However, according to EPA, the costs of a septic tank amount to $35.30 per capita per year. This includes the amortization of the septic tank over 35 years and biannual servicing, but without any consideration of the cost of ultimately treating the material that must be removed from the septic tank when it is emptied every 2 years or so.

Well, then, what about community systems? Frequently, when talking about costs, people overlook the first step of community systems, again, over which there is frequently little controversy in urban areas, and that is the cost of the sewage collection system.

According to EPA figures, communities with sewers pay about $16 per capita per year for the sewage collection system. When one adds primary, secondary treatment at the end of the sewage collection system in order to remove, say, 80 percent of oxygen-demanding pollution we get an additional cost of $4.90 for a total of $20.90 for secondary treatment.

The treatment costs, then, are less than one-third the cost of the sewer system. When tertiary treatment such as that practiced at Lake

Tahoe, with complete treatment of solids and a fully environmentally compatible system, is added, a cost of $7.80 per capita per year is also dded, a little more than doubling the cost of primary and secondary treatment, bringing the total to about $28.70 per year. But notice that this is still less than the cost of the typical average septic tank, which is hardly a complete system and is known to contaminate the water supply in some areas.

Now, in applying cost effective analyses to the responses about alleged excessive cost of physical-chemical treatment, one should start again with the sewer system, $16 per capita per year, but with today's technology physical-chemical treatment can in many cases be used instead of biological or conventional waste treatment, and can be controlled in such a way as to achieve a quality of treatment comparable to biological secondary treatment with a number of added benefits, such as integral phosphorous removal, resistance to variations in influent characteristics from industrial effluent. It costs about 5 percent more than conventional treatment.

However, the greatest benefits from physical-chemical treatment undoubtedly rest in the long range benefits derived under our national plan that is looking toward zero pollution discharge as a goal in 1985.

The incremental cost to bring tertiary, or drinkable, quality to a typical municipal effluent is only $1.70 when added to an existing PCT plant, bringing the total cost to $23.80 or 17 percent less than the cost of conventional treatment plus tertiary.

While time available has not permitted me to update these costs since they were published, the relative values are still considered quite comparable. The most recent figures from EPA, just published by NERC, Cincinnati last month, show that the capital costs for sewage facilities in communities from 10,000 to 1,000,000 persons are divided approximately five-sixths for collection and one-sixth for treatment, when activated sludge treatment is provided; and if more complete or gh-quality water is used the capital cost is divided approximately hree-quarters for collection and one-quarter for treatment.

Total costs for sewage services in communities of 10,000 to 100,000 persons are divided approximately two-thirds for collection and one-third for treatment when activated sludge is provided; if complete treatment is used the cost is divided about equally between collection and treatment.

Thus, it seems to me to talk about excessive costs one must start from the collection system to make comparisons, rather than with the treatment plant because no improvement in quality occurs in the normal collection step.

Before closing, I would like to add one comment about air quality. Last year, the Industrial Gas Cleaning Institute recommended that EPA consider providing at least a 50-percent Government share for demonstration plants on SO_2 removal at power stations for at least one throwaway system and two to three recovery-type systems. I understand that one such SO_2 program for a double alkali throwaway system is imminent on a 100-megawatt-sized unit and perhaps a second one of less than 100 megawatt size.

I would like to add my support to EPA for its R. & D. efforts and directions, and suggest that consideration be given to even further em-

phasis to the health effects, particularly research in the area of water reuse and of benefits from damages eliminated through clean-up.

I hope I have shown that far more technology exists in the equipment industry community than is generally recognized, and that there is indeed far more reasonable cost technology available to move us toward 1985 goals than is being required at the present time in the municipal sector.

Equipment industry-conducted R. & D. largely complements EPA R. & D. and supports the overall objectives and goals of the Clean Water Act and the EPA.

Thank you, Mr. Chairman.

Mr. BROWN. Thank you, Mr. Sebastian. I think that the record which you have helped to make is going to create a great deal of interest not only to the members of this committee but to the entire Congress. I think that the goal which you have indicated, of a complete clean-up in our environmental system, is one which the Congress is moving fairly rapidly toward.

I am going to defer questioning, if I may, Mr. Sebastian.

Mr. SEBASTIAN. Yes, sir.

Mr. BROWN. I still hope that we can get through by 11 when another committee has to take over here. I will ask if I may submit questions to you in writing and if you will respond to them.

Mr. SEBASTIAN. I will be happy to do so.

Mr. BROWN. I am extremely grateful to you for your testimony.

Now, I am going to invite Dr. James Pitts to take the witness stand.

Dr. Pitts is also from California and happens to come from my own home district where he is head of the environmental laboratory at the University of California, Riverside. That laboratory is a major resource in the fight against atmospheric pollution not only for the State of California but for the entire United States.

We are very pleased to have you with us, Dr. Pitts, and are look forward to your testimony; we apologize for the time pressure which has been forced upon us here.

Dr. PITTS. Thank you very much, Mr. Chairman. I might start by officially wishing the chairman of this committee a happy birthday, and indeed as a token of my esteem it seems appropriate, since we are dealing with air pollution, that I brought for you a cigar.

Mr. BROWN. We were going to celebrate with a little of that Tahoe champagne.

Dr. PITTS. We can go both ways there. I am sure you will not be a stationary source. I have never seen you stationary. Mobile is indeed the word.

I will in fact compress my remarks. I think it is only fair play to do that. Professors have inflicted extended remarks upon students for years, and compression cannot hurt at all.

For the record I would like to indicate that on page 7 there is a point that is fairly useful. We left out a line. Under Atmospheric Monitoring it should read,

"For the measurement of ambient NO and NO_2 and used to calibrate field instruments for the measurement of ambient NO and NO_2 are themselves calibrated against the known stream of ozone. If this ozone is in error, then the "standard" calibration gases, and hence the instrument measuring ambient NO and NO_2 in the field will also be in error."

That is an interesting point. A large number, hundreds of instruments that are put out to calibrate NO and NO_2 for your intimates in the field are in turn back-calibrated against oxidants, so that if the oxidant calibration is wrong you now have errors in NO and NO_2. This indicates I think one of the reasons I am fully supportive of an increased effort on the part of the EPA, cooperative effort with State agencies, local agencies, and other Federal agencies to develop and to coordinate this very important area of environmental monitoring.

Surely if we can't measure what the impact upon man and his environment is, then how can we indeed legislate appropriate laws for control of our environment and then implement those laws through our agencies?

Mr. BROWN. Without objection your entire statement will be included in the record with the one correction that you have indicated, and you may proceed with your oral presentation in any fashion you wish.

Dr. PITTS. I will go back now, but let me just indicate the following: I am fully supportive of the remarks of Dr. MacDonald. In fact, we fully agree. I had perhaps followed along focusing upon processes and effects and perhaps fine-tuning some of his comments in the sense of giving specific examples of where research is needed, desperately needed, for the decisionmakers, so that we have a much better data base to make the decisions that are costing us billions of dollars.

I might also say parenthetically the decision yesterday of Mr. Train to defer the implementation of stricter emission standards on cars and the basis on which that decision was made was based upon sulfate emissions—a prime example of where if some research had been done in advance we could have avoided this problem. And the problem has been embarrassing to the Government and embarrassing financially to a number of automobile manufacturers who have gone the catalytic route. It is a prime example of the type of situation where I would like to say more defensive research should be done by agencies, a number of agencies.

The question of what problem are we going to face could have been examined in advance.

I predict you will be here in a couple of years to discuss the problems of diesel exhaust. The diesel engine represents a very interesting way of combining high-fuel economy and low emissions. There is a foreign car today which meets the Federal standards several years hence in all aspects, at least in many aspects. It certainly will meet the new proposed Train's 82 standards. Yet it is a diesel.

Now, the question is what are the particular chemical and physical characteristics, toxics, potential carcinogens, what happens to the particulate matter in the exhaust when released to the atmosphere? These are all subjects amenable to rational scientific investigation. And I would say that several years ago we should have looked at a problem such as this, because this is an alternative system to the conventional engine.

Another alternative system which is in fact currently driving about and I understand selling well in California is the stratified charge automobiles. The emissions—and I have the 1975 official emissions—read something like the following: six-tenths of a gram per mile, hy-

drocarbon; 4.9 grams per mole, CO; and 1.38 grams per mile. NC This is a car being driven in California today, a car sold commercially. That could be contrasted with the proposed standards yesterday of 1.5 grams per mile, hydrocarbons; 15 grams per mile, CO; and 2 grams per mile, NO_x.

It is perfectly clear that technologically this is a smaller car, but with a smaller car it gets substantial savings, as you know, in fuel economy.

I will admit it is a foreign car. I would prefer to buy an American car—we all do. We want jobs here. It is a shame to see this happen.

I might even add that a reproduction model of this particular car, equipped with the 1977 emission control system, has been tested and emissions were .23 grams per mile hydrocarbons, almost half of the original Muskie standards for 1977. This is the National Academy of Science report of November, 1974. This is not hearsay, it is in the National Academy report.

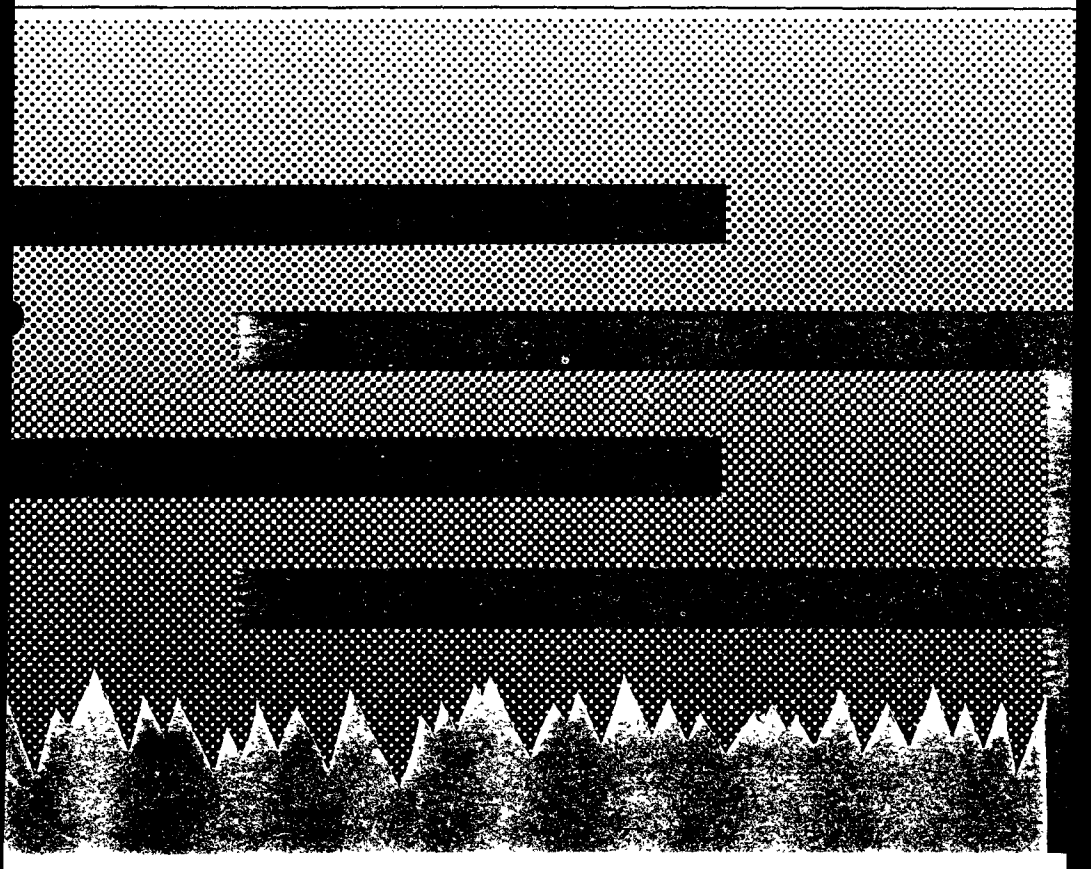
I would, if you are interested—I had prepared these comments before Mr. Train's statement yesterday at the request of the attorney general of California's task force. If you would like them for the record, the numbers are there.

Mr. BROWN. Yes, without objection that additional statement will be included in the record.

Exhibit 2

Air Pollution Aspects of Sludge Incineration

Technology Transfer Seminar Publication



1047

EPA-625/4-75-009

AIR POLLUTION ASPECTS OF SLUDGE INCINERATION

ENVIRONMENTAL PROTECTION AGENCY • Technology Transfer

June 1975

1048

ACKNOWLEDGMENTS

This seminar publication contains materials prepared for the U.S. Environmental Protection Agency Technology Transfer Program and has been presented at Technology Transfer design seminars throughout the United States.

A portion of this publication appeared originally in the Technology Transfer Process Design Manual for Sludge Treatment and Disposal. Additional information included was prepared by Gordon Culp, representing Culp, Wesner, Culp—Clean Water Consultants, Eldorado Hills, Calif.

NOTICE

The mention of trade names or commercial products in this publication is for illustration purposes, and does not constitute endorsement or recommendation for use by the U.S. Environmental Protection Agency.

CONTENTS

Page

Introduction . . . . . .

Particulate Matter . . . . . .

Metals 8

Gaseous Pollutants 9

Organics 10

Conclusions 1

Case Histories 1
Livermore, Calif. 1
Palo Alto, Calif. 1

References 12

INTRODUCTION

Incineration offers the opportunity to reduce sludge to a sterile landfill and remove offensive odors, but it also has the potential to be a significant contributor to the air pollution problem in an urban community. The quantity and size of particulate emissions leaving the furnace of an incinerator vary widely, depending on such factors as the sludge being fired, operating procedures, and completeness of combustion. Incomplete combustion can form objectionable intermediate products, such as hydrocarbons and carbon monoxide. There is also the potential for discharge of air pollutants such as sulfur dioxide, nitrous oxides, and metals such as mercury.

PARTICULATE MATTER

New Source Performance Standards (NSPS) regulating discharges from municipal sludge incinerators have been promulgated by the Environmental Protection Agency (EPA). These standards limit the discharge of particulate matter from both new and modified sewage sludge incinerators. The process weight and opacity restrictions placed on this atmospheric pollution source are:[1]

- No more than 0.65 g/kg dry sludge input (1.30 lb/ton dry sludge input).
- Less than 20 percent opacity. Visible emissions caused solely by the presence of uncombined water are not subject to the opacity standard.

Available data indicate that, on the average, uncontrolled multiple-hearth incinerator gases contain about 0.6 grain of particulate per standard cubic foot of dry gas.[2] Uncontrolled fluid-bed reactor gases contain about 1.0 grain of particulate per standard cubic foot.[3] For average municipal wastewater sludge, these uncontrolled pollutant concentrations correspond to about 33 pounds of particulates per ton of sludge burned in a multiple hearth, and about 45 pounds of particulates per ton of sludge burned in a fluid-bed incinerator. Particulate collection efficiencies of 96 to 97 percent are required to meet the NSPS,[4] based on the above uncontrolled emission rate.

Sludge incinerators differ from most other types of incinerators in that the sludge does not normally supply enough heat to sustain combustion. Furthermore, there is less emphasis on retaining ash in the incinerator and much of it is discharged in stack gases. Particulate emissions to the atmosphere are almost entirely a function of the scrubber efficiency and are only minimally affected by incinerator conditions. Sludge incinerators in the United States are equipped with scrubbers of varying efficiency. These scrubbers range from simple spray-tower-type units to venturi-type scrubbers with pressure drops up to 40 inches of water.

Existing State or local regulations in the United States tend to regulate sludge incinerator emissions through incinerator codes or process weight regulations.[5] Many State and local standards are

Table 1.—*Sludge incinerator facility A_1: Summary of results*

Item	Run number			Average
	1	2	3	
Date	1-11-72	1-12-72	1-12-72	
Test time, minutes	108	108	108	108
Furnace feed rate, ton/h dry solids	0.550	0.560	0.560	0.557
Stack effluent:				
Flow rate, dscfm	2,880	2,550	2,660	2,700
Flow rate, dscf/ton feed	314,000	273,000	285,000	291,000
Temperature, °F	59	59	59	59
Water vapor, volume %	1.93	1.92	2.23	2.03
CO_2, volume % dry	12.8	12.6	11.5	12.3
O_2, volume % dry	4.8	4.7	6.4	5.3
CO, volume % dry	0	0	0	0
SO_2 emissions, ppm	<0.3	<0.3	<0.3	<0.3
NO_x emissions, ppm	4.2	5.7	6.4	5.4
HCl emissions, ppm	<3.8	<2.9	<4.1	<3.6
Visible emissions, % opacity	<10	<10	<10	<10
Particulate emissions:				
Probe and filter catch				
gr/dscf	0.024	0.005	0.004	0.011
gr/acf	0.023	0.005	0.004	0.011
lb/h	0.583	0.116	0.099	0.266
lb/ton of feed	1.06	0.207	0.177	0.481
Total catch.				
gr/dscf	0.032	0.007	0.010	0.0163
gr/acf	0.031	0.007	0.010	0.016
lb/h	0.779	0.160	0.227	0.389
lb/ton of feed	1.42	0.286	0.405	0.704

Note.—dscfm indicates dry standard cubic feet per minute; dscf indicates dry standard cubic feet, acf indicates actual cubic feet.

Source: *Background Information for Proposed New Source Performance Standards*, EPA Report APTD-13526, June 1973, vol. 2, appendix.

corrected to a reference base of 12 percent carbon dioxide or 6 percent oxygen. Corrections to CO_2 or O_2 baselines are not directly related to the sludge incineration rate, because of the high percentage of auxiliary fuel required. In some regulations, the CO_2 from fuel burning is subtracted from the total when determining compliance.

Table 2.—*Sludge incinerator facility A_2: Summary of results*

Item	Run number			Average
	1	2	3	
Date	5-3-71	5-4-71	5-4-71	
Test time, minutes	60	60	60	60
Furnace feed rate, ton/h dry solids	0.325	0.325	0.325	0.325
Stack effluent:				
Flow rate, dscfm	3,480	3,600	3,320	3,470
Flow rate, dscf/ton feed	642,500	664,600	612,900	640,600
Temperature, °F	80	80	78	79
Water vapor, volume %	3.4	3.4	3.4	3.4
CO_2, volume % dry (less auxiliary fuel)	4.0	5.1	4.0	4.4
SO_2 emissions[1]	–	–	–	–
Visible emissions, Ringelmann No.[2]	<1	<1	<1	<1
Particulate emissions, total catch:				
gr/dscf (corresponds to 12% CO_2)	0.020	0.031	0.048	0.033
gr/acf	0.019	0.029	0.047	0.032
lb/h	0.596	0.956	1.365	0.972
lb/ton of feed	1.84	2.94	4.20	2.99

[1]No SO_2 detected.
[2]Opacity was not recorded.
Note.—Tested by local agency using code method 1. Probe and filter catch not analyzed separately. dscfm indicates dry standard cubic feet per minute, dscf indicates dry standard cubic feet, acf indicates actual cubic feet.
Source: *Background Information for Proposed New Source Performance Standards*, EPA Report APTD-13526, June 1973, vol. 2, appendix.

In developing the foregoing NSPS, tests were conducted on the gaseous discharges from several sludge incinerators. Stack tests were conducted by EPA at five locations, including three multiple-hearth incinerators and two fluid-bed reactors, as follows:[6]

A. Fluidized-bed reactor, 1,100 lb/h dry solids design capacity, operated at 100 percent capacity during test, equipped with a 20-inch-water-pressure-drop venturi scrubber operated at 18 inches water pressure drop. Tested by EPA and by a State agency, the latter using code method 8 (see tables 1 and 2).

B. Multiple-hearth (six hearths) incinerator, 750 lb/h dry solids design capacity, operated at 64 percent capacity during test, equipped with a 6-inch-water-pressure-drop single-crossflow perforated-plate impinjet scrubber (see table 3).

C. Multiple-hearth (six hearths) incinerator, 900 lb/h dry solids design capacity, operated at 35 percent capacity during test, equipped with a 6-inch-water-pressure-drop single-crossflow perforated-plate impinjet scrubber (see table 4).

Table 3.—*Sludge incinerator facility B. Summary of results*

Item	Run number			Average
	1	2	3	
Date	10-13-71	10-14-71	10-14-71	
Test time, minutes	120	120	120	120
Furnace feed rate, tons/h dry solids	0.237	0.236	0.249	0.241
Stack effluent:				
Flow rate, dscfm	3,300	2,950	2,120	2,790
Flow rate, dscf/ton feed	835,000	750,000	511,000	699,000
Temperature, °F	198	196	199	198
Water vapor, volume %	3.64	4.02	3.65	3.77
CO_2, volume % dry	3.8	4.7	2.7	3.7
O_2, volume % dry	17.3	1.40	15.8	15.7
CO, volume % dry	0	0	0	0
SO_2 emissions, ppm	2.29 to 2.57	2.75	–	2.53
NO_x emissions, ppm	–	–	44.2 to 24.3 14.3	27.6
HCl emissions, ppm	–	–	0.624 to 1.33 0.621	0.858
Visible emissions, % opacity	<10	<10	<10	<10
Particulate emissions:				
Probe and filter catch:				
gr/dscf	0.0245	0.0196	0.0173	0.0205
gr/acf	0.0187	0.0155	0.0132	0.0158
lb/h	0.690	0.495	0.315	0.500
lb/ton of feed	2.91	2.10	1.26	2.09
Total catch:				
gr/dscf	0.0374	0.0374	0.0457	0.0402
gr/acf	0.0289	0.0287	0.0348	0.0308
lb/h	1.06	0.945	0.832	0.946
lb/ton of feed	4.47	4.00	3.34	3.94

Note.—dscfm indicates dry standard cubic feet per minute, dscf indicates dry standard cubic feet, acf indicates actual cubic feet.

Source: *Background Information for Proposed New Source Performance Standards*, EPA Report APTD-13526, June 1973, vol. 2, appendix.

D. Fluidized-bed reactor, 500 lb/h dry solids design capacity, operated at 95 percent capacity during test, equipped with a 4-inch-water-pressure-drop single-crossflow perforated-plate impinjet scrubber (see table 5).

E. Multiple-hearth incinerator, 2,500 lb/h dry solids design capacity, operated at about 50 percent capacity during tests, equipped with a 2.5-inch-water-pressure-drop cyclonic inertial jet scrubber (see table 6).

Table 4.—*Sludge incinerator facility C: Summary of results*

Item	Run number			Average
	1	2	3	
ıte	7-15-71	7-15-71	7-16-71	
ıst time, minutes	80	80	80	80
ırnace feed rate, tons/h dry solids	0.111	0.149	0.146	0.135
ack effluent:				
Flow rate, dscfm	1,230	1,490	1,400	1,373
Flow rate, dscf/ton feed	665,000	600,000	575,000	613,000
Temperature, °F	80	80	77	79
Water vapor, volume %	3.23	3.00	2.95	3.06
CO_2, volume % dry	10.0	10.1	10.2	10.1
O_2, volume % dry	7.7	7.3	7.4	7.5
CO, volume % dry	0	0	0	0
SO_2 emissions, ppm	15.9 to 11.9	14.5 to 14.6	14.6 to 13.3	14.2
NO_x emissions, ppm	402 to 140	90.8 to 74.3	14.5 to 142 50.6 to 61.8	163
HCl emissions, ppm	3.50 to 2.62	2.33 to 2.62	2.52 to 2.62	2.72
sible emissions, % opacity	<10	<10	<10	<10
rticulate emissions:				
Probe and filter catch:				
gr/dscf	0.0127	0.0620	0.0196	0.0314
gr/acf	0.00985	0.0477	0.0152	0.0242
lb/h	0.127	0.620	0.196	0.314
lb/ton of feed	1.14	4.16	1.34	2.21
Total catch:				
gr/dscf	0.0195	0.0696	0.0260	0.0384
gr/acf	0.0150	0.0535	0.0201	0.0295
lb/h	0.206	0.889	0.312	0.469
lb/ton of feed	1.86	5.97	2.14	3.23

Note.—dscfm indicates dry standard cubic feet per minute, dscf indicates dry standard cubic feet, acf indicates actual cubic ɜt.

Source *Background Information for Proposed New Source Performance Standards,* EPA Report APTD-13526, June 1973, l. 2, appendix.

The results of these tests are shown in tables 1 to 6. Figure 1 summarizes the results of the articulate measurements. The results from the unit using a venturi scrubber operating at 18-inch ɣater pressure drop were used as the basis for the standard. The other systems using other types of crubbers operating at lower pressure drops failed to meet the promulgated NSPS of 1.3 lb/ton dry udge input. The study of these facilities indicated no relationship between the mass emission rates nd the percent of rated capacity at which the incinerator was operating, but a strong relationship ıetween pressure drop across the scrubber and mass emission rates was found.[4] All of the systems asily met the opacity standard. Observations at 15 other facilities indicated they all met a 10-percent

Table 5.—*Sludge incinerator facility D: Summary of results*

Item	Run number			Average
	1	2	3	
Date	7-21-71	7-21-71	7-22-71	
Test time, minutes	120	96	96	10
Furnace feed rate, tons/h dry solids	0.255	0.237	0.202	0.23
Stack effluent:				
Flow rate, dscfm	1,190	1,170	1,240	1,20
Flow rate, dscf/ton feed	280,000	296,000	368,000	315,00
Temperature, °F	99	99	95	9
Water vapor, volume %	3.92	4.90	3.48	3.8
CO_2, volume % dry	8.8	9.9	9.1	9.
O_2, volume % dry	6.3	7.4	8.2	7.
CO, volume % dry	0	0	0	
SO_2 emissions, ppm	8.29 to 11.2	14.8 to 14.8	14.2 to 15.4 17.8	13.
NO_x emissions, ppm	154 to 168	41.2 to 42.9	187 to 170 161	13
HCl emissions, ppm	0.780 to 260	4.16 to 1.56	2.35 to 2.09	2.2
Visible emission, % opacity	<10	<10	<10	<1
Particulate emissions:				
Probe and filter catch:				
gr/dscf	0.0551	0.0766	0.0545	0.062
gr/acf	0.0468	0.0650	0.0467	0.052
lb/h	0.562	0.768	0.579	0.636
lb/ton of feed	2.20	3.24	2.87	2.77
Total catch				
gr/dscf	0.0665	0.0859	0.0653	0.072
gr/acf	0.0565	0.0729	0.0559	0.061
lb/h	0.678	0.861	0.694	0.744
lb/ton of feed	2.66	3.63	3.43	3.24

Note.—dscfm indicates dry standard cubic feet per minute; dscf indicates dry standard cubic feet; acf indicates actual cubi feet.

Source: *Background Information for Proposed New Source Performance Standards,* EPA Report APTD-13526, June 1973 vol. 2, appendix.

opacity. The estimated costs of the scrubbing systems used as standard practice in the United State are typically about 4 percent of the total incineration facility for a plant serving 100,000 people. The scrubber required to achieve the proposed particulate standards would increase the cost an estimated 0.4 percent. Annual operating costs were estimated to be increased by 0.9 percent.[5]

Table 6.–*Sludge incinerator facility E: Summary of results*

Item	Run number			Average
	1	2	3	
Date	8-5-71	8-5-71	8-5-71	
Test time, minutes	96	96	96	96
Furnace feed rate, tons/h dry solids	0.689	0.855	0.290	0.611
Stack effluent:				
Flow rate, dscfm	9,840	8,510	10,290	9,547
Flow rate, dscf/ton feed	–	–	–	–
Temperature, °F	135	145	145	142
Water vapor, volume %	16.3	18.6	14.8	16.6
CO_2, volume % dry	4.2	4.3	2.2	3.6
O_2, volume % dry	14.9	14.9	16.9	15.6
CO, volume % dry	0	0	0	0
SO_2 emissions, ppm	2.01	2.07	2.12	2.07
NO_x emissions, ppm	62.8 to 46.0	93.5 to 75.8	44.3 to 54.7	61.2
HCl emissions, ppm	11.9	6.83	10.9	9.88
Visible emissions, % opacity	<10	<10	<10	<10
Particulate emissions:				
Probe and filter catch:				
gr/dsf	0.0260	0.0136	0.0134	0.0177
gr/acf	0.0196	0.0099	0.0101	0.0132
lb/h	2.19	0.99	1.18	1.45
lb/ton of feed	3.18	1.16	4.07	2.80
Total catch:				
gr/dscf	0.0335	0.0221	0.0170	0.0242
gr/acf	0.0252	0.0159	0.0128	0.180
lb/h	2.83	1.61	1.50	1.98
lb/ton of feed	4.11	1.88	5.17	3.72

Note.–dscfm indicates dry standard cubic feet per minute, dscf indicates dry standard cubic feet; acf indicates actual cubic feet.

Source *Background Information for Proposed New Source Performance Standards*, EPA Report APTD-13526, June 1973, vol. 2, appendix.

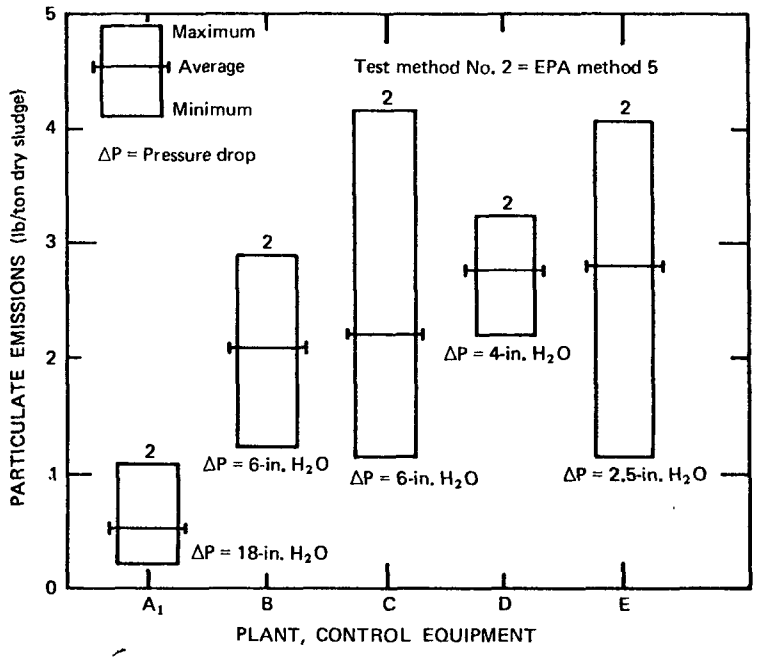


Figure 1. Particulate emissions from sludge incinerators at wastewater treatment plants. (See reference 4.)

METALS

Wastewater sludges contain metals that could be hazardous if discharged into the atmosphere. Unfortunately, there are very few data on the metals being discharged to the atmosphere from municipal sludge incineration. The forms in which metals are found in sludge will influence their behavior on incineration.[5] For example, if cadmium is present in the sludge in solution as cadmium chloride, it could volatilize upon incineration. If it is present as a precipitated hydroxide, it would probably decompose to the oxide, but would not volatilize at the temperatures of incineration. It is believed, however, that most of the hazardous or potentially hazardous metals, with the exception of mercury, will not disproportionately appear in stack gases because of volatilization, but will be converted to oxides and appear in the particulates removed by scrubbers or electrostatic precipitators and in the ash.

Some data are available on the discharge of manganese and nickel, which indicate the following emission rates from incinerator facilities with emission controls:

Metal	Emission factor range, millipounds per ton (dry solids)
Mn	0.5 to 1.6
Ni	.2 to 8.2

In both cases, the higher limit is represented by a single measurement.

Mercury is an example of a substance that presents special problems during incineration. High temperatures during incineration decompose mercury compounds to volatile mercuric oxide or metallic mercury.

Tests for mercury have been conducted by EPA[7] on 42 sewage treatment plant sludges. The mercury content ranged from 0.6 ppm to 43 ppm (in terms of dry solids) with an average value of 4.2 ppm. Tests on five incinerators equipped with scrubbers showed an average emission factor of 1.65 grams of mercury emitted to the atmosphere per metric ton of dry sludge incinerated. Mercury-removal efficiencies of water scrubbers varied from 68 to 96 percent. A study of the fate of mercury in municipal incineration plants has reported[8] that 9.7 percent of the mercury entering a multiple-hearth furnace at Palo Alto, Calif., escaped the wet scrubber and entered the atmosphere, 59 percent appeared in the furnace ash, and the remainder appeared in the scrubber underflow. In the same incinerator, only 0.84 percent of the lead in the sludge feed entered the atmosphere, with 88 percent in the ash and the rest in the scrubber underflow. The wet scrubber removed 93 percent of the lead and 76 percent of the mercury from the exhaust gases.

In accordance with Section 112 of the Clean Air Act Amendments of 1970, a national emission standard for mercury as a hazardous atmospheric pollutant resulting from sludge incineration was proposed on October 25, 1974. This proposed hazardous pollutant standard limits the atmospheric discharge of mercury from the incineration and drying of wastewater-treatment-plant sludges to a maximum of 3,200 g/d.[9] This limit is based on maintaining an average ambient mercury concentration of 1 $\mu g/m^3$ over a 30-day period. At an average emission rate (using wet scrubbers) of 1.65 grams of mercury per metric ton of dry solids incinerated, incineration facilities of 1,939 metric tons per day of dry solids (2,138 tons per day of dry solids) will approach this limit. There are, however, no known existing wastewater plants or new plants anticipated for use in the foreseeable future that will approach this size.

GASEOUS POLLUTANTS

Gaseous pollutants that could be released by sludge incineration are hydrogen chloride, sulfur dioxide, oxides of nitrogen, and carbon monoxide. Data are presented in tables 1-6 on the quantities of these materials found in stack gases. Carbon monoxide is no threat if the incinerator is properly designed and operated. Hydrogen chloride, which would be generated by decomposition of certain plastics, is not a significant problem at concentrations currently observed. Consideration of

the possibility of SO_2 and NO_x pollution is aided by examination of the sulfur and nitrogen content of sludges. Sulfur content is relatively low in most sludges. In addition, much of this sulfur is in the form of sulfate, which originated in the wastewater. Sulfur dioxide is not expected to be a serious problem. At San Mateo, Calif., the SO_2 discharge concentrations were found to be 10.2 ppm as compared to a 300-ppm standard.[10]

Sludge typically has a high nitrogen content from proteinaceous compounds and ammonium ion. Limited data are available for predicting whether a high proportion of these materials will be converted to oxides of nitrogen on combustion. From the data available, the concentration of oxides of nitrogen from sludge incineration should be less than 100 ppm from a properly operated incinerator, and were observed to be less than 10 ppm from facility A (table 1). Considering this low concentration, the production of oxides of nitrogen will probably not limit the use of incineration for disposing of sludge in most cases.

ORGANICS

In addition to the major air pollutants resulting from the burning of sludge, toxic substances can arise because of the content of pesticides or other organic compounds in the sludge. Unfortunately, very limited data are available on the concentrations of these materials in municipal sludges or their fate in an incinerator. Data reported by EPA,[5] in a random selection of sludges, showed the following levels of materials present in the raw sludges:

Compound	Range (ppm)
Aldrin	16 (in one sludge only)
Dieldrin	0.08 to 2.0
Chlordane	3.0 to 32
DDD	Not detected to 0.5
DDT	Not detected to 1.1
PCB's	Not detected to 105

Pesticide and polychlorinated-biphenyl (PCB) determinations were made on sludges collected during the incinerator tests at three of the five plants listed in tables 1-6.[5] PCB's were found in all of these sludges, but concentrations were low (1.2 to 2.5 ppm). Pesticides and PCB's were found only in the sludge. They were not found in the ash from either type incinerator, nor in the inlet or outlet scrubber water. Ash can be analyzed for these materials to the same degree of sensitivity as the sludge. A level of 0.1 μg/g (ppm) could easily have been detected. It is quite certain that these materials are not being carried out in the ash.

The mass flow rate of water to the scrubber is about 400 times the dry solids flow rate to the incinerator. Consequently, the concentration at which these materials can be detected in water must be sufficiently low to be sure that they are not escaping in the scrubber water. Fortunately, analytical techniques are such that these materials can be detected in water down to 0.1 ng/g (ppb). Thus, it is reasonable to believe that they are not in the scrubber water.

Since the PCB's do not appear in ash or scrubber water, they are either destroyed by incineration or remain as vapors in the water-scrubbed (and cooled) gas stream. All of these materials have some solubility in water, and it is likely that no trace would be present in the scrubber water. Conse-

quently, their escape as vapors from the incinerators seems unlikely. However, one should also examine the available data on the decomposition of PCB's and pesticides in other situations.

Rapid thermal degradation of most pesticides has been shown to begin at approximately 500° C with near total destruction at 900° C (1,652° F).[11,12] If these materials volatilize before burning, the use of afterburners on incinerators would be needed to provide complete destruction. One manufacturer of pesticides achieves near total destruction of pesticides in its multiple-hearth carbon regenerator by providing an afterburner using a 0.23-0.80-second retention time at 1,600° to 1,800° F.

The PCB's are even more thermally stable than most pesticides, as one would suspect. An incinerator at St. Louis, Mo., achieves total destruction of concentrated PCB's at 2,400° F with a retention time of 2.5 seconds. Experiments have shown, however, that 99 percent destruction is possible at 1,600° to 1,800° F in 2.0 seconds on pure PCB's.

Tests on municipal sludges[10] showed that total destruction of PCB was possible when oxidized in combination with sewage sludge and with an exhaust gas temperature of 1100° F versus 1600° F required when PCB's are handled separately. Ninety-five percent destruction of PCB's was achieved in a multiple-hearth furnace with no afterburning at the normal exhaust temperature of 700° F.

CONCLUSIONS

The EPA Sewage Sludge Incineration Task Force[5] concluded that it has been adequately demonstrated that existing well-designed and -operated municipal wastewater sludge incinerators are capable of meeting the most stringent particulate emission control regulation existing in any State or local control agency. This observation, coupled with the fact that the newly promulgated Federal NSPS are based on demonstrated performance of an operating facility, indicates that use of proper emission controls and proper operation of the incineration system will enable a facility to meet all existing particulate matter regulations. Although only the venturi scrubber (tables 1-6) met the promulgated standard in the EPA tests, EPA[4] has stated that—

> Impingement scrubbers tested by EPA did not meet the standard but, in our best judgment, would do so if used in conjunction with an oxygen meter that automatically regulates fuel burning rate. In our best judgment, electrostatic precipitators could also provide more than adequate control. There are no EPA test data on either of these control systems because during the test program there were no existing plants using them.

CASE HISTORIES

LIVERMORE, CALIF.

A recent evaluation[10] of the environmental impact of sludge incineration at Livermore, Calif., provides an interesting case history. Livermore proposed to install multiple-hearth furnaces for

sludge incineration and lime recalcining. Much of the offgas from the recalcining furnace will be recycled to the plant for recarbonation of the lime-treated wastewater. The Bay Area Air Pollution Control District (BAAPCD) adopted standards for discharge as shown in table 7. Also shown in table 7 are the results of analyses made at a nearby (San Mateo) multiple-hearth sludge incinerator. These test data and those presented in tables 2-6 indicate that little difficulty should be encountered in meeting particulate, hydrocarbon, and carbonyl standards with a properly designed and operated system. Of major interest in Livermore was the potential impact of NO_x, although there were no standards established. The relative contributions of NO_x in the Livermore valley from several sources were evaluated with the following results:

Source	Pounds NO_x per day
Automobiles	28,000
Sludge hauling	10
Sludge oxidation ...	50
Lime recalcining ...	12

The sludge-hauling value is only for the hauling of sludges to the border of the valley where it and the pesticides and PCB's it contains still must be dealt with in an environmentally acceptable fashion. In this example, the NO_x contribution from multiple-hearth incineration was slightly higher than the NO_x contribution from hauling only, but still was an insignificant fraction (0.2 percent) of the total NO_x discharge in the study area. The average per capita discharges of pollutants from automobiles and sludge incinerators were also calculated, and the results are shown in figures 2-4.

Table 7.—*Emission limits at Livermore, Calif.*

Test	Test results	Emission limits[1]
Hydrocarbons, C_2-C_6, ppm (dry basis) at 6 percent O_2	0.4 - 2.2	25
Total carbonyls, ppm (dry basis) at 6 percent O_2	3.4 - 7.6	25
Grain loading, gr/dscf[2] at 12 percent CO_2	0.017 - 0.021	0.15

[1] According to the California BAAPCD regulation 2 for units under 100 tons per day capacity with emissions adjusted to 6 percent O_2.

[2] dscf indicates dry standard cubic feet.

Source: F. P. Sebastian et al., "Sludge Incineration—Air Emission Standards vs. Technology—A Case Study," presented at Water and Wastewater Equipment Manufacturers Association Industrial Water and Pollution Conference and Exposition, Detroit, Mich., Apr. 1974.

PALO ALTO, CALIF.

Figure 5 illustrates the results obtained at Palo Alto, Calif., with a multiple-hearth furnace equipped with multiple-tray impingement scrubbers. Nitrous oxide emission at Palo Alto was only 0.037 g/day[10] as compared to 0.29 shown in figure 4 as a typical value. If this level of NO_x were achieved in the Livermore example discussed earlier, the NO_x discharge from incineration and recalcination would be even less than that from hauling alone.

REFERENCES

[1] "National Source Performance Standards, Municipal Incineration," *Fed. Reg.*, *36*, No. 247, 24876, Dec. 23, 1971.

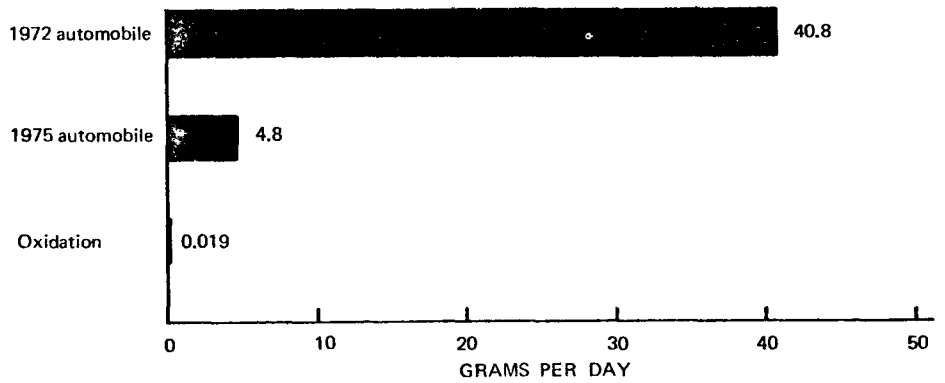


Figure 2. Relative per capita contributions of hydrocarbons from automobiles and sludge incineration. (See reference 10.)

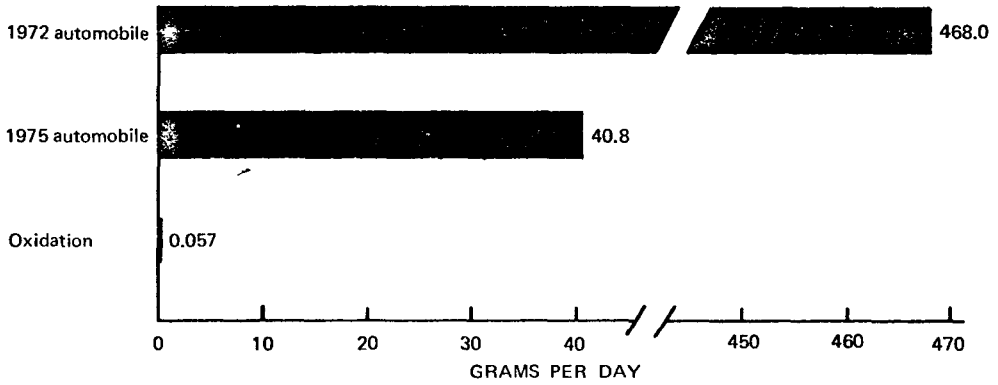


Figure 3. Relative per capita contributions of carbon monoxide from automobiles and sludge incineration. (See reference 10.)

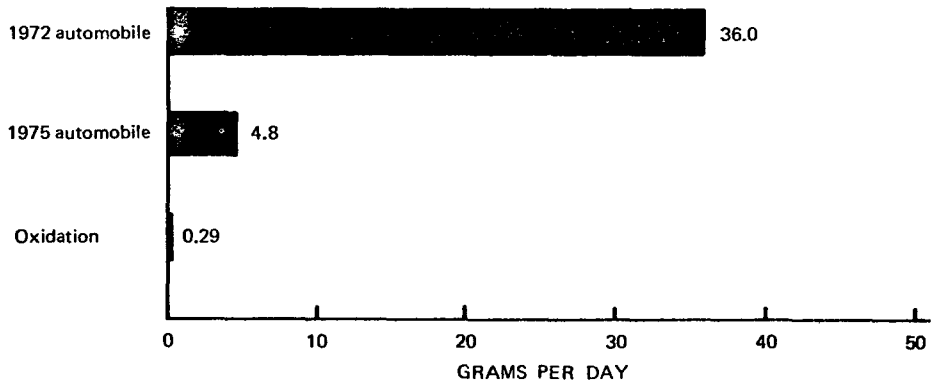


Figure 4. Relative per capita contributions of nitrogen oxides from automobiles and sludge incineration. (See reference 10.)

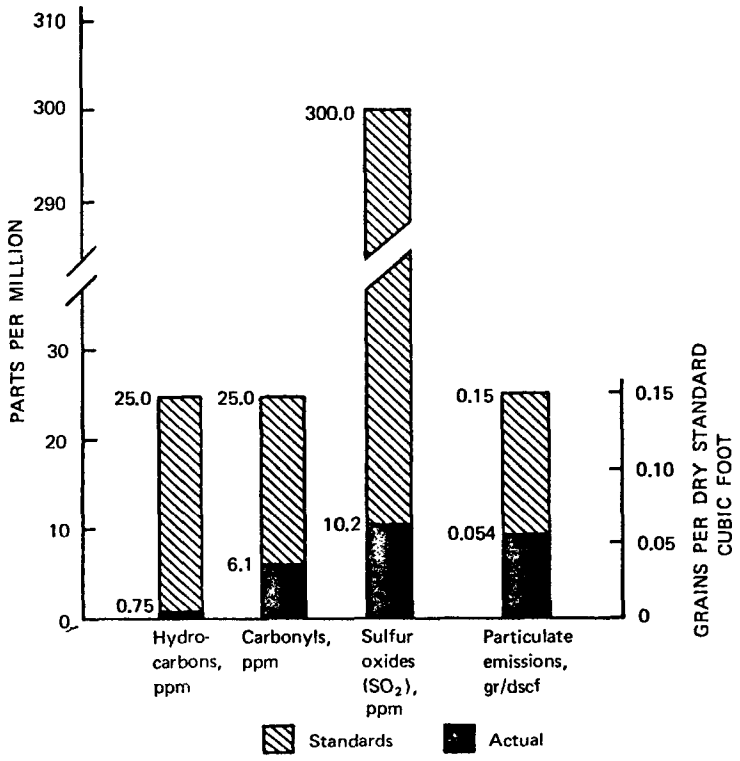


Figure 5. Standards and emissions from the Palo Alto multiple-hearth incinerator. (See reference 10.)

[2] S. Balakrishman, D. E. Williamson, and R. W. Okey, *State of the Art Review on Sludge Incineration Practice.* Federal Water Quality Administration Report 17070 olV 04/70, 1970.

[3] R. S. Burd, *A Study of Sludge Handling and Disposal.* Federal Water Pollution Control Administration Publication WP-20-4, May 1968.

[4] *Background Information for New Source Performance Standards,* EPA Report 450/2-74-003, APTD-1352C, Feb. 1974, vol. 3.

[5] Final report, "Sewage Sludge Incineration Task Force," EPA, Feb. 1970.

[6] *Background Information for Proposed New Source Performance Standards,* EPA Report APTD-13526, June 1973, vol. 2, appendix.

[7] *Background Information on National Emission Standards for Hazardous Air Pollutants—Proposed Amendments to Standards for Asbestos and Mercury,* EPA 450/2-74-009a, Oct. 1974.

[8] "A Study of Pesticide disposal in a Sewage Sludge Incinerator," Versar, Inc., Monthly progress report, EPA Contract No. 68-01-1587, Sept. 9, 1974.

[9] "Asbestos and Mercury—Proposed Amendments to National Emission Standards," *Fed. Reg.*, *39*, No. 208, pt. 2, 38064, Oct. 25, 1974.

[10] F. P. Sebastian et al., "Sludge Incineration—Air Emission Standards vs. Technology—A Case Study," presented at Water and Wastewater Equipment Manufacturers Association Industrial Water and Pollution Conference and Exposition, Detroit, Mich., Apr. 1974.

[11] *Basic Research on Equipment and Methods for Decontamination and Disposal of Pesticides and Pesticide Containers*, annual report, USDA Grant No. 12-14-100-9182(34), Mississippi State University, June 1968 to June 1969.

[12] *Organic Pesticides and Pesticide Containers—A Study of Their Decontamination and Combustion*, Foster D. Snell, Inc., final report, Bureau of Solid Waste Management Contract No. CPA-69-140, 1970.

METRIC CONVERSION TABLES

Recommended Units

Description	Unit	Symbol	Comments	Customary Equivalents
Length	metre	m	*Basic SI unit*	39 37 in.=3 28 ft= 1.09 yd
	kilometre	km		0.62 mi
	millimetre	mm		0.03937 in
	micrometre	μm		3 937 X 10^{3}=10^{3}A
Area	square metre	m^2		10 764 sq ft = 1.196 sq yd
	square kilometre	km^2		6.384 sq mi = 247 acres
	square millimetre	mm^2		0.00155 sq in
	hectare	ha	The hectare (10 000 m^2) is a recognized multiple unit and will remain in international use.	2.471 acres
Volume	cubic metre	m^3		35.314 cu ft = 1.3079 cu yd
	litre	l	The litre is now recognized as the special name for the cubic decimetre.	1.057 qt = 0.264 gal = 0.81 X 10^{-4} acre-ft
Mass	kilogram	kg	*Basic SI unit*	2.205 lb
	gram	g		0 035 oz = 15.43 gr
	milligram	mg		0.01543 gr
	tonne or	t	1 tonne = 1 000 kg	0.984 ton (long) =
	megagram	Mg	1 Mg = 1 000 kg	1.1023 ton (short)
Time	second	s	*Basic SI unit*	
	day	d	Neither the day nor the year is an SI unit but both are important.	
	year	year		
Force	newton	N	The newton is that force that produces an acceleration of 1 m/s^2 in a mass of 1 kg.	0 22481 lb (weight) = 7.233 poundals
Moment or torque	newton metre	N-m	The metre is measured perpendicular to the line of action of the force N. Not a joule	0.7375 ft-lbf
Stress	pascal	Pa		0.02089 lbf/sq ft
	kilopascal	kPa		0.14465 lbf/sq in

Recommended Units

Description	Unit	Symbol	Comments	Custom Equival
Velocity linear	metre per second	m/s		3 28 fps
	millimetre per second	mm/s		0.00328 f
	kilometres per second	km/s		2.230 mph
angular	radians per second	rad/s		
Flow (volumetric)	cubic metre per second	m^3/s	Commonly called the cumec	15,850 gp = 2.120 cf
	litre per second	l/s		15.85 gpm
Viscosity	pascal second	Pa-s		0.00672 poundals/
Pressure	newton per square metre or pascal	N/m^2 Pa		0.000145
	kilometre per square metre or kilopascal	kN/m^2 kPa		0.145 lb/s
	bar	bar		14.5 b/sq
Temperature	Kelvin	K	*Basic SI unit*	
	degree Celsius	C	The Kelvin and Celsius degrees are identical. The use of the Celsius scale is recommended as it is the former centigrade scale.	$\frac{5F}{9}$ – 17
Work, energy, quantity of heat	joule	J	1 joule = 1 N-m where metres are measured along the line of action of force N.	2.778 X 1 kw hr = 3.725 X 1 hp-hr = 0. ft-lb = 9.4 10^{-4} Btu
	kilojoule	kJ		2.778 kw-
Power	watt	W	1 watt = 1 J/s	
	kilowatt	kW		
	joule per second	J/s		

Application of Units

Description	Unit	Symbol	Comments	Customary Equivalents
Precipitation, run-off, evaporation	millimetre	mm	For meteorological purposes it may be convenient to measure precipitation in terms of mass/unit area (kg/m^3). 1 mm of rain = 1 kg/m^2	
River flow	cubic metre per second	m^3/s	Commonly called the cumec	35.314 cfs
Flow in pipes, conduits, channels, over weirs, pumping	cubic metre per second	m^3/s		
	litre per second	l/s		15.85 gpm
Discharges or abstractions, yields	cubic metre per day	m^3/d	1 l/s = 86.4 m^3/d	1.83 X 10^{-3} gpm
	cubic metre per year	m^3/year		
of water	litre per person per day	l/person day		0.264 gcpd
Density	kilogram per cubic metre	kg/m^3	The density of water under standard conditions is 1 000 kg/m^3 or 1 000 g/l or 1 g/ml.	0.0624 lb/cu ft

Application of Units

Description	Unit	Symbol	Comments	Custom Equival
Concentration	milligram per litre	mg/l		1 ppm
BOD loading	kilogram per cubic metre per day	kg/m^3d		0.0624 lb/ day
Hydraulic load per unit area; e.g filtration rates	cubic metre per square metre per day	m^3/m^2d	If this is converted to a velocity, it should be expressed in mm/s (1 mm/s = 86.4 m^3/m^2 day).	3.28 cu ft/
Hydraulic load per unit volume, e.g., biological filters, lagoons	cubic metre per cubic metre per day	m^3/m^3d		
Air supply	cubic metre or litre of free air per second	m^3/s l/s		
Pipes diameter	millimetre	mm		0.03937 in.
length	metre	m		39.37 in. = 3.28 ft
Optical units	lumen per square metre	lumen/m^2		0.092 ft candle/sq ft

ANNOTATED SUPPLEMENT
as of
September 1975

by

Frank P. Sebastian
Envirotech Corporation

EPA-625/4-75-009

AIR POLLUTION ASPECTS OF SLUDGE INCINERATION

ENVIRONMENTAL PROTECTION AGENCY • Technology Transfer

June 1975

1068

INTRODUCTION

Incineration offers the opportunity to reduce sludge to a sterile landfill and remove offensive odors, but it also has the potential to be a significant contributor to the air pollution problem in an urban community. The quantity and size of particulate emissions leaving the furnace of an incinerator vary widely, depending on such factors as the sludge being fired, operating procedures, and completeness of combustion. Incomplete combustion can form objectionable intermediate products, such as hydrocarbons and carbon monoxide. There is also the potential for discharge of air pollutants such as sulfur dioxide, nitrous oxides, and metals such as mercury.

PARTICULATE MATTER

New Source Performance Standards (NSPS) regulating discharges from municipal sludge incinerators have been promulgated by the Environmental Protection Agency (EPA). These standards limit the discharge of particulate matter from both new and modified sewage sludge incinerators. The process weight and opacity restrictions placed on this atmospheric pollution source are:[1]

- No more than 0.65 g/kg dry sludge input (1.30 lb/ton dry sludge input).
- Less than 20 percent opacity. Visible emissions caused solely by the presence of uncombined water are not subject to the opacity standard.

Available data indicate that, on the average, uncontrolled multiple-hearth incinerator gases contain about 0.6 grain of particulate per standard cubic foot of dry gas.[2] Uncontrolled fluid-bed reactor gases contain about 1.0 grain of particulate per standard cubic foot.[3] For average municipal wastewater sludge, these uncontrolled pollutant concentrations correspond to about 33 pounds of particulates per ton of sludge burned in a multiple hearth, and about 45 pounds of particulates per ton of sludge burned in a fluid-bed incinerator. Particulate collection efficiencies of 96 to 97 percent are required to meet the NSPS,[4] based on the above uncontrolled emission rate.

Sludge incinerators differ from most other types of incinerators in that the sludge does not normally supply enough heat to sustain combustion.[1] Furthermore, there is less emphasis on retaining it in the incinerator and much of it is discharged in stack gases. Particulate emissions to the atmosphere are almost entirely a function of the scrubber efficiency and are only minimally affected by incinerator conditions. Sludge incinerators in the United States are equipped with scrubbers of varying efficiency. These scrubbers range from simple spray-tower-type units to venturi-type scrubbers with pressure drops up to 40 inches of water.

Existing State or local regulations in the United States tend to regulate sludge incinerator emissions through incinerator codes or process weight regulations.[5] Many State and local standards are

1

* On page 11, the conclusion of this report states, "The EPA Sewage Sludge Incineration Task Force concludes that it has been adequately demonstrated that existing well-designed and operated municipal sludge incinerators are capable of meeting the most stringent particulate emission control regulation existing in any state or local control agency".

* EPA Task Force paper, "Sewage Sludge Incineration," March 1972, found very little SO_2 in exhaust gases. In addition, use of scrubbers serves to reduce SO_2 emissions even further.

The San Francisco Bay Area Air Pollution Control District has ruled that multiple hearth incinerators as installed at Palo Alto, Calif. are an insignificant source of nitrous oxide emissions (see comment on the left bottom of this page).

The 1972 EPA Task Force paper mentioned above also concluded that emissions of metals were low in multiple hearth furnaces.

* The proposed EPA standards on mercury (see page 9) of 3200 grams per day are so great that there are no known existing wastewater plants, nor are there new plants anticipated, that would approach the size where mercury would be a limitation on sludge incineration.

* There is no visible plume on the modern multiple hearth furnaces, which meet today's standards.

* No furnaces without air cleaning systems have been built since 1963 - over 12 years, and with the issuance of the NSPS, there is no possibility that a sludge furnace is going to be built without a proper scrubber being incorporated into the system.

* The San Francisco Bay Area Air Pollution Control District has deemed multiple hearth incinerators, such as the installation at Palo Alto, California, to be an insignificant source of air pollution on January 18, 1973.

* Normally with a solids content of 25% or higher, combustion can be sustained without additional fuel.

The results of these tests are shown in tables 1 to 6. Figure 1 summarizes the results of the particulate measurements. The results from the unit using a venturi scrubber operating at 18-inch water pressure drop were used as the basis for the standard. The other systems using other types of scrubbers operating at lower pressure drops failed to meet the promulgated NSPS of 1.3 lb/ton dry sludge input. The study of these facilities indicated no relationship between the mass emission rates and the percent of rated capacity at which the incinerator was operating, but a strong relationship between pressure drop across the scrubber and mass emission rates was found.[4] All of the systems easily met the opacity standard. Observations at 15 other facilities indicated they all met a 10-percent

* As previously mentioned, modern multiple hearth furnaces have no visible plume.

1070

opacity. The estimated costs of the scrubbing systems used as standard practice in the United States are typically about 4 percent of the total incineration facility for a plant serving 100,000 people. The scrubber required to achieve the proposed particulate standards would increase the cost an estimated 0.4 percent. Annual operating costs were estimated to be increased by 0.9 percent.[5]

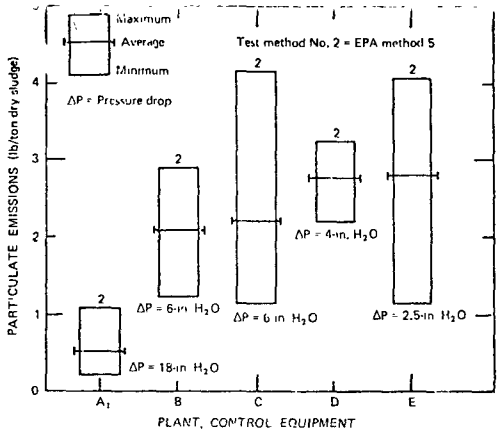


Figure 1 Particulate emissions from sludge incinerators at wastewater treatment plants (See reference 4.)

1071

METALS

Wastewater sludges contain metals that could be hazardous if discharged into the atmosphere. Unfortunately, there are very few data on the metals being discharged to the atmosphere from municipal sludge incineration. The forms in which metals are found in sludge will influence their behavior on incineration.[5] For example, if cadmium is present in the sludge in solution as cadmium chloride, it could volatilize upon incineration. If it is present as a precipitated hydroxide, it would probably decompose to the oxide, but would not volatilize at the temperatures of incineration. It is believed, however, that most of the hazardous or potentially hazardous metals, with the exception of mercury, will not disproportionately appear in stack gases because of volatilization, but will be converted to oxides and appear in the particulates removed by scrubbers or electrostatic precipitators and in the ash.

* Please note that this comment on mercury, which is based on the 1972 EPA Task Force Document, "Sewage Sludge Incineration", was written before the proposed amendments to the standards for mercury were published in October 1974 (see reference 7). These new data - which are reported on page 9 - show that from 68% to 96% of the mercury in the exhaust gases are actually removed in the scrubbers. This is a new development and contrary to conventional wisdom on this subject prior to 1974.

emission rates from incinerator facilities with emission controls.

Metal	Emission factor range, millipounds per ton (dry solids)
Mn	0.5 to 1.6
Ni	2 to 8.2

In both cases, the higher limit is represented by a single measurement.

Mercury is an example of a substance that presents special problems during incineration. High temperatures during incineration decompose mercury compounds to volatile mercuric oxide or metallic mercury.

Tests for mercury have been conducted by EPA[7] on 12 sewage treatment plant sludges. The mercury content ranged from 0.6 ppm to 43 ppm (in terms of dry solids) with an average value of 4.2 ppm. Tests on five incinerators equipped with scrubbers showed an average emission factor of 1.65 grams of mercury emitted to the atmosphere per metric ton of dry sludge incinerated. Mercury removal efficiencies of wet scrubbers varied from 68 to 96 percent. A study of the fate of mercury in municipal incineration plants has reported[8] that 9.7 percent of the mercury entering a multiple-hearth furnace at Palo Alto, Calif., escaped the wet scrubber and entered the atmosphere. 59 percent appeared in the furnace ash, and the remainder appeared in the scrubber underflow. In the same incinerator, only 0.81 percent of the lead in the sludge feed entered the atmosphere, with 88 percent in the ash and the rest in the scrubber underflow. The wet scrubber removed 93 percent of the lead and 73 percent of the mercury from the exhaust gases.

In accordance with Section 112 of the Clean Air Act Amendments of 1970, a national emission standard for mercury as a hazardous atmospheric pollutant resulting from sludge incineration was proposed on October 25, 1974. This proposed hazardous pollutant standard limits the atmospheric discharge of mercury from the incineration and drying of wastewater-treatment-plant sludges to a maximum of 3,200 g/d.[9] This limit is based on maintaining an average ambient mercury concentration of 1 $\mu g/m^3$ over a 30-day period. At an average emission rate (using wet scrubbers) of 1.65 grams of mercury per metric ton of dry solids incinerated, incineration facilities of 1,939 metric tons per day of dry solids (2,138 tons per day of dry solids) will approach this limit. There are, however, no known existing wastewater plants or new plants anticipated for use in the foreseeable future that will approach this size.

1072

* As mentioned previously, the proposed EPA mercury emission standard (see page 9) is 3200 grams per day which is so great that, according to the EPA background document referred to before (see reference 7), there are no known existing wastewater plants, nor are there new plants anticipated, that would approach the size where mercury would be a limitation on sludge incineration. In the comments below, it is stated that the total percent of mercury which is lost to the atmosphere is less than 3%. Accordingly, 3% of the small mercury concentrations given does not warrant mercury as a significant problem for incineration.

* Envirotech installations using multiple hearth furnaces were shown to have mercury removal efficiencies of 83 - 96 percent in the EPA Durham tests (reference 7).

* Actually, this represents less than 3% loss in the air stream. The remaining 6.7% or so is in the scrubber underflow and is returned to the headworks.

* In subsequent tests, no Hg was detected in ash.

GASEOUS POLLUTANTS

Gaseous pollutants that could be released by sludge incineration are hydrogen chloride, sulfur dioxide, oxides of nitrogen, and carbon monoxide. Data are presented in tables 1.6 on the quantities of these materials found in stack gases. Carbon monoxide is no threat if the incinerator is properly designed and operated. Hydrogen chloride, which would be generated by decomposition of certain plastics, is not a significant problem at concentrations currently observed. Consideration of

me the available data on the decomposition of PCB's and pesticides in other situations.

Ra hermal degradation of most pesticides has been shown to begin at approx ately 500° C with t otal destruction at 900° C (1,652° F)[11,12] If these materials volatilize before burning, the use of afterburners on incinerators would be needed to provide complete destruction One manufacturer of pesticides achieves near total destruction of pesticides in its multiple-hearth carbon regenerator by providing an afterburner using a 0 23-0 80-second retention time at 1,600° to 1,800° F

The PCB's are even more thermally stable than most pesticides, as one would suspect An incinerator at St Louis, Mo , achieves total destruction of concentrated PCB's at 2,400° F with a retention time of 2 5 seconds Experiments have shown, however, that 99 percent destruction is possible *at 1,600° to 1,800° F in 2 0 seconds on pure PCB's.*

Tests on municipal sludges[10] showed that total destruction of PCB was possible when oxidized in combination with sewage sludge and with an exhaust gas temperature of 1100° F versus 1600° F *required when PCB's are handled separately Ninety-five percent destruction of PCB's was achieved* in a multiple hearth furnace with no afterburning at the normal exhaust temperature of 700° F.

* Carbon regeneration will be re ized as a pyrolysis process that is different from co-incineration of PCB's with sludge. In such processes, PCB's and organic materials are volatilized to save the carbon in a manner where the organics are later burned in a separate chamber. Such data serves a constructive purpose by showing that PCB's and pesticides can be removed from waste streams through the use of carbon and then decomposed. However, the present state of technological advancement in the co-incineration of pesticides and PCB's with sludge is represented by the last sentence in the paragraph.

CONCLUSIONS

The EPA Sewage Sludge Incineration Task Force[5] concluded that it has been adequately demonstrated that existing well designed and operated municipal wastewater sludge incinerators are capable of meeting the most stringent particulate emission control regulation existing in any State or local control agency This observation, coupled with the fact that the newly promulgated Federal NSPS and based on demonstrated performance of an operating facility, indicates that use of proper emission controls and proper operation of the incineration system will enable a facility to meet all existing particulate matter regulations Although only the venturi scrubber (tables 1-6) met the promulgated standard in the EPA tests, EPA[4] has stated that—

> Impingement scrubbers tested by EPA did not meet the standard but, in our best judgment, would do so if used in conjunction with an oxygen meter that automatically regulates fuel burning rate In our best judgment, electrostatic precipitators could also provide more than adequate control There are no EPA test data on either of these control systems because during the test program there were no existing plants using them

* The EPA Draft Technical Bulletin on Sludge *Disposal (November 5, 1974) reflects this* technological development as follows:

"If the PCB's exceed 25 mg/kg dry sludge then special measures should be taken to ensure at least 95 percent destruction of organic compounds in incineration."

The EPA Document "Sewage Sludge Incineration (March 1972), reports that the concentrations of PCB's in most sludge samples are on the order of 1-4 mg/kg dry solids. As a consequence, virtually all multiple hearth incinerators could be run at these reduced temperatures, at substantial energy savings over the higher temperatures required for other processes.

CASE HISTORIES

LIVERMORE, CALIF

A recent evaluation[10] of the environmental impact of sludge incineration at Livermore, Calif., provides an interesting case history Livermore proposed to install multiple hearth furnaces for

1073

Exhibit 4

SLUDGE INCINERATION SYSTEMS FOR PURIFICATION AND RESOURCE RECOVERY

by

Frank P. Sebastian
Member, Working Party

Senior Vice President
Envirotech Corporation
Menlo Park, California

Working Party for the Prevention of Pollution from
Municipal and Industrial Sources

SLUDGE SYMPOSIUM
Moscow
May 12-27, 1975

under

USSR/USA ENVIRONMENTAL AGREEMENT

SLUDGE INCINERATION SYSTEMS FOR
PURIFICATION AND RESOURCE RECOVERY
by
Frank P. Sebastian

Introduction

In the treatment of wastes at a sewage treatment plant, following the various dewatering processes waste solids and water still remain for disposal. More stringent laws and codes have reduced freedom of choice in disposing of such waste solids or sludge.

In a study for a midwestern U.S. town, Weller and Condon reported relative costs for various systems as follows:

System	Original Cost	Annual Cost
Dewatering and Incineration of Raw Solids	1.0	1.0
Digestion, Mechanical Dewatering and Land filling	1.05	1.41
Digestion, Mechanical Dewatering and Incineration	1.43	1.38
Wet Combustion and Effluent Treatment	1.97	1.54

This paper will review sludge incineration and heat treatment for conventional primary secondary systems, and incineration and reclamation for advanced physical chemical systems, particularly as regards their environmental impact.

Uses

The multiple hearth furnace is versatile, although originally developed

in 1889 as a furnace to roast pyrites for the manufacture of sulfuric acid. The modern multiple hearth system has been adapted to over 120 proven uses, including:

1. Burning (or drying) raw sludge, digested sludge, and sewage greases;
2. Recalcining lime sludge and waste pond lime;
3. Reclaiming fruit, nut and lumber waste (peach pits, walnut shells, almond shells, sawdust and bark) for charcoal briquettes, and reclaiming cryolite and aluminum smelting operations;
4. Regeneration of spent activated granular carbon and diatomaceous earth;
5. Other uses: mercury, molybdenum sulfide, carbon, magnesium oxide, uranium, yellow cake, nickel.

The multiple hearth furnace itself is a simple piece of equipment, consisting primarily of a steel shell lined with refractory on the inside. The refractory can be either castable or in brick form, depending upon the size of the furnace. The interior is divided by horizontal brick arches into separate compartments called hearths. Alternate hearths have holes at the periphery to allow the feed solids to drop onto the hearth below. The center shaft, driven by a variable speed motor, rotates the rabble arms situated on each hearth. The rabble teeth on these arms are placed at an angle such that the material is moved inwards and then outwards on alternate hearths. The shaft and rabble arms are cooled by air introduced at the bottom. This air may be recycled as required by the thermal process (Exhibit 1).

The sludge is fed through an inlet in the furnace roof by a screw feeder, or belt and flapgate. The rotating rabble arms and rabble teeth push the

sludge across the hearth to drop holes where it falls to the next hearth and continues to the next hearth and the next, until the ash is discharged at the bottom.

The multiple hearth system has three distinct operating zones: the top hearths where the feed is dried to approximately 48% moisture; the incineration/deodorization zone where temperatures of 760°-982°C (1400°-1800°F) are maintained, and the cooling zone where the hot ash gives up heat to the incoming combustion air. The warmed air rises to the combustion zone in counterflow style and the hot combustion gases sweep over the cold incoming sludge, evaporating the sludge moisture to about 48%, at which point a phenomenon called "thermal jump" can occur in the beginning of the combustion zone. This beneficial exchange of energy allows odorfree exhaust gas and temperatures of 260°-593°C (500°-1100°F). The typical temperature profile across the sludge furnace is as follows:

Hearth No.	Approx. Half Capacity - °C	°F	Nominal Design Capacity - °C	°F
1	354	670	426	800
2	748	1380	648	1200
3	848	1560	898	1650
4	787	1450	787	1450
5	648	1200	648	1200
6	163	325	148	300

Thermal oxidation is reaching new high levels of technology and performance not generally realized even in technical circles. New data recently developed answer favorably for the first time many questions that have surrounded the impact on air quality from such thermal processing systems. In addition, favorable benefits such as energy reclamation and ash utilization from the

burning of sludge have become a reality in these sludge processing units.

Sludge Incineration/Reclamation Benefits

* Meets EPA air standards - particulates
* Ruled insignificant source of emissions
* Decomposes PCB's (polychlorinated biphenyls)
* Decomposes pesticides - DDT, 2,4,5-T
* Produces ash product - quasi-fertilizer
* Recovers resources - CO_2, lime
* Controls heavy metals
* Energy reclamation - Closed Loop Energy System

The most comprehensive study that has been done to date on sludge incineration was by the EPA Sludge Task Force, the report on which was published in August 1972. It included a survey of ten furnaces throughout the United States, including, for example, installations at Monterey and South Lake Tahoe, California. The Task Force study also included a report of the sludge, ash and air emission, and of air pollutants and toxics.

The Monterey sludge incineration building was converted from an existing digester to house the incineration unit. It is located on the edge of Monterey Bay where raw sludge used to be dumped.

The South Lake Tahoe Water Reclamation Plant is one of the most advanced wastewater treatment plants in the world. The solids handling building contains a sludge incineration furnace and a lime recalcination furnace.

The EPA Task Force conclusions were:

* Incineration is an acceptable alternative for sludge disposal.
* Air emissions acceptable:

  NO_x
  SO_x
  Odors
  Particulates

* Apparent destruction of pesticides/PCB's

The information presented here is principally an update of several key points that were included in the EPA Task Force report.

EPA Task Force Abstract

A Task Force was established within the Environmental Protection Agency to evaluate sludge incineration as an acceptable alternative to sea disposal. Multiple-hearth and fluidized bed furnaces, containing scrubbing devices for particulate removal, were selected for performance evaluation. The sludge, particulate, stack gas, scrubbing liquid, and ash were sampled, and analyzed for heavy metals, pesticides and oxides of nitrogen and sulfur. The results indicated that incinerators are capable of achieving low emission concentrations for the common pollutants. Particulate samples showed a measurable concentration of lead. The ash samples normally showed a higher concentration of the heavy metals when compared with the sludge samples; however, mercury was one of the exceptions and was not detectable in the ash sample and assumed as lost to the stack gases. The pesticides and PCB, present in the sludge, were not detectable in either the ash or the scrubbing water, and indicated complete destruction. The study demonstrated that well designed and operated municipal sewage sludge incinerators can meet the most stringent existing particulate emission control regulation.

Since the Task Force published the report on its findings, there have been new test results pertaining to PCB's, pesticides, lead and mercury. The new data show that the air quality impact can be even further reduced over the Task Force data. In addition, the fate of PCB's became the pivotal

issue of the report insofar as fuel conservation was concerned. These concerns have now been relaxed.

The Task Force report recommended that, to be certain of complete decomposition of PCB's found in a sludge furnace, exhaust gases should be raised to 871°C (1600°F) for two seconds.

The Task Force further reported that PCB's were found to range from "not detected" in mountainous areas to 105 PPM in industrial areas where PCB's were used in manufacturing processes. The 871°C (1600°F) temperature requirement, if imposed, would have meant as much as a four-fold increase in the fuel cost of a typical sludge incinerator at that time.

As soon as a copy of the preliminary Task Force report was received, in February 1972, Envirotech immediately undertook an independent study and found virtually complete destruction of PCB's at 593°C (1100°F) in only one-tenth of a second, and 95% decomposition under normal operations. This information was presented to the EPA and in November 1974 the draft EPA Technical Bulletin on Sludge Disposal revised the guidelines as follows: (1) check to determine if the PCB content in sludge exceeds 25 milligrams per kilogram, and (2) if it does, use a process that assures 95% decomposition. Since the new data showed that this can be achieved at the normal operating parameters of a multiple hearth furnace, no extra fuel is required to eliminate the PCB's even when the sludge contains more than 25 milligrams per kilogram.

The tests that led to this new guideline were conducted by injecting PCB's into the sewage sludge at the San Mateo, California furnace.

* 4500 PPM of Therminal FR-1 was injected into the sludge feed;
* The furnace was operated at normal temperatures with internal temperatures of

  815°C (1500°F) to 926°C (1700°F)
* Four different afterburner temperatures were used to develop sample decomposition data:

  337°C (640°F)

  365°C (690°F)

  493°C (920°F)

  632°C(1170°F)
* The analysis was done by certified independent laboratories.

The results showed what 95% of the PCB's were destroyed at 371°C (700°F) using 0.1 second exhaust gas detention time. At 593°C (1100°F), 99.9% of all PCB's were destroyed, also at an exhaust gas detention time of 0.1 second.

What is the significance of PCB in sludge? Perhaps it would be helpful to review briefly some background information on PCB. PCB's have some unique properties that have made them very useful in industrial applications for the last forty years. PCB's were first produced commercially in the U.S. in 1929. Since then they have been produced by one U.S. manufacturer and several manufacturers outside the U.S.

The main properties that distinguish PCB's are: they are inert chemicals; they are insoluble in water; they are adhesive; they are extremely heat resistant; and they are toxic to many organisms. Chemically, they are

very similar to the well known chlorinated hydrocarbons or pesticides. Due to their remarkable stability, PCB's have found many uses, particularly in industry.

The major user of PCB's has been the electrical equipment industry, followed by heat transfer systems, use as hydraulic fluid, and, finally, use as plasticizers which originally, but no longer, included carbonless carbon paper, and in paints and glues. In 1966, PCB's were first identified as being present in some food products and, since, have been found throughout the environment.

Based on these findings, the sole producer of PCB's in the United States voluntarily limited production of these chemicals in 1971. The latter three of these uses have been severely limited and suitable substitutes have been found for the PCB's. At this time, the U.S. government is recommending the use of PCB's only in electrical equipment, such as transformers and capacitors, which presently have no suitable substitute for PCB's.

A U.S. government interdepartmental task force on PCB's identified where PCB's exist in the environment. It was estimated that in North America the air environment contains 20,000 tons of PCB's; land environment, 250,000 tons; and the water environment, 30,000 tons. These totals represent a great majority of the PCB's that have been produced in the last forty years. Worldwide totals for these three sectors of the environment would run much higher. Significant to this report is that the government pinpointed the principal means of cycling through the environment for PCB's as being in wastewater systems.

The cycle consists of waste streams, receiving waters, fish, animals and, finally, man. PCB's, like their close pesticide relatives, the DDT, DDD, dieldrin-chlorinated hydrocarbons, tend to concentrate in the higher levels of the food chain and in the fatty tissues of animals. The cycle begins with waste streams from industrial manufacturing or accidental spills into sewers or streams. From there the PCB's enter receiving waters where aquatic organisms ingest them, and as mentioned above they concentrate in the top of the food chain. Also, wildlife, which increasingly serve man as an early warning system, take in PCB's and concentrate them in their bodies when they consume water laced with PCB.

Finally, the chemicals find their way into man. The U.S. government does not believe that PCB's represent an immediate threat to human health. However, this tendency to concentrate in the food chain, plus the long lived characteristics of PCB's make them a long range threat. The U.S. government has recognized them as such and some New York reports show a direct correlation in fish with age.

In September 1972 a United States Geological Survey report made headlines in the newspapers across the U.S. A survey of streams and lakes in 39 states detected PCB's in 17 of the 39 states. In many places where PCB's would not be expected to exist, such as remote lakes and rivers, scientists were surprised to find PCB's present.

This omnipresence, coupled with the non-biodegradability, is obviously the reason the U.S. EPA is concerned about the fate of PCB in sludges. Fortunately, the current sludge incineration technology has been shown to

offer a safe alternative to eliminate any concern over PCB contamination in the air or on land from that process.

Air Quality Impact

For comparison with stringent air quality regulations, further tests were conducted at the same San Mateo installation. The air quality tests there were also very favorable. Three tests for hydrocarbons showed 0.7, 2.2 and 0.4 PPM, and three tests for carbonyls showed 3.4, 7.6 and 3.4 PPM - all very low fractions of the 25 PPM allowable for the Bay Area Air Pollution Control District (BAAPCD). Similar low values were obtained for particulates - .019, .021 and .017 PPM compared to the .125 allowable of 0.15 in terms of grains per standard dry cubic foot.

To offer some perspective as to how significant incineration impact is on air quality, a comparison can be made on a per capita or person versus per automobile impact on air quality, using a typical U.S. automobile traveling 12 miles per day. Taking the actual U.S. standards on hydrocarbons, hydrocarbon emissions for 1970 U.S. cars were 55.2 grams, in 1975 18.0 grams, and 1977 standards were 4.89 grams - a substantial reduction (Exhibit 2). On a per capita basis, the air impact from incineration is .019 grams per day per person. The carbon monoxide comparison is similar, at 564, 180 and 40.8 grams per day emissions for an automobile, and only .057 grams per person per day from incineration.

Nitrogen oxide carries a similar story: improvements from 49.2 in 1970 to 37.2 grams in 1975, and 24.0 grams in 1977. The impact per person is 0.29 grams.

The Tahoe plant, mentioned earlier, was one of the plants studied by the Task Force. This plant was a conventional activated sludge plant that has been upgraded by adding lime and carbon tertiary treatment to produce an ultra high quality effluent water. The effluent water will meet U.S. "laboratory tests" for drinking water standards. The sparkling product is pumped to a new 3.785 million cubic meter, one billion gallon reservoir, Indian Creek, where it is used for trout fishing, recreation and crop irrigation.

This advanced facility is frequently visited by both U.S. and foreign environmental groups and has been inspected by several Soviet delegations under the USSR/USA Environmental Agreement. It was our honor to host Dr. Yury Izrael's delegation there in July 1973 and the Working Party for Prevention of Pollution in October 1974. During these visits we sipped together "Tahoe champagne" as the reclaimed water is called by the local plant operators.

Further, environmental impact improvements have been achieved since Tahoe was built, as the EPA Task Force report mentioned. Two 5.71 meter, 18.75 ft. 6-hearth furnaces were under construction when the BAAPCD reduced its allowables in 1970. Tests were conducted on the improved Palo Alto furnace design following completion in 1973. The actual emissions were a small fraction of the reduced allowables for hydrocarbon emission, carbonyls, SO_2 (a new requirement) and particulates (Exhibit 3).

About the time that the Palo Alto tests were completed, Livermore, California, a small community east of San Francisco, was denied a permit to

build its wastewater treatment plant as required under the Clean Water Act. This was due to the fact that this valley, which is famous in the U.S. for its white wine, was already exceeding the secondary air quality standards. Therefore, no more construction could be started, not even to clean up the wastewater. At the invitation of the municipality and its consulting engineer, the impact on air quality from the new Palo Alto furnace was presented to the Bay Area Air Pollution Control District Board (Exhibit 4). A study showed that in the Livermore valley automobiles were the source of 28,000 pounds per day of NO_x emissions. If sludge were hauled from a treatment plant by truck, emissions from the truck would be ten pounds per day into the valley, traveling just to the edge of the valley, and the truck would still have to be driven some additional distance where it could be unloaded. Within the valley itself there would be a ten pound NO_x impact.

Earlier data indicated that 62 pounds per day of NO_x would be emitted from the sludge incinerator if lime reclamation were included with it, compared to 50 pounds per day for sludge only. However, based on the Palo Alto plant performance, it was determined that the NO_x impact on the valley would be about the same whether incinerated or hauled away by truck. Here again, this does not include the truck emissions outside the rim of the valley. Based on these results, the Bay Area Pollution Control District ruled that sludge incineration was an insignificant source of emission and no permit was required to proceed to build the waste treatment plant.

A further comparison of air emissions on a per capita basis with the automobile on a per day basis shows the NO_x emissions, based on the Palo Alto

tests, were .037 grams per day per person, and a 1976 automobile traveling 12 miles per day is estimated to emit .4 grams per mile of NO_x. Sludge incineration emissions per capita are about equal to driving a U.S. car one-tenth of a mile.

The test results from San Mateo and Palo Alto were studied by EPA personnel concerned with solid waste and the disposition of residuals.

EPA concerns involved excess DDT which has been banned in the U.S. and also disposition of the pesticide 2,4,5-T. The Solid Waste Division of EPA was interested in the possibility of injecting DDT into sludge as a means of processing DDT through the furnace to remove it from the environment. The EPA contracted for tests to be performed by Versar, Inc., an independent laboratory. Following pilot scale tests, full scale tests were run at the Palo Alto installation. DDT was injected into the sludge (Exhibit 5) at the rate of 908 grams per hour. The ash at the bottom of the furnace contained 0.000027 grams/hour. In the airstream with no afterburner operating there was 0.0044 grams per hour and 3 grams per hour were contained in the scrubber water which is returned to the headworks. The overall removal or decomposition efficiency was determined to be 99.669%. With the afterburner operating there was 0.0036 grams/hour in the ash, 0.0146 grams/hour in the airstream and 0.00039 grams/hour in the scrubber water. The overall removal efficiency was 99.99%. It was concluded that any DDT that is normally contained in the sludge is destroyed in the furnace, and that additional DDT up to 5% that might be added to the sludge would also be similarly decomposed. Similar tests were conducted for 2,4,5-T with similar results - 99.989% decomposition (Exhibit 6).

There has been some expressed concern about the fate of heavy metals that might be contained in sludge.

In connection with the fate of mercury in municipal incinerators, the EPA has recently published results of tests on several sludge incinerators including Envirotech installations at South Lake Tahoe and Monterey, California. The results show, contrary to conventional thinking up to now, that the mercury in the sludge exhaust gases is substantially removed in the scrubber (Exhibit 7).

At the Lake Tahoe furnace the sludge feed was 28.0 grams/day and 26.805 grams/day or 96% of the mercury was removed from the exhaust gases. At Monterey, California 62.5 grams/day of mercury was contained in the sludge feed and 51.68 grams/day or 83% was removed by the scrubber.

The proposed EPA standard for mercury emissions is 3200 grams/day based on the typical range of 5-15 PPM of mercury found in sludge. No constraint of sludge incineration is foreseen due to mercury in the sludge (Exhibit 8).

Prior to these tests it was generally assumed that all mercury in the sludge was vaporized and passed out of the furnace with the gas. Now it is known through these tests that the mercury vapors will be substantially removed in the form of gases and contained in the scrubber water which is returned to the headworks of the plant for further treatment.

A further example of mercury removal is shown by the EPA - Georgia's Company funded project to recover mercury from chlorine plant wastes at Burlingame, Washington. Over 99% recovery of mercury is achieved through the incineration of MHF to process sludge wastes from the chlorine plant.

Lime Reclamation

In these energy and material conscious days, reclamation is all important. Reclamation in the multiple hearth furnace is a normal operating procedure. For instance, the Lake Tahoe Water Reclamation Plant uses a separate multiple hearth furnace to recalcine or reclaim lime that is used in the treatment process. Since this is a manufacturing process - that is, taking the lime-rich sludge and reclaiming the valuable lime treatment chemical - it does not fall under the sludge furnace air quality regulations. A further benefit of reclaiming lime is that there is a unique opportunity to lower emissions to the atmosphere in the process. When lime is added to facilitate settling of the solid matter, the alkalinity pH of the wastewater is raised substantially. In order to reduce the pH, the exhaust gases from the furnace are highly cleansed in the methods already described - they are not released to the atmosphere but are reused. To capture the CO_2 that is required by the process, the gases are compressed and bubbled into the bottom of a recarbonation basin where the CO_2 and trace components in the gases are transferred to the wastewater. Thus, the gases are further scrubbed clean. This system has been in operation at the South Lake Tahoe Water Reclamation Plant since 1968.

Energy Reclamation

A further industry development is that of energy reclamation from sewage plants. In addition to the reclamation of the fuel value of sewage sludge to reclaim chemicals on site for reuse, a further step has been taken in three municipal plants currently under construction involving the use of

third generation multiple hearth furnace systems which we call Closed Loop (Exhibit 9).

Energy Systems/ In these systems a sludge heat treatment step is installed to break loose the water bound in the biological cells to enable normal dewatering equipment (vacuum filters or centrifuges) to be used to obtain up to a 250% increase in the normal solids content of the sludge. This brings the sludge to a fuel value approximately equal to that of soft coal. The heat treated sludge is then processed through a similar but differently designed furnace to convert itself to a sterile but potentially useful ash without the need for auxiliary operating fuels and with sufficient heat left over to provide process heat and steam at the treatment plant.

Three sludge handling and disposal systems, designed with a "closed circuit energy loop" to conserve fuel, are currently under construction in the U.S. for Granite City, Illinois; Chesapeake-Elizabeth, Virginia; and the Western Branch Plant at Prince Georges, Maryland.

Granite City, Illinois

At Granite City the existing wastewater facility is currently being upgraded with activated sludge treatment to handle the 23 MGD flow and to treat sludge in a "recuperative" BSP system. The influent consists primarily of domestic waste with a small industrial component.

This system includes:

* Two 6000 GPH BSP Heat Treatment units to thermally condition hydrous sludges using waste heat recovered from the furnace.
* One 18'9" ø x 7 hearth furnace designed to reduce 11,000 lb/hr of cake to 1000 lb/hr inert ash without use of support fuel.
* One heat recovery boiler to convert the furnace's 16.9 million BTU/hr of waste heat to 8,255 lb/hr steam for thermal conditioning of the raw sludge.

* (The Eimco/BSP system also includes an 18 GPM BSP Scum Concentrator to segregate grease and fibrous trash and to put it into the furnace as fuel at a controlled rate, and an Arco Impingement scrubber to control emissions.)

The $10 million expansion at Granite City will also include two Eimco 80' ø x 18' primary clarifiers, two Eimco 70' ø gravity sludge thickeners; and an Environmental Operating Services contract for a startup and training assistance program.

Chesapeake-Elizabeth, Virginia

The Chesapeake-Elizabeth waste treatment facility in Virginia, one of many being executed for the Hampton Roads Sanitation District, includes:

* Two 70' ø x 10' Eimco Sludge Thickeners.
* One 9300 GPH BSP Heat Treatment unit.
* Two 18'9" ø x 7 hearth BSP furnace systems and an Environmental Operating Services startup and training assistance program.
* Two heat recovery boilers to convert 3,319,000 BTU/hr. of waste heat into 6200 lb/hr of steam for the BSP Heat Treatment Process.

Western Branch, Maryland

The Western Branch facility at Prince Georges County, Maryland is the latest of the three new "Closed Energy Loop" projects. It consists of upgrading an existing 15 MGD plant to reduce the sludge volume containing 51,700 pounds of dry solids per day over 99% in a virtually "fuel-less" system. The plant primarily processes municipal waste with a small industrial component. It includes two 6000 GPH BSP Heat Treatment systems and two 14'3" ø x 7 hearth BSP furnaces. The 5500 lb/hr waste heat recovered from the autogenous combustion is 25% more than the 4666 lb/hr necessary to power the heat treatment system.

The economics of the CLES are based on the fact that the combustion in the flowsheet containing the closed loop concept is self-sustaining. The excess heat from the combustion is sufficient to run the heat treatment system's heat treatment requirements. Therefore, the fuel required in CLES is essentially zero (Exhibit 9).

Regarding the actual cost comparison between the Closed Loop Energy System and the conventional system (Exhibit 10):

1. Costs include both operating and amortized capital costs of installed heat treatment and multiple hearth furnace systems.
2. All costs have been reduced to "dollars per ton" of dry solids, and include all the actual solids generated by a complete primary secondary treatment flowsheet.
3. Annual costs are computed by multiplying the sludge generated (tons/year) by the cost ($/ton).

The following conclusions are apparent:

1. Despite the fact that a slightly greater quantity of sludge is generated using the Closed Loop Energy System, savings are consistently realized regardless of plant flow;
2. Annual cost savings vary depending on the economies of scale realized. (A particular piece of equipment may be employed at a higher rate of utilization which would affect the savings.) For example, this phenomenon has occurred at the 75 MGD plant flow. Conventional system costs at 75 MGD appear to be somewhat out of line, probably due to lower equipment utilization rates.

Ash as Potential Fertilizer

Other reclamation potential for sludge incineration - in addition to energy and CO_2 recovery - exists in the potential fertilizer value of the ash.

In Japan, more than 50,000 tons of ash from multiple hearth furnaces have been sold on an experimental basis by cities to fertilizer companies for

sale in 20 kilo bags. The fertilizer value is

0.1% nitrogen
6.0% phosphate
1.0% potash

To indicate the high potential fertilizer value in ash, a comparison can be made with typical values of nutrient found in wet sludges and used in typical sludge to land projects such as at Denver, Colorado.

Using the value of $0.48 per kilogram ($440 per ton) for nitrogen, $0.88 per kilogram ($800 per ton) for phosphate, and $0.07 per kilogram ($6.00 per ton) for potash, the wet sludge at Denver has been valued at $0.013 per kilogram and $12.22 per ton. By comparison, using the same values, and due to the fact that the ash is more concentrated, the ash from the sludge furnace at Palo Alto - a typical secondary sludge - would have a value of $0.053 per kilogram and $48.50 per ton, four times as much as wet sludge.

The ash from an advanced waste treatment facility such as Tahoe, of course, removes a higher percentage of phosphate. Principally, due to the higher phosphate content of the ash, it has a potential value of $0.088/kilogram and $80.50 per ton.

Costs

Before closing, a comment about costs based on U.S. experience might be useful.

At the Tahoe Water Reclamation Plant, published figures show an operating cost of $0.154 per kilogram ($13.98 per ton) of dry solids dewatered.

Total operating and capital cost is $0.053 per kilogram ($47.92 per ton) for the sludge incineration process. This amounts to less than 5% of the total cost for complete treatment, which is about $0.105 per cubic meter (40¢/1000 gallons) for the 28,400 cubic meter (7.5 MGD) capacity. Large plant flows would reflect economics of scale and lower costs by as much as one-half.

The Environmental Engineers' Handbook, published in 1974, reports multiple hearth incineration cost for cities of one million population of 14¢ per capita per year and 64¢ per capita per year for cities of 100,000 population.

A 1973 study of one of the large population areas in the U.S. - the Metropolitan Boston area - shows that incineration/reclamation of sludge is the lowest cost and lowest energy use alternative, in comparison to land disposal and wet oxidation. The energy cost alone for land disposal was 60% higher than for sludge incineration.

Fuel costs and labor and material costs have risen sharply since these data were developed but, as mentioned earlier, the new Closed Loop Energy Systems furnaces eliminate the need for auxiliary operating fuel.

The ash is an environmentally superior product for it has been purified of DDT, 2,4,5-T and PCB, as well as many other chemicals found in sludge that are on the EPA toxic chemicals list (e.g., chlordane, dieldrin, endrin, toxophene). Quantities of heavy metals in excess of allowable would need to be removed through pre-treatment for any fertilizer usage of sludge or ash.

In summary, the new sludge oxidation technology offers the following advantages:

* Meets EPA air standards - particulates
* Ruled insignificant source of emissions
* Decomposes PCB's (polychlorinated biphenyls)
* Decomposes pesticides - DDT, 2,4,5-T
* Produces ash product - quasi-fertilizer
* Recovers resources - CO_2, lime
* Controls heavy metals
* Energy reclamation - Closed Loop Energy System

As the USSR and the US move to higher quality levels in both the air and water sectors, the overall environmental impact of technology must be considered. In the allocation of environmental resources in urban communities, advanced thermal processing technology deserves to be fully considered for its resource recovery and purification benefits, as well as for its "disposal" aspects.

# # # # # #

REFERENCES

"Advanced Waste Water Treatment as Practiced at South Tahoe," EPA, August 1971, No. 17010ELQ08/71

"Advances in Incineration and Thermal Processes," Frank P. Sebastian, Short Course: The Theory and Design of Advanced Waste Treatment Processes, University of California, Berkeley, September 30-October 1, 1971

"Accepted Methods for the Utilization or Disposal of Sludges," EPA No. 430/9-75-XXX, Technical Bulletin, November 1974

The Environmental Engineers' Handbook, Chilton Book Company, Philadelphia, Pa., 1974

"PCB's Spotted in Nation's Water Resources", U.S. Geological Survey, September 1972

"Problems in the Design of Sludge Incinerating Systems," Proceedings, 16th Annual Conference of Sanitary Engineering, University of Kansas, Bulletin of Engineering and Architecture, No. 56, January 1966

"A Study of Pesticide Disposal in a Sewage Sludge Incinerator,", Frank C. Whitmore and Robert L. Durfee, Versar Incorporated, Contract No. 68-01-1587, prepared for EPA, Tenth Report and Final Report, 1974

"Sewage Sludge Incineration,", EPA Task Force, No. EPA-R2-72-040, August 1972, NTIS No. PB-211 323

Exhibit 1

BSP
ENVIROTECH

SLUDGE OXIDATION SYSTEM

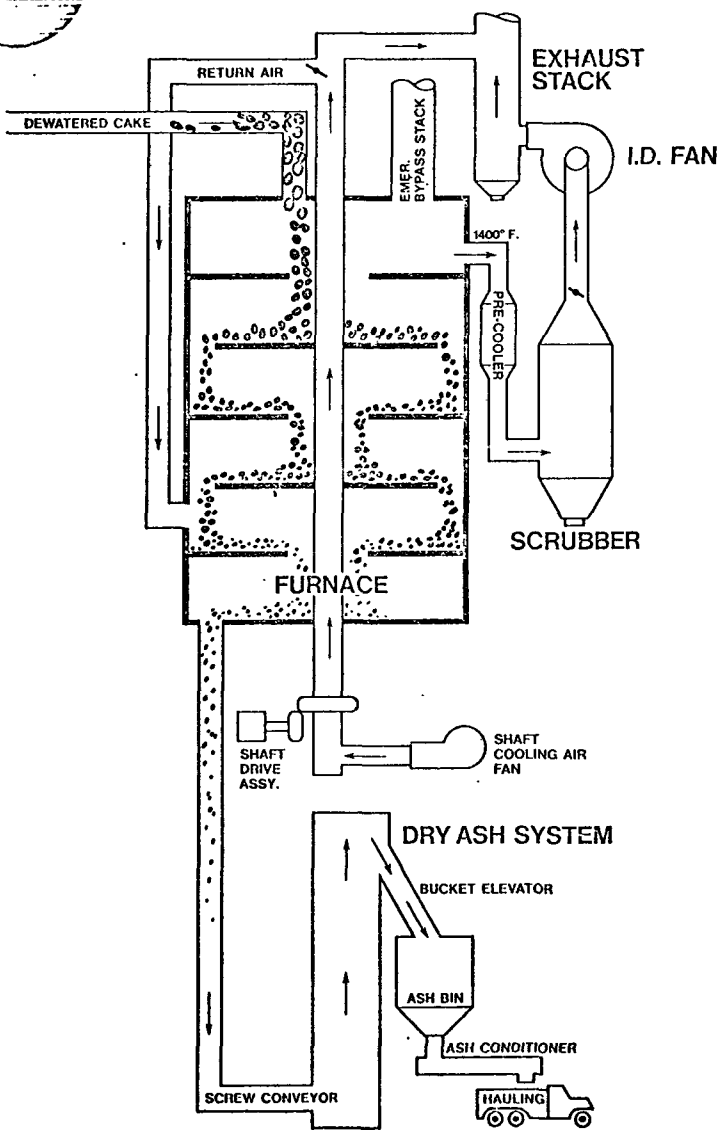


Exhibit 2

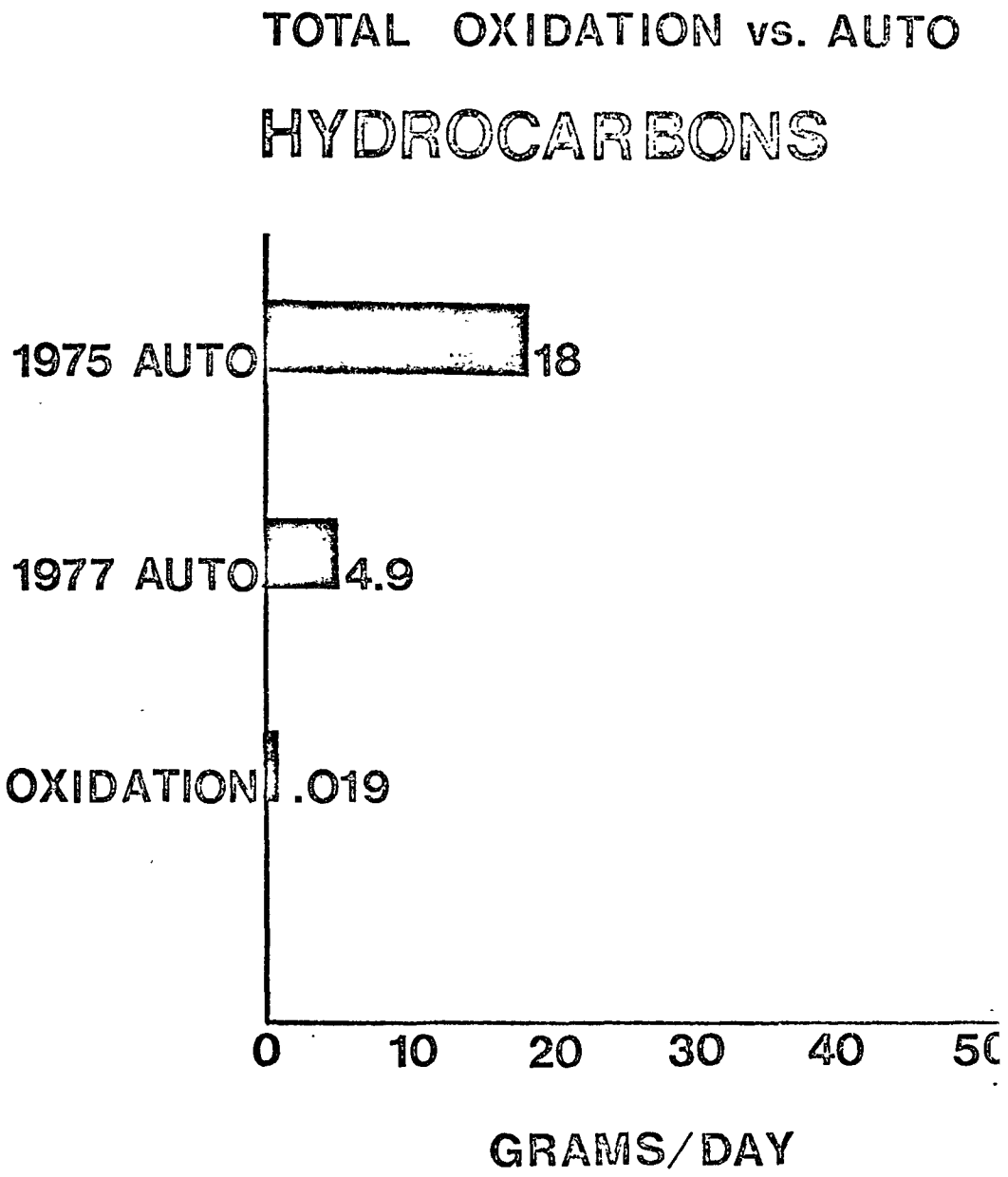

TOTAL OXIDATION vs. AUTO
HYDROCARBONS
1975 AUTO
18
1977 AUTO
4.9
OXIDATION
.019
0
10
20
30
40
50
GRAMS/DAY

Exhibit 3

PALO ALTO EMISSIONS

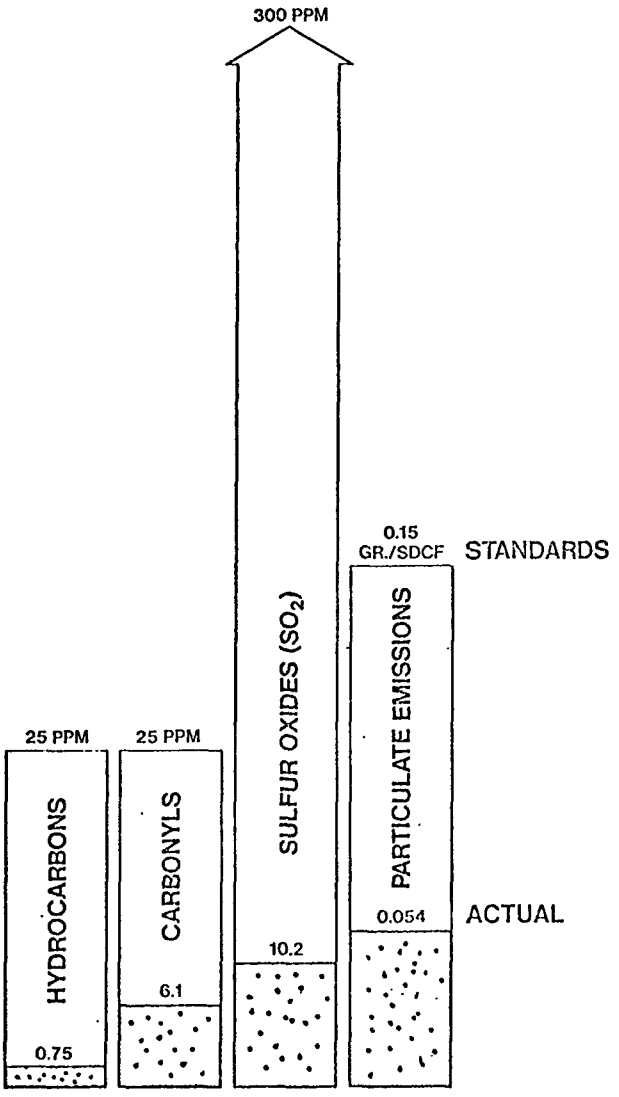


Exhibit 4

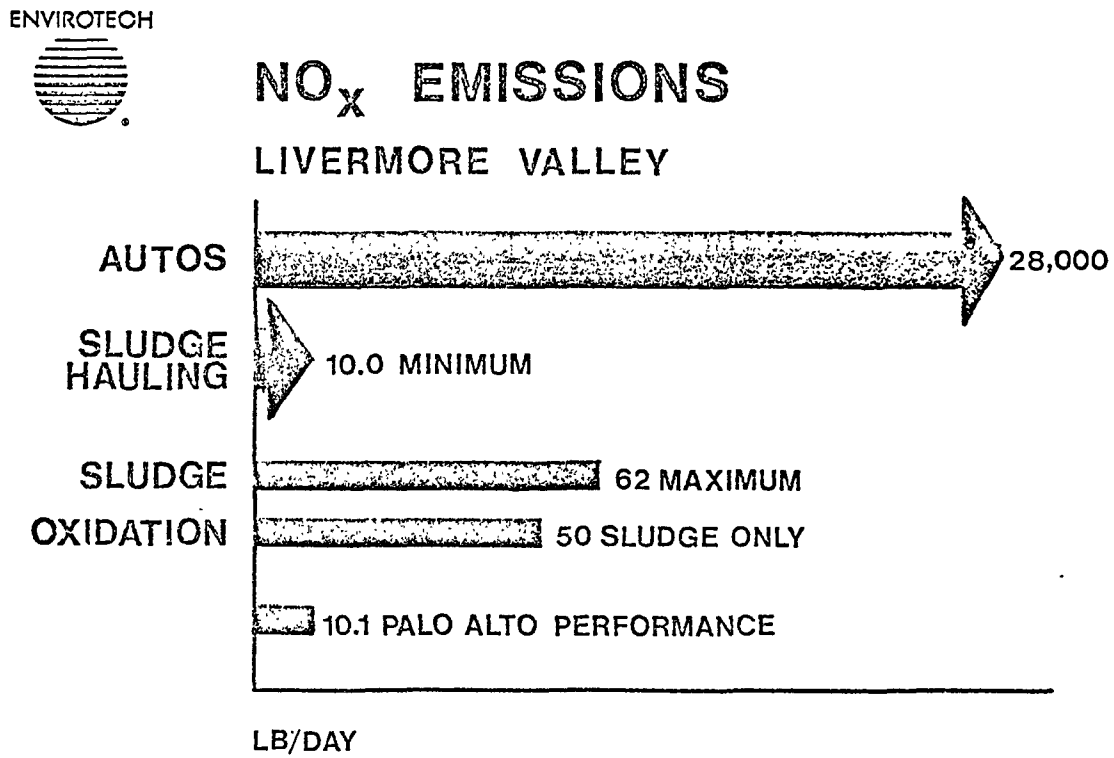
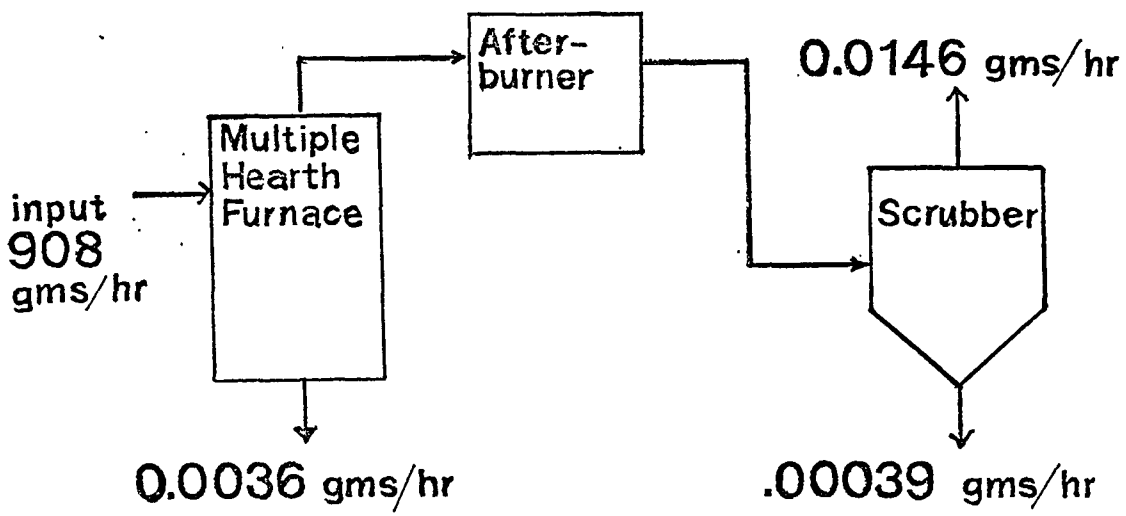

ENVIROTECH
NOx EMISSIONS
LIVERMORE VALLEY
AUTOS
28,000
SLUDGE HAULING
10.0 MINIMUM
SLUDGE OXIDATION
62 MAXIMUM
50 SLUDGE ONLY
10.1 PALO ALTO PERFORMANCE
LB/DAY

Exhibit 5

DDT Removal in a Multiple Hearth Furnace

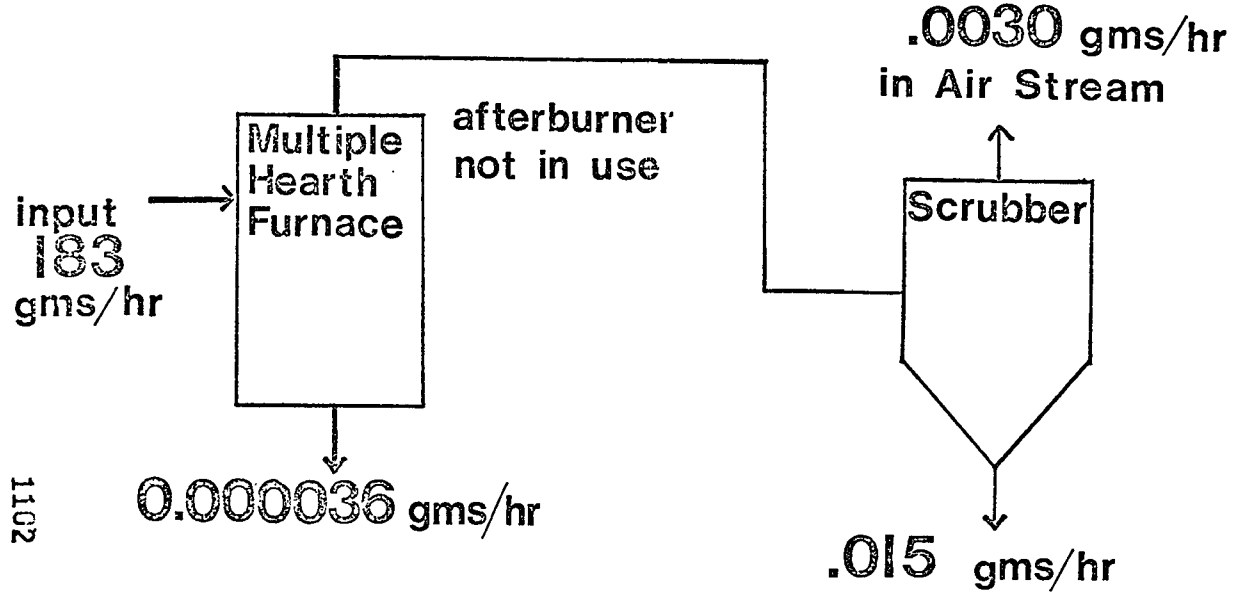


$$\text{Overall Removal Efficiency} = \left(\frac{908-.0186}{908}\right)100 = 99.99\%$$

source: EPA/Versar

Exhibit 6

2,4,5-T Removal in a Multiple Hearth Furnace



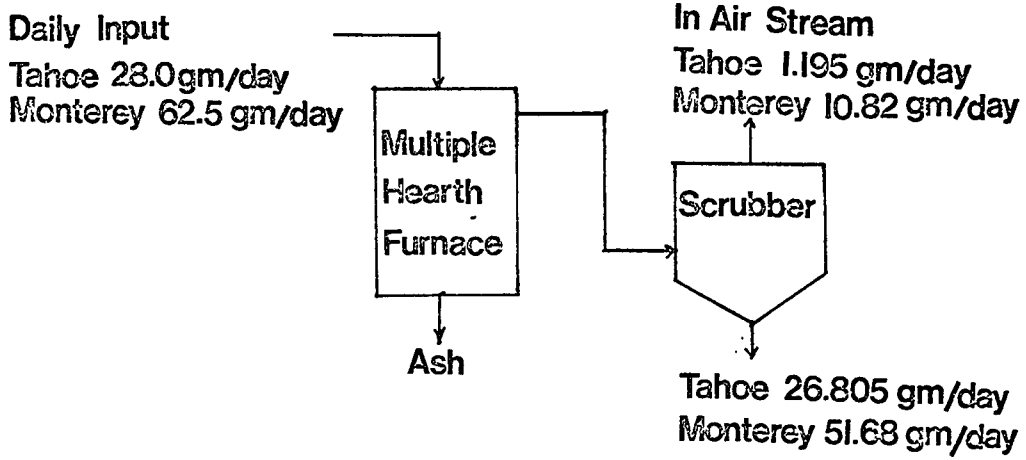
$$\text{Overall Removal Efficiency} = \left(\frac{183 - 0.018}{183}\right) 100 = 99.989\%$$

source: EPA/Versar

Ex' 'bit 7

ENVIROTECH

MERCURY REMOVAL IN A MULTIPLE HEARTH FURNACE



Scrubber Removal Efficiency : Tahoe $\left(\frac{26.805}{28.0}\right)100 = 96\%$

Monterey $\left(\frac{51.68}{62.5}\right)100 = 83\%$

Exhibit 8

ENVIROTECH

MERCURY EMISSIONS FROM SEWAGE SLUDGE INCINERATION

PLANT	INPUT OF Hg gm/day	*EMISSION OF Hg gm/day	SCRUBBER REMOVAL gm/day	Hg % REMOVAL EFFICIENCY
SOUTH LAKE TAHOE	28.0	1.195	26.805	96
MONTEREY WATER POLLUTION CONTROL PLANT	62.5	10.82	51.68	83

* EPA proposed emission standard 3200 gm/day

Exhibit 9

Closed energy loop, sludge handling systems incorporates heat treatment, incineration, and heat recovery

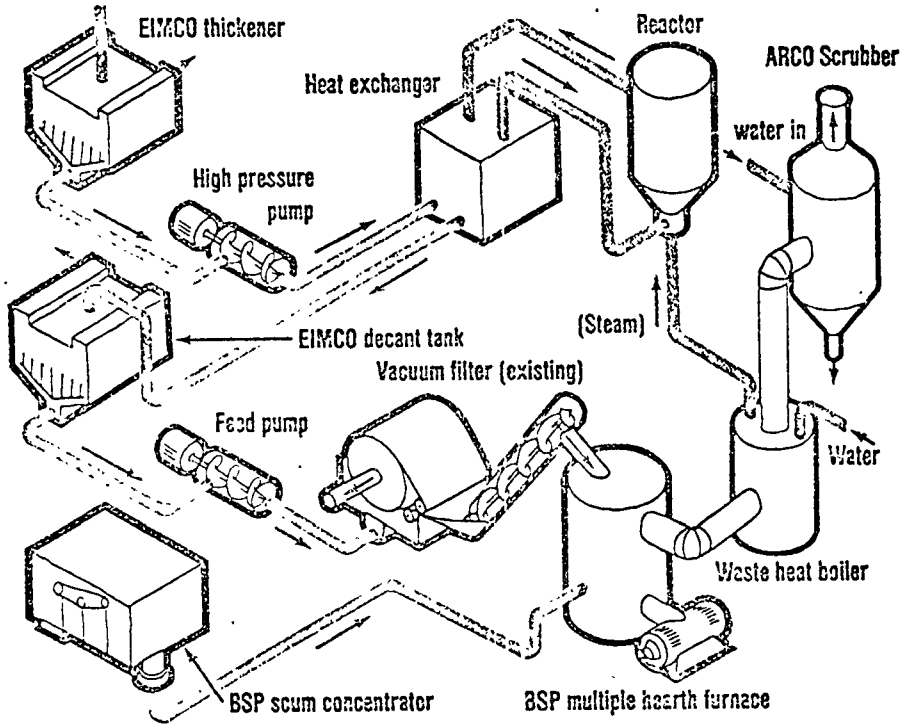


Exhibit 10

ENVIROTECH

COST COMPARISON OF CLOSED ENERGY LOOP SYSTEM VS CONVENTIONAL SYSTEM

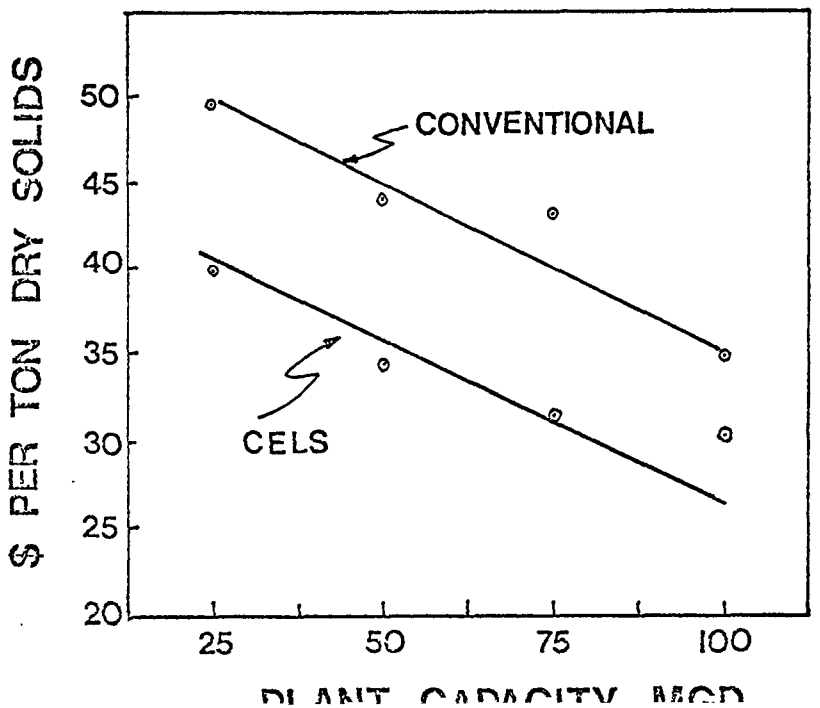


Exhibit 5

FATE OF PESTICIDES

@ 900°F FURNACE EXHAUST TEMPERATURE

PESTICIDE	SLUDGE		ASH		INLET				DISCHARGE				FURNACE EXHAUST				SCRUBBER EXHAUST			
					SCRUBBER WATER		SUS. SOL		SCRUBBER WATER		SUS. SOL		GASES **		PARTICULATES **		GASES **		PARTICULATES **	
	PPM	LBS/HR ($\times 10^{-5}$)	PPM	LBS/HR ($\times 10^{-5}$)	PPB	LBS/HR ($\times 10^{-5}$)	PPB	LBS/HR	PPB	LBS/HR ($\times 10^{-5}$)	PPM	LBS/HR	PPM	LBS/HR	PPM	LBS/HR (10^{-6})	PPM	LBS/HR	PPM	LBS/HR (10^{-6})
ALDRIN	0.032	1.2480	0.057	0.4617	N/D	-	*	-	N/D	-	*	-	N/D	-	80.750	221.05000	N/D	-	0.200	0.0455
DIELDRIN	0.030	1.1700	N/D	-	N/D	-	*	-	N/D	-	*	-	N/D	-	N/D	-	N/D	-	N/D	-
CHLORDANE	N/D	-	N/D	-	N/D	-	*	-	N/D	-	*	-	N/D	-	N/D	-	N/D	-	N/D	-
DDE	0.024	0.9360	N/D	-	N/D	-	*	-	N/D	-	*	-	N/D	-	N/D	-	N/D	-	N/D	-
DDD	0.016	0.6240	0.018	0.1458	N/D	-	*	-	N/D	-	*	-	N/D	-	N/D	95.9500	N/D	-	0.400	0.0880
DDT	0.028	1.0920	N/D	-	N/D	-	*	-	N/D	-	*	-	N/D	-	13.650	95.9500	N/D	-	0.400	0.0880
HEPTACHLOR	0.070	2.7300	0.054	0.4374	0.64	7.684	*	-	0.56	6.853	*	-	N/D	-	13.750	96.1000	N/D	-	0.905	0.2860
KELTHANE	0.073	2.8470	0.490	3.9690	6.40	76.835	*	-	5.70	69.743			N/D	-	N/D	-	N/D	-	N/D	-
ENDRIN	0.048	1.8720	N/D	-	N/D	-	*	-	N/D	-	*	-	N/D	-	N/D	-	N/D	-	N/D	-
PCB	<0.3	-	N/D	-	N/D	-	*	-	N/D	-	*	-	N/D	-	N/D	-	N/D	-	5.380	1.5840

* Combined particulate (4) samples. Not comparable on an individual basis

** Average over two runs.

This table is compiled by averaging results from the tests at a nominal temperature of 900°F. Tests were performed on 4/18/72 at the Monterey STP, Monterey, Calif.

N/D = Not detected.

Detection limits — all expressed as parts per million (ppm)

on wet sludge	on dry sludge	on dry sludge ash	on scrubber water	on suspended solids
0.3	1.8	10	0.006	0.005

(1) Vapor phase (gaseous emissions) 0.1 micrograms/cubic foot of sampled gas

(2) Particulates from furnace exhaust: 0.0001%

(3) Particulates from scrubber exhaust: 0.01%

Exhibit 6

Volume 5

INDUSTRIAL PROCESS DESIGN FOR POLLUTION CONTROL

Proceedings of the Workshop organized and held under the auspices of the AIChE Environmental Division

Midland, Michigan
November 1-3, 1972

an workshop published by

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS
345 East 47 Street New York, N.Y. 10017

Copyright in U.S.A. 1974

INCINERATORS AND INCINERATION SYSTEMS DESIGNED FOR USE IN INDUSTRIAL PROCESS PLANT:

Latest Developments on Polychlorinated Biphenyls Decomposition in BSP Multiple Hearth Furnaces

F.P. Sebastian, G.F. Kroneberger,
L.A. Lombana, and J.M. Napoleon
BSP Division
Envirotech Systems Inc.
San Francisco, California

The first part of this article deals with the characterization of polychlorinated biphenyls in order to realize the concern about PCBs and their impact on the environment. The second part of the article discusses the decomposition by incineration of PCB, the impact of incineration of PCBs and the latest developments in PCB processing.

The following data and information was developed in late 1972 as part of an on-going R & D program at Envirotech Systems Inc. as well as in response to an EPA study request. In this study, we have evaluated the action of Polychlorinated biphenyls, both in the furnace itself and in afterburning chambers.

PCB Properties:

Inert	Heat resistant
Insoluble	Toxic
Adhesive	Stable

Polychlorinated biphenyls have been used in industrial processes because of their unique properties, Figures 1 to 3. Unfortunately, some of these same properties promulgate the toxic property which has caused the present concerns on environmental impact. The toxicity effects are similar to other chlorinated hydrocarbons such as used in pesticides. The more highly chlorinated PCBs are more persistent and the less chlorinated ones are more toxic. In some cases, small traces of PCB have increased the toxicity of DDT by 100%.

PCB uses:

Electrical systems	Heat transfer systems
Hydraulic fluid	Plasticizers

PCBs were first produced commercially in the United States, in 1929. In 1966, PCBs were identified in some food products, and since that time have been found throughout the environment. Because of the findings, the sole U.S. producer has voluntarily limited production, and PCBs are no longer used in carbonless (NCR) paper, paints, and glues. PCB use has been drastically reduced in all applications except electrical equipment, this is the only use currently recommended by the government and no suitable substitute has been found.

PCB in environment:

Air	20,000 tons
Land	250,000 tons
Water	30,000 tons

The PCB distribution shown above was determined by a recent interagency task force. The totals represent a great majority of the PCBs that have been produced in the U.S. in the last 40 years. Worldwide totals would run much higher. These figures underline the resistance, stability, and inertness of this configuration. These totals also indicate that even with an uneconomical discontinuation of all use,

	Therminol FR-1	Therminol 66	Therminol 55
Composition	Polychlorinated Biphenyl	Modified Terphenyl	Alkylated Aromatic
Maximum Bulk Temperature Rating (°F)	600°F.	650°F.	600°F.
Recommended Use Range (°F)	45 — 575°F.	45 — 635°F.	20 — 575°F.
Pour Point (°F)	2	—15	—40
Pounds/Gallon (75°F)	11.55	8.35	7.4
Flash Point (°F.)	350	355	355
Fire Point (°F.)	None to Boiling	374 — 392	410
AIT (°F)	1206°F	705	670
Boiling Range (°F)	620 — 680	644 — 745	635 — 734
Molecular Weight	265	240	340
Expansion Coefficient cc/cc/°F.	0.00031	0.00039	0.00047

Figure 1. Typical physical, chemical and thermal properties.

Temperature		Density		Specific Heat		Thermal Conductivity		Viscosity		Vapor Pressure	
°F	°C	lb/gal	Kg/m³	BTU/lb °F	Kcal/Kg °C	BTU/ft hr °F	Kcal/m hr °C	Cp	Cs	mmHg absolute	Kg/cm²
50	10	11 68	1399 6	0 272	0 272	0 06098	0 0907	308	220	—	—
100	38	11 46	1372 7	0 282	0 282	0.06060	0 0902	23 2	16 9	—	—
150	66	11 22	1343 7	0 291	0 291	0 06021	0 0896	6 6	4 9	—	—
200	93	10 99	1316 7	0 3047	0 3047	0 05976	0 0889	3 4	2 6	—	—
250	121	10 76	1289 1	0 3151	0 3151	0 05927	0 0882	2.3	1 8	—	—
300	149	10 53	1261 3	0.3255	0 3255	0 05875	0 0874	1 4	1 1	—	—
350	177	10 30	1233 5	0 3359	0 3359	0 05819	0 0866	1 0	0.8	10	0 0136
400	204	10 07	1205 8	0 3464	0 3464	0 05760	0 0857	0 8	0 7	27	0 0367
450	232	9.83	1178 0	0 3568	0.3568	0.05697	0 0848	0 6	0 5	65	0 0884
500	260	9 60	1150 2	0 3672	0 3672	0 05630	0 0838	0 5	0 4	143	0.1945
550	288	9 37	1122 5	0 3776	0 3776	0 05560	0 0827	0 4	0 4	291	0 3958
600	316	9 14	1094.7	0 3880	0 3880	0 05487	0 0817	0 4	0 3	550	0 7480
650	343	8 91	1066 9	0 3985	0 3985	0 05409	0 0805	0 3	0.3	18 8psia	1 3718
700	371	8 68	1039 3	0 4089	0 4089	0 05329	0 0793	0 3	0 3	31 9psia	2 2429

Figure 2. Therminol FR-1 variation of properties with temperature.

there will have to be some means of decreasing the persistence of this type of material

Cycle through environment

Electrical systems
Receiving Waters
Aquatic Organisms
Fish
Animals
Man

Although PCBs are not an immediate threat to human health, the government is concerned about the long range threat because of the tendencies for PCBs to concentrate in the food chain Like their pesticide relatives, DDT, DDD, dieldnan-chlorinated hydrocarbons tend to concentrate in the fatty tissues at the various food chain levels In addition, there have been cases reported were external contamination has taken place

Water survey

Scientists were surprised to find PCBs in many places

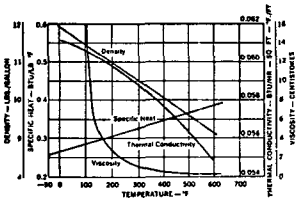


Figure 3. Therminol FR-1 physical properties.

where PCBs would not be expected to exist, such as remote lakes and rivers In a survey of streams and lakes in 39 states, PCBs were found in almost half of them Recognizing the extent of this problem, the EPA established a task force to investigate the requirements for PCB destruction The following pages summarize the findings of that task force and also incorporate recent data developed at Envirotech Systems Inc 's Brisbane, California facility.

There are about 210 possible PCB compounds About 50 of these are produced commercially and usually exist as mixtures. Gas chromatography is used for total analysis, and it is difficult to differentitate between the various isomers. Some generalizations are listed below, but the effects are far from scientific at this point

The lower chlorinated compounds are more toxic Dibenzo-furans are sometimes contained in PCBs and they are suspected of being a major contributor to the toxic effects

Concentrations in fish·

Common 0 01 to 1ppm
Also found in excess of the 5 ppm U.S. FDA Seizure Limit.
In many areas, PCB residues in fish have been found in excess of DDT
Lethal doses for some fish (several weeks exposure)

Blue gills and catfish	20 to 50 ppb
Trout	8 ppb
Shrimp	1 ppb

Concentrations in Birds:

Concentrations of 300 to 1000 ppm have been found in Cormorants and Ospreys

Concentrations in humans.

200 out of 600 samples of human adipose tissue con-

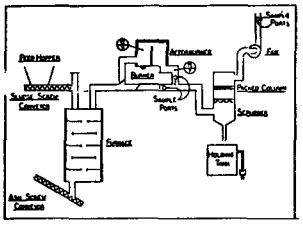


Figure 4. Laboratory sludge incinerator arrangement.

tained at least 1 ppm 100 ppm has been found in the fatty tissues in one case

In the worse case* which occurred to 1000 persons in Japan in 1968, rice oil contaminated with PCB resulted in immediate external symptoms (darkened skins, eye discharges, severe acne) on patients that consume 0 5 to 2g. and more No treatments are known and the conditions existed three years later in many cases (*Note There are not too many known clinical cases that have been related to PCBs. The worst known incidence is suspected to have been aggravated by impurities in materials of foreign manufacture.)

The internal effects are not known, but several infants were born with the symptoms from apparently unaffected mothers

Treatment of PCB in incinerator off-gas

Being insoluble, much of the water borne PCB is concentrated in sludge and sediment layers The February, 1972, EPA sludge incineration task force published a preliminary report NTIS No PB-211-323 in August, 1972

As a part of the study, sludges from ten communities around the U.S were analyzed in great detail, along with the byproducts of incineration PCBs were found to be the most thermally resistant of the chlorinated hydrocarbons The report presumed that PCBs were destroyed since none was reported in off-gases, ash, or scrubber water. However, it observed that "direct experimental evidence . . should be obtained." In the meantime, the report used extrapolated data from liquid waste incinerators and rotary kilns and determined that an off-gas treatment of 1600°F for two sec was the best data at that time Subsequently, the BSP tests have shown that a Multiple Hearth Furnace can use considerably less retention time and temperature, 1100°F for 0.1 sec but the tests showed that there can also be significant processing variations caused by the type of material in the admix

MHF test procedure

The highest PCB concentration found to-date in municipal sludge has been 100 ppm. In order to fully test

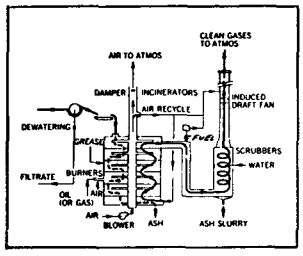


Figure 5. BSP incineration system.

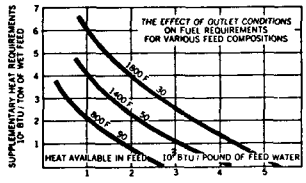


Figure 6. Effect of outlet temperature on fuel economy.

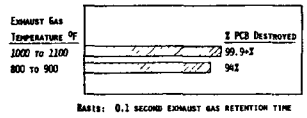


Figure 7 Test results on polychlorinated biphenyls.

the referenced equipment and process, the test sludge was bolstered to 45 times this concentration with Therminol FR-1, type PCB

Sewage sludge + 4500 ppm FR-1
Normal 1500/1700°F + 4 afterburner temperatures
Independent analysis

The test equipment, Figure 4, is one of the most efficient types of sludge incinerators in existence and because of this, sludges with a total heat content as low as 2800 Btu/wet lb can be incinerated, in a self-sustaining manner, with normal outlet temperatures Sludges with more than 75% water or higher outlet temperatures can

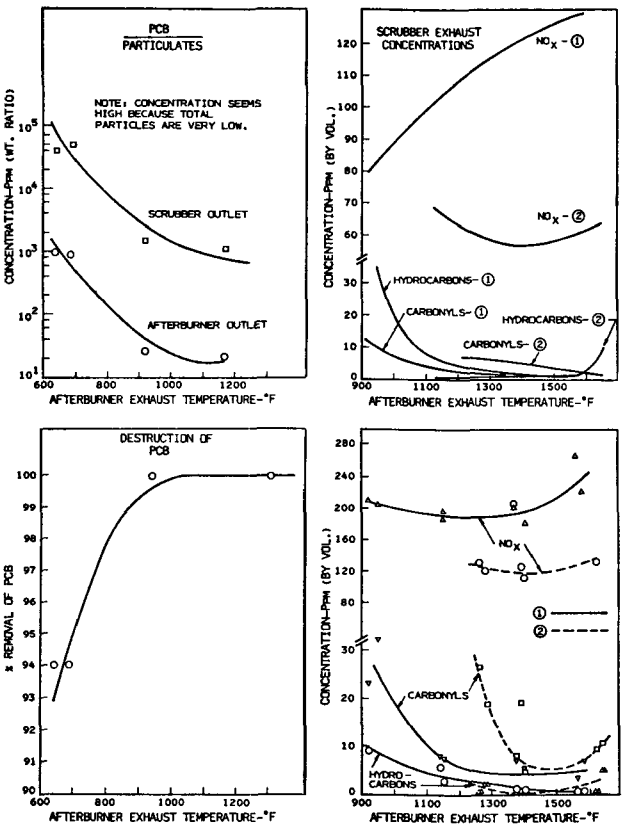


Figure 8. Graphs showing the temperature dependency of exhaust gas products.

require supplementary fuel It was found that even with the heavy dose of PCB the exhaust gases from the Multiple Hearth Furnace Figure 5, required only 1100°F and 0 1 sec This "combustion equivalent" for the BSP Multiple Hearth Furnace is very conservative since any traces were 1/10 of government suggested residuals

An item of further study will be the characterization of the combined effects of PCBs and the entraining material

Advantages of low-temperature MHF operations

Figure 6 shows the effect of outlet temperature on fuel economy With feed material characteristics that require fuel at low temperatures, proportionately more fuel is required for higher outlet temperatures Only multiple chambered counterflow units are able to obtain proper combustion with low outlet temperatures Depending on the type of application, a MHF can have outlet temperatures less than 1000°F while maintaining combustion zone temperatures over 1600°F Advantages of low-temperature operation include fuel savings, economical subprocess, complete destruction, and reduced environmental impact

Normal multiple hearth operation has a weekly per capita cost of 2½¢ The daily emissions from this process are less than that produced by operating a single automobile for 5 min , the furnace emissions being figured on a per capita basis, the multiple zones greatly assist the complete burn-out of trace quantities of PCBs because tests have shown that they can survive short periods of red hot temperatures when deep within the interstices of inert articles

In the test results of Figure 7, no PCB was found in the furnace ash The upper bar represents low temperature afterburner operation and shows that the PCB is satisfactorily destroyed, even at the lower retention times and temperatures

The lower bar shows normal furnace operation without separate afterburning In these runs, 94% of the PCB was destroyed which indicate that the reduced afterburning requirements of the furnace is due to the fact that most of the PCB is destroyed within the hearth chambers due to the multiple processing zones Subsequent tests, Figures 8 to 12, have shown that in some instances more PCB has been found in scrubber influent water than in the exhaust gases from the multiple hearth furnace If desired, activated carbon systems can be used for removing PCB from water streams The adsorbed PCBs can be destroyed during the thermal reactivation of the carbon in multiple hearth furnances

Increasingly, sludge incineration has been recognized as the safest and most efficient method for ultimate sludge disposal. In 1971, the Council on Environmental Quality recommended a policy of ending pollution dumping in the United States. In the summer of 1972, California instituted a plan which would outlaw ocean dumping by 1977 A recent report prepared for the United Nations by representatives from Western Germany, identified sludge incineration as the disposal method with the brightest future. In Japan, secondary benefits of incineration are achieved by taking phosphate laden ash from the furnaces

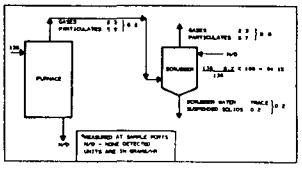


Figure 9 Laboratory furnace tests on Therminol FR-1 at 640°F.

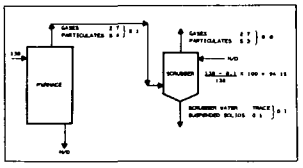


Figure 10 Laboratory furnace test at 690°F

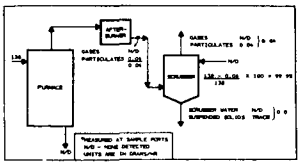


Figure 11. Laboratory furnace test at 920°F

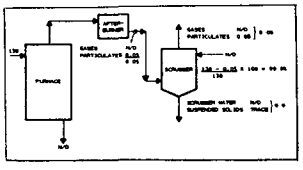


Figure 12. Laboratory furnace test at 1170°F.

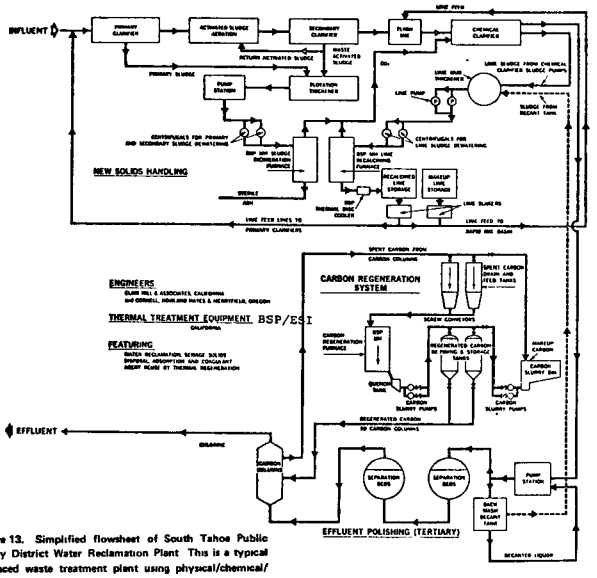


Figure 13. Simplified flowsheet of South Tahoe Public Utility District Water Reclamation Plant This is a typical advanced waste treatment plant using physical/chemical/thermal processes.

and selling it as a quasi-fertilizer containing up to 6% phosphates The ash from BSP furnaces at the South Lake Tahoe water reclamation plant, Figure 13, has been found to contain twice that amount, 12%.

Conclusions

Data from the recently completed tests and experiments show that the ESI incineration system destroys PCB to the degree desired by the EPA The tests also indicated that this was accomplished at temperatures less than 1100°F and less than 0 2 sec , so the suggested combustion equivalent of 5 sec and 1200°F is conservative

1. With an afterburner temperature of 1200°F and a retention time of 0.5 sec , a smaller afterburner can be used
2. With the lower temperature of 1200°F, a substantial savings in fuel can be realized
3. The lower temperature of 1200°F also reduces the NO_X concentration which accompanies high temperatures

The concern expressed by many agencies about PCB entering the eco-system is a very real one But as far as incineration of waste sludges are concerned, PCB removal by proper incineration processes should not pose a problem The PCB concentration levels now found in municipal sludges are well below those used in the tests Specific industrial sludges will have to be evaluated on a case by case basis

Bibliography

1 Hammond, A L , "EPA PCB Task Force Report," *Science*, 175 (January 1972)
2. "PCB test report," Envirotech Systems Inc (September, 1972)
3. "PCB Report, Envirotech Systems Inc (October, 1972)
4. Thermunol Conversion Bulletin SP/TC-1, Monsanto Co
5 Thermal Systems Bulletin 711, Envirotech Systems Inc
6. "Stack Gas Sampling and Analyses Report," Ultra Chem Corp

* Not according to the test data of the EPA Background Information on National Emission Standards for Hazardous Air Pollutants - Proposed Amendments to Standards for Asbestos and Mercury dated October, 1974 EPa-45-/2-74-009a. South Lake Tahoe and Monterey Water Treatment plants have shown a scrubber efficiency of between 83% and 96% mercury removal. See also the Federal Register, October 25, 1974, Volume 29, #208,Part I

DISCUSSION

_ANCY— Nancy Laboratories Would you discuss lead, *mercury, zinc and other vaporized metals in the gaseous* discharge of incinerators?

KRONEBERGER We do have, as part of the larger study, many pages on the trace metal quantities both in the ash and in the off-gases The presentation here, of course, concentrated on the main subject which is PCB's With respect to metals and more particularly to heavy metals, *you do realize that the main original use of the Multiple* Hearth Furnace was primarily for metallurgical processing In these applications, ores and metal compounds are converted for beneficial processing Because of the many variations possible in temperature, atmosphere, and retention time available in this type furnace, it has been used for oxidizing compounds, reducing compounds and *volatilizing compounds and elemental constituents We can* say that through its use, we are able to control the form of various compounds including metallic compounds to a greater degree than in any other furnace In the case of trace metal constituents in sludges, we would have to be appraised of the most desirable forms of these constituents to determine the best method of processing them for least *effect on the environment If any specific agent cannot be* detoxified by the Multiple Hearth Furnace, it would be best to control that particular agent at the source

NANCY. There is no question that at these temperatures all these metals are going in the atmosphere Now the question is only that nobody is paying attention to the harmful after -ffects

RONEBERGER Some of the metals are and some are not As a matter of fact, most of the metals would be discharged in the ash from the furnace not to the atmosphere A few of the metals, like mercury for instance would be volatilized, whether they would be captured in the off gas system would depend on the specific design of that system Some plants processing mercury ores can be *made to comply with the mercury emission codes with* stringent off gas equipment In the case of trace mercury constituents in a sludge operation, I would say there is no question but that we can emit a discharge that complies with current reasonable codes

COMMENT At the 1970 National Incinerator Conference Proceedings, there was a paper on the sludge burning *incinerator in Connecticut EPA went through an* exhaustive series of tests for metals coming out of the sludge burning incinerators up there That data showed that there are a lot of heavy metals as you indicate coming out If anyone is interested in these results he can refer to the 1970 Proceedings of the National Incinerator Conference

KRONEBERGER In a multiple Hearth Furnace most of *the inorganic solids discharge as ash from the bottom of the* furnace A small amount goes off as fly ash and this is captured in the scrubber A typical mass balance would be as listed below We, of course, do not make any claims to be able to make the inorganics disappear but we can capture them in the most desirable fashion

Typical Balance: Basis 100 lb of wet feed

	Water	Combustible	Ash
.aste sludge (furnace feed)	75	20	5 0
Bottom discharge	—	—	4 5
Fly ash			0 5

So we have 100 lb of wet putrescible sludge converted to 5 *lb of predominantly inert ash This ash typically is sand* and clays and can contain traces of various metals

As an example, taking one of the reports from NTIS (National Technical Information Service) Pub PB 211 323 out of 1 g of ash, there were 19 metals identified and detected (other than silicon) These totaled 446 mg Of this total, 400 mg are not only non toxic but are known *nutrients for human consumption I will let others* comment on the characteristics of the remaining constituents, but I personally question "toxic lists' that include trace quantities of copper, chrome and nickel for instance

NANKEE—Dow Chemical In connection with this particular PCB task force, the assumption or the implication that we were not concerned with metals at the time this was done is not accurate The ash metal content was of considerable importance in that task force and I think those results were also published Likewise, the overhead loss of the vaporized metals was once under great concern in another part of EPA primarily in the air programs Again, I don't have figures on this but I have seen some material balances that were based on speculations that there is in fact large postulated metal burning and I am sure your conference data would support that We're also concerned with the metals in the ash because it frequently is used in landfill or put out on land as a soil aid or whatever you want to call it, and metal in there is also of extreme concern to us In fact, there's a couple projects turned down, just plain old sewage sludge not concentrated by incineration, but just the sludge itself was possessing too much metal to be disposed of safely on the land from an agricultural or business point of view Thus I think these are of concern to EPA It would be a mistake to say that they were not I think, however, the state of the art needs to be clarified

KRONEBERGER Yes and for agricultural purposes especially, there would be a great concern on the leachable metals such as sodium and potassium This is not so much *from a human toxicity point of view as it is a plant life* aspect

QUESTION Your PCBs contain chlorine Where did you find it, in the ash discharge, the scrubber water, or in your stack gases?

KRONEBERGER We found that there were two different cases in the tests we made We found that if the PCB s were from the sludge itself and highly concentrated (for example, when we added the 4500 ppm) that the trace quantities that came to the scrubber did carry through Even so, you can see that the thermal unit itself did bring the quantity well below limits

It appeared, though, that when the PCB was in the scrubber water (which we found out by accident) that a lot of that material seemed to adhere to the particles that washed out and collected in the scrubber These are two contrary types of effect and they would not necessarily hold true in all cases You can see that in either case any *residuals were far below maximum limits Carbon* adsorption would be the best treatment for trace PCBs in water streams

QUESTION. Is this coming out as chlorine or as HCl?

KRONEBERGER In these cases, where we are saying we had a 99 9% reduction in PCB's, (99% being acceptable) we are saying we have 0 1% left The traces remaining were still *as chlorinated hydrocarbons The 99 9% that is destroyed*

exists as oxidized constituents in the off-gases When these gases are scrubbed, you have a weak, ionized, hypochlorous acid component just as when effluent water, or even swimming pool water, is chlorinated for disinfection

WILSON—Dow Chemical In your paper you comment that the lower chlorinated compounds are more toxic Dibenzo furans sometimes contain PCB's and they re suspected of being a major contributor to the toxic effects Was there any dibenzo furans in the PCB materials you burned? Specifically, was dibenzo furan looked for in the samples?

KRONEBERGER Not specifically The comment on the dibenzo furans was from the report which is in the bibliography This was the source of most of the characterization type of information on the effects of PCB's It seems true that the DBFs seemed to contribute most of the undesirable effects

WILSON It seems to me we are coming up against some new standards for performance for sludge burning incinerators Do you have any idea what this might be in grains per cubic foot prior to the scrubbing?

KRONEBERGER There are many different kinds of sludge and procedures for running the furnace However, I remember one older facility, this is about 10 years ago, where we obtained tests prior to scrubbing that complied with the then current ASME code for particulates

WILSON: What was the ASME requirement in 1964?

KRONEBERGER This was 0 2 grains per std /cu ft Incidentally that will give you some idea of what you might require for exhaust gas scrubbing Keep in mind that this furnace has less carry out than other comparable incinerators A standard of 0 04 would require an 80% reduction by the scrubbing system To cover the other extreme, an incinerator that discharged all of the ash in the exhaust stream would have to have a scrubber of 98% efficiency to be comparable

WILSON—Crown Zellerbach You have phenolics in an aqueous waste stream with a concentration to high for sewer disposal, which of the following is the least expensive antipollution method with respect to both capital and operating costs (A) incineration of aqueous streams or (B) removal with activated carbon?

KRONEBERGER: Your question has a number of answers which depend on the specifics of the problem, such as concentration, peak flow, and the average flow and utilization factor to name some of the more important ones Generally speaking dilute streams of say 400 to 500 ppm would be less economical to incinerate than to treat with carbon unless you had existing equipment that would accommodate low flows of say 20 to 250 gal /hr For higher flows, of say 100 gal /min , the cost (based on a new facility, figuring capital amortization and including costs for energy, and maintenance) would be about 1¢/gal Figuring the same 400 to 500 ppm flow the cost for the 20 to 250 gal /hr conditions, using activated carbon on a throwaway basis, would be 3/4 to 1¢/gal For higher flows of say 100 gal /min , the cost would come down to 1/4¢/gal using a regeneration system For plants of over a million gallons per day and higher concentrations, the plant capital and operating costs should be determined on a specific project basis with consideration being given to the applicable processes such as carbon adsorption and incineration With plants of significant size, say over one million gallons per day the supplemental processes that then become applicable (such as heat recovery on incineration and carbon regeneration for adsorption) become important factors In a few very specific cases, where the contaminant is pure, it might be worth considering a chemical recovery regeneration system In most cases, the contaminants are not pure and thermal regeneration is most applicable In large plants the most significant savings can often be achieved by considering the total disposal problem and the benefits of combined use of the treatment equipment, this is especially true for thermal processes

Polychlorinated biphenyls in treatment plant effluents

DOUGLAS J. DUBE, GILMAN D. VEITH, AND G. FRED LEE

As METHODS of detection for chlorinated hydrocarbon pesticides have improved, polychlorinated biphenyls (PCB's), which are mixtures of chlorinated biphenyl compounds that have various percentages of chlorination, have been found in the environment. Interest in PCB's has increased because some of the physiological effects of the PCB isomers were thought to be similar to those of the chlorinated pesticides.

In Wisconsin, Veith[1] found PCB's in samples of the Milwaukee River near the city of Milwaukee. The concentrations of these PCB's (identified as Aroclor 1260) ranged from 0.02 to 0.25 μg/l. The PCB's were also found in selected wastewater treatment plant effluents along the Milwaukee River at concentrations of equivalent Aroclor 1254 from 0.12 to 0.25 μg/l.[1]

This study of wastewater treatment plant efflents was conducted in order to determine the degree of contamination in other wastewaters in southeastern Wisconsin.

STUDY AREA

Samples were collected at municipal treatment plants in 11 southeastern Wisconsin cities (Figure 1). Factors used to select these cities were population (1,500 to 100,000), volume of waste flow [140,000 gal/day to 13 mgd (530 to 49,205 cu m/day)], type of treatment, number and types of industries present, and type of receiving water. The characteristics of each municipality investigated are presented in Table I.

METHODS

Sampling. Glass containers were used throughout the study to minimize the possibility of sample contamination.

The samples were collected by immersing 2.5-l bottles in the waste stream at its entrance to the treatment plant, in the primary settling tank, in the trickling filter effluent, and in the final effluent of the treatment plant. The samples were conveyed to the State Laboratory of Hygiene, Madison, Wis., and extracted within 24 hr.

Extraction. The samples were batch extracted with redistilled hexane in separatory funnels. The samples were not filtered because they contained small amounts of solids. Hexane (100 ml) and the sample (800 ml) were placed in the funnel. After vigorous agitation for 1 min, the sample was passed to another funnel that also contained hexane (100 ml) and was again agitated for 1 min. The water portion was then discarded. This procedure was followed until 2,400 ml of the sample had been extracted. The extracts were combined and concentrated to 10 ml for cleanup.

Cleanup. The sample cleanup was done by means of liquid-solid chromatography of florisil.[2-7] The florisil column used was a 0.5-in. (1.27-cm) OD glass column with a 200-ml vessel on the top. The column was fitted with a fritted glass and Teflon stopcock at the bottom. The column was filled with 0.5 in. (1.27 cm) of anhydrous sodium sulfate (Na_2SO_4) and 19 g of florisil that had been activated at 105°C. The column was then covered with another 0.5 in. (1.27 cm) of anhydrous Na_2SO_4 to prevent deactivation from water in the sample extract.[4] The columns were prewetted with hexane, and the extracts (10 ml) were placed on the column and eluted with hexane ether mixture (200 mg, 94.6 percent) at 3 to 5 ml/min.[7] This procedure was designed to remove fats, waxes, oils, and pigments from the eluate.

In order to separate the PCB's from other pesticides, the eluate was concentrated to 2 ml and passed through a second florisil column. This column consisted of florisil in a 9-mm ID glass column with 65 ml of hexane as the eluate.[1] The extracts were then concentrated to appropriate volumes for analysis of the samples on the gas-liquid chromatograph.

Instrumentation. Analyses of the cleaned extracts to determine the presence of PCB's were made by means of gas-liquid chromatography (GLC) with an electron-capture detector. Gas chromatographic analyses were conducted on a gas chromatograph * equipped with a concentric tube, electron-capture detector (^{90}Sr). The columns used were 6 ft by 0.25 in. (18.3 m by 0.635 cm) glass coils packed with OV-101/Qf-1 (2:2 percent) and OV-101/DC-200 (2:3 percent) coated on Gas Chrom Q (80/100 mesh). The carrier gas (purified nitrogen) was maintained at a flow rate of 28 ml/min; and the injector, column, and detector temperatures were 210°, 200°, and 270°C, respectively.

From the gas chromatograms, preliminary identification of the PCB's was made by comparing chromatograms of standard Aroclors with the chromatograms of the samples to determine which Aroclor the sample most resembled. The determination of the concentration present was made by measuring the height of the most prominent peaks in each of the Aroclor standards

* Barber Coleman 5460 Pestalyzer, Barber-Coleman Co., Rockford, Ill.

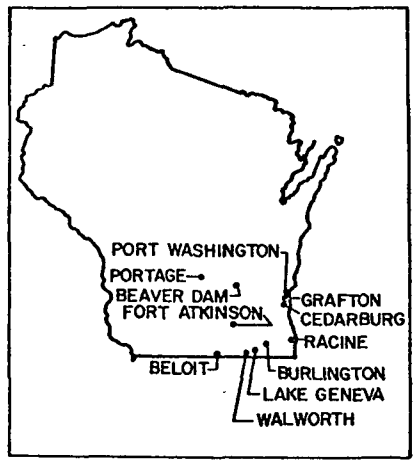


FIGURE 1.—Location of sampling sites in southeastern Wisconsin.

TABLE I.—Characteristics of Municipalities Investigated in this Study

Municipality	Population	Dominant Types of Industries	Flow (mgd)	Type of Treatment*
Beaver Dam	15,000	Paint, glass, foundry, metal fabricators	0.25	TF, C
Beloit	35,000	Printing, tool and die, chemical formulators, heavy equipment	5	AS, C
Burlington	6,000	Cement, metal work, abrasives, paint, fiberglass, electrical equipment	1.5	AS, C
Cedarburg	5,000	Casting, plastics, tool and die, printing, paint	1	TF, C
Fort Atkinson	8,000	Tool and die, printing, electrical equipment, paint	1.3	AS, C
Grafton	4,000	Steel products, welding and cutting, casting, printing, plastics, electrical equipment	0.8	AS, C
Lake Geneva	5,000	Plastics, electric fixtures, rubber products, tool and die	0.7	TF, C
Port Washington	8,500	Foundries, chemicals, clothes manufacturing	1	Pr, C
Portage	8,000	Concrete products, plastics, hosiery, reproducing paper	0.7	TF, C
Racine	100,000	Die and molding, precision stamping, casting, foundry, printing, electrical products, chemical treatment and formulators	11	AS, C
Walworth	1,500	None	0.14	TF

* TF = trickling filter; C = chlorination; D = digestors; AS = activated sludge; Pr = primary.
Note: Mgd × 3,785 = cu m/day.

TABLE II.—Reproducibility of PCB Analysis

Sample*	Volume Extracted (ml)	PCB Concentration† (μg/l)
Raw wastewater		
Sample 1	3,000	1.5
Sample 2	3,000	1.4
Sample 3	3,000	1.4
Final effluent		
Sample 1	2,500	0.9
Sample 2	2,400	1.1
Sample 3	2,400	1.0

* All samples were taken at the Cedarburg, Wis., treatment plant on Oct. 6, 1971, at 11:30 hours.

† The chromatograms of all samples collected most closely resembled the chromatogram of Aroclor 1254.

and comparing these to the height of the most prominent peaks in the samples. In this study, these peaks (PCB components numbers 4 and 7) lay on either side of the first doublet peak (isomer components numbers 5 and 6 in Figure 2). The difficulty of this method is apparent when a sample contains a mixture of two or more Aroclors and more detailed study is needed.

Recoveries of the samples used to test the precision of the Aroclor 1254 analyses are summarized in Table II. The analyses of the raw wastewater samples varied 7 percent from 1.4 μg/l, while analyses of the final effluent samples varied 10 percent from 1.0 μg/l.

Because of possible complications caused by the presence of more than one Aroclor and because of the possible interference of DDE, identification of some of the samples was confirmed using mass spectrometry. Confirmation was made on nine of the peaks from three of the samples.

The mass spectra were obtained at the Environmental Protection Agency's Southeast Water Laboratory in Athens, Ga. Analyses were made on a double focusing instrument † interfaced to a gas chromatograph ‡ with a separator.§ A constant accelerating voltage of 70 ev was used. The mass spectra were manually reduced.

† Hatachi Perkin Elmer RMU-7, Perkin-Elmer Corp., Norwalk, Conn.

‡ PE-900, Perkin-Elmer Corp., Norwalk, Conn.

§ Watson-Bieman.

RESULTS AND DISCUSSION

The analysis of the mass spectra of three water extracts confirmed that the PCB mixtures present were the same as those indicated by the gas chromatograph. Because the judgments made from chromatograms were confirmed by mass spectrometry and because all samples were analyzed on the gas chromatograph under similar conditions, judgments made on the remaining samples were assumed to be qualitatively correct. However, the occurrence of materials other than PCB's in the rest of the samples is not precluded. The waste treatment plant at Beaver Dam was the only site where possible interference was noted. On the gas chromatograms from this site, PCB's could be detected, but the peaks on the graphs were obscured in such a way that the PCB concentrations present could not be determined.

The samples analyzed in this study indicate that Aroclor 1254 is the most common PCB in the wastewater effluents. Table III shows that PCB's were detected in all samples at concentrations that ranged from < 0.05 μg/l at Beaver Dam to 2.8 μg/l at Lake Geneva.‖ The mass transport (average pounds per day) of equivalent Aroclor 1254 ranged from less than $0.2 \times 10^{3-}$ to $142 \times 10^{3-}$ lb/day ($0.9 \times 10^{4-}$ to $64.5 \times 10^{3-}$ kg/day) at Beaver Dam and Racine, respectively.

Port Washington is not as highly industrialized as Grafton; however, the effluents from both cities contained approximately the same concentrations of PCB's. The concentrations ranged from 0.12 to 0.23 μg/l which, based on this study, is typical for cities with little or no industry.

Cedarburg is an industrialized municipality whose effluents contained concentrations of equivalent Aroclor 1254 of approximately 1.0 μg/l. Because the concentrations of PCB's for this city were high, the fluctuations in concentration throughout a 24-hr period were determined. The

‖ The determinable level for PCB's in water is approximately 0.05 μg/l with this method.

TABLE III.—PCB Concentrations in Wisconsin Treatment Plant Effluents

City	Sampling		PCB Concentrations* (μg/l)	Flow (mgd)	Estimated Mass Transport† (10^{-3} lb PCB/day)
	Date (1971)	Time			
Beaver Dam	1/20	6:30	<0.05	1.59	<0.2
	2/19	6:30	<0.05	4.33	—
	3/22	6:30	<0.05	3.50	—
	10/6	6:30	<0.05	2.34	—
Port Washington	1/20	8:30	0.14	0.70	—
	2/19	8:30	0.12	1.27	—
	3/22	8:30	0.22	1.46	2.7
	10/6	8:30	0.19	1.80	—
Grafton	1/9	9:30	0.12	0.84	0.8
	2/19	9:30	0.13	1.00	1.1
	3/22	9:30	0.23	0.78	1.5
	10/6	9:30	0.07	0.84	—
Cedarburg	1/20	10:30	0.48	1.05	4.2
	2/19	10:30	0.28	1.17	2.7
	3/22	10:30	0.97	2.57	—
	10/6	10:30	0.91	1.95	15
	10/6	10:30	1.1	1.95	18
	10/6	10:30	1.0	1.95	16
Racine	1/20	8:30	0.72	16.45	—
	2/19	12:00	0.60	25.06	—
	3/22	12:00	0.76	23.01	—
	10/6	12:00	0.83	20.51	142
Burlington	1/20	9:30	0.14	1.74	—
	2/19	13:00	0.09	2.61	—
	3/22	13:00	0.08	2.50	1.7
	10/6	13:00	0.12	1.35	—
Lake Geneva	1/20	10:30	2.5	0.56	—
	2/19	14:00	2.2	0.66	—
	3/22	14:00	2.8	0.78	18
	10/6	14:00	2.4	0.54	—
Walworth	1/19	11:00	0.17	—	—
	2/20	14:30	0.21	—	—
	3/22	14:30	0.34	—	—
	10/6	14:30	0.18	—	—
Beloit	1/19	12:30	0.11	3.89	—
	2/20	16:00	0.07	11.75	—
	3/22	16:00	0.06	7.56	3.8
	10/6	16:00	0.14	4.42	5.2
Fort Atkinson	1/19	2:00	0.15	1.24	—
	2/20	18:00	0.07	2.48	—
	3/22	18:00	0.10	1.85	1.5
	10/6	18:00	0.08	1.30	—
Portage	5/20	10:00	42	0.79	—
	9/20	10.00	38	1.00	—
	10/6	10:00	32	0.78	—

* The chromatograms from all cities except for Portage most closely resembled the chromatogram of Aroclor 1254; the chromatogram from the Portage samples most closely resembled the chromatogram of Aroclor 1248.

† Mass transport estimates were made by dividing the number of pounds of PCB's discharged by the plant per day by the average flow of wastes into the plant per day.

Note: Mgd × 3,785 = cu m/day; lb × 0.454 = kg.

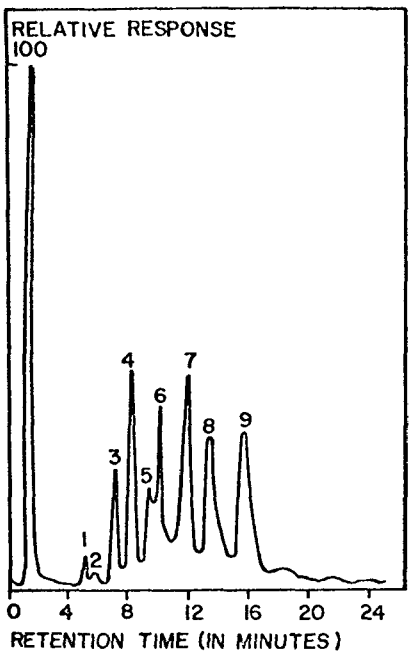


FIGURE 2.—Chromatogram of Aroclor 1254.

concentration of PCB's in raw wastewater began to increase at the beginning of the working day (8:00) from 0.54 μg/l to a maximum of 3.1 μg/l at 16:00 hours (Figure 3).

The concentration of PCB's in the final effluent seems to begin increasing from 0.33 μg/l at 0:00 (midnight) to a maximum of 0.77 μg/l at 14:00. The PCB concentration in both raw and final wastewaters increased and decreased simultaneously throughout the day.

The PCB concentration in the effluent is approximately 30 percent of that in the influent, and it is likely that the primary and secondary treatment plant was removing in excess of 70 percent of the PCB's.

The analysis of PCB's in the sludge presented in Table IV indicates that the sludges contain 1,000 times higher concentrations than does the water effluent of Cedarburg.

Racine is highly industrialized and has a high flow [11 mgd (41,635 cu m/day)] in its wastewater treatment plant. The PCB concentrations varied from 0.60 μg/l on February 19 to 0.83 μg/l on October 6. Because of the comparatively high flow, the mass transport of PCB's from the Racine plant is greater than 0.1 lb/day (0.05 kg/day) compared with approximately 0.02 lb/day (0.009 kg/day) from the Cedarburg treatment plant.

Plants in Burlington, Walworth, Beloit, and Fort Atkinson had concentrations

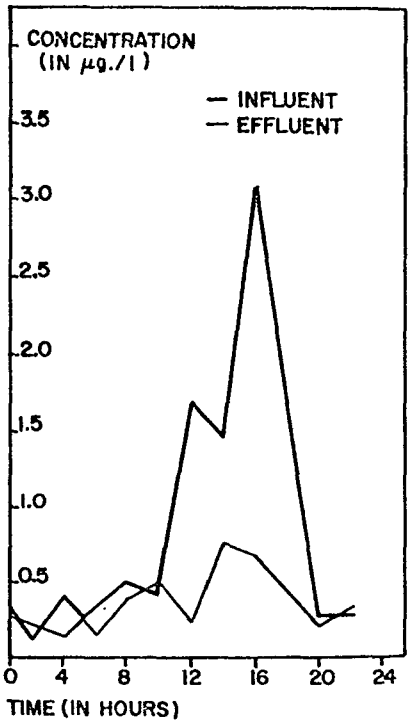


FIGURE 3.—Hourly concentrations of polychlorinated biphenyls in the influent and effluent from the Cedarburg, Wisconsin, treatment plant, April 15, 1971.

above the determinable level but less than 0.40 μg/l. The mass transport of PCB's from the treatment plants in these four cities was less than 0.01 lb/day (0.005 kg/day).

Lake Geneva is a highly industrialized city whose treatment plant effluents had PCB concentrations between 2.2 and 2.8 μg/l. These high PCB concentrations suggested that the contamination is possibly from industrial wastes. The daily discharge of 0.02 lb/day (0.009 kg/day) was comparable to that for the Cedarburg plant.

Although industries in the city of Portage are few, they contributed between 32 and 42 μg/l of equivalent Aroclor 1248 to the sanitary waste flow. A sample of the digester sludge was analyzed at 10:00 and found to contain 5.25 mg/l. It is of interest to note that the city of Portage has reported problems with the operation of their trickling filter, which may partially be the result of the presence of PCB's and other chemicals. With 32 to 42 μg/l equivalent Aroclor 1248 in the waste, it could be toxic to some of the filter fauna. Organic mercury compounds were also found by mass spectrometry on the scum of the trickling filter at concentrations up to 90 mg/l.

Data presented in Figure 3 demonstrate that the time of sampling waste effluents is of major importance in mass transport estimate. For example, if the Cedarburg effluent was sampled at 14:00 on April 15, 1971, the estimated transport of PCB's out of the plant would be approximately twice that estimated from a sample taken at 8:00. It should be noted, however, that the PCB concentration in the effluent from the plant varied considerably less than that in the raw wastes entering the plant. Consequently, the mass transport may be considered as order-of-magnitude estimates.

The sources of the PCB's entering the treatment plants have not been identified in this study or in the literature. It is possible that PCB's could be released through the use of household products such as cleaning compounds and waxes. For example, Veith and Lee[8] found PCB's in several detergents designed for electric dishwashers, aluminum foil, and packaging material. In addition to these possible household sources, PCB's may be released from leaking heat-exchanges, cutting oils, and lubricants. The Monsanto Company, formerly the sole producer of PCB's in the U. S., restricted the sales of PCB's to capacitors, transformers, and heat exchange systems in August 1970, although until April 1971 PCB's were still sold for industrial uses for which suitable replacement chemicals were not immediately available.

Further studies are needed to determine how effective these self-imposed restrictions by Monsanto will be in reducing the quantities of PCB's entering the environment.

TABLE IV.—PCB Concentrations in the Cedarburg, Wisconsin, Treatment Plant*

Sample	PCB Concentration†	
	At 10.00 (mg/l)	At 16 00 (mg/l)
Digester sludge	24	20
Primary settling sludge	69	31

* Samples taken on April 15, 1971.

† The chromatograms of the samples most closely resembled the chromatogram of Aroclor 1254.

SUMMARY AND CONCLUSIONS

The results of this study indicate that 6 of the 11 wastewater treatment plants in the study had effluent concentrations in the range of 0.1 to 0.5 μg/l of a compound whose chromatogram appeared to match the chromatogram of Aroclor 1254. Two sites had effluent concentrations greater than 1.0 μg/l of equivalent Aroclor 1254. One city had a maximum concentration of 42 μg/l of equivalent Aroclor 1248 in the effluent waters and 5.2 mg/l of equivalent Aroclor 1248 in the digester sludge.

Data from the Cedarburg treatment plant show that the time of collection is important because the concentration can vary greatly. The data show that the minimum concentrations of PCB's in the Cedarburg plant are probably 0.13 to 0.30

μg/l of equivalent Aroclor 1254, while maximum concentrations range from 1.5 to 3.1 μg/l. Because of hourly fluctuations, it is difficult to determine precisely the total amount of PCB's being discharged into receiving waters without hourly sampling of the effluent at a given site

Of the various samples of waste effluents collected, the estimated mass transport of PCB's varied from $< 0.2 \times 10^{3-}$ to $142 \times 10^{3-}$ lb/day ($0.9 \times 10^{4-}$ to $64.5 \times 10^{3-}$ kg/day). At Racine, an equivalent of 41.1 lb PCB/yr (18.7 kg/yr) flowed into the near shore waters of Lake Michigan.

Based on the study at the Cedarburg plant, it seems that the treatment of domestic waters removes 70 percent or more of the PCB's (Aroclor 1254) present in incoming wastes. The fact that most of the PCB's are removed by treatment is also evident in the comparatively high concentration of PCB's found in the digester and primary settling sludges.

ACKNOWLEDGMENTS

Credits. The authors wish to acknowledge the aid of Jackie Zoch for her assistance in the analyses, Joe Ball for his assistance in sample collection, and Wayne Garrison and his staff from the EPA Southeast Water Laboratory in Athens, Ga., for their help on mass spectral analyses.

This investigation was funded by the Wisconsin Department of Natural Resources and by the Department of Civil and Environmental Engineering, University of Wisconsin, Madison. Additional support was provided by the University of Texas, Dallas.

Authors. Douglas J. Dube is research chemist, Department of Natural Resources, Madison, Wis. Gilman D. Veith is scientist, EPA National Water Quality Laboratory, Duluth, Minn. G. Fred Lee is director, Institute Environmental Science, University of Texas, Dallas.

REFERENCES

1. Veith, G. D., "Environmental Chemistry of the Chloro-Biphenyls in the Milwaukee River." Ph.D. thesis, Univ. of Wisconsin, Madison (1970).
2. Burchfield, H. P., and Johnson, D. E., "The Analysis of Pesticide Residues." U. S. Dept. of Health, Education, and Welfare, Washington, D. C. (1965).
3. Hughes, R. A., "Studies on the Persistence of Toxaphene in Treated Lakes." Ph.D. thesis, Univ. of Wisconsin, Madison (1970).
4. Risebrough, R. S., *et al.*, "Current Progress in the Determination of the Polychlorinated Biphenyls." *Bull. Environ. Contam. Toxicol.*, 4, 192 (1969).
5. Stalling, D. L., and Huckins, J. N., "Gas-Liquid Chromatography—Mass Spectrometry Characterization of Polychlorinated Biphenyls (Aroclors) and ^{36}Cl-Labeling of Aroclors 1248 and 1254." *Jour. Assn. Offic. Anal. Chem.*, 54, 801 (1971).
6. Veith, G. D., "Role of Lake Sediments in the Water Chemistry of Toxaphene." M.S. thesis, Univ. of Wisconsin, Madison (1968).
7. "Pesticide Analytical Manual." Food and Drug Admin., Dept. of Health, Education, and Welfare, Washington, D. C. (1971).
8. Veith, G. D., and Lee, G. F., Unpublished data. Water Chemistry Program, Univ. of Wisconsin, Madison (1970).

THE CHAIRMAN: All right. Thank you, Mr. Howard.

Do we have questions?

Mr. Mausshardt.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. MAUSSHARDT: Yes. Mr. Howard, would it be possible -- this is more of a request than a question -- to have you submit to the record for us cost data on the operation of these incinerators and the cost of the incinerator itself?

MR. HOWARD: Yes.

MR. MAUSSHARDT: Thank you very much.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: Did I understand correctly that the information which you are going to be giving to us will have information on the data on the Monterey tests and some of these other tests?

MR. HOWARD: Yes, yes. And if it is not all complete here, we have the entire test.

MR. LINDSEY: And one other quick question, if I can.

You mentioned that the ash from this type of incinerator brings somewhere in the neighborhood of $40 a ton to $80 a ton. I think those are the figures you used.

MR. HOWARD: Right.

MR. LINDSEY: Apparently this is a useful product.

Could you elaborate on what it is used for and who it would be that might be interested in purchasing the materials.

MR. HOWARD: The value that was placed on this was strictly for its phosphorus and nitrogen contents and would be used as the cost of these chemicals increased.

The consideration of the utilization of ash as a soil

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

conditioner and supporting material increases.

Historically in the past the cost of such fertilizer with those products was so low because they could be manufactured for less. But today with our shortages of natural gas and such it is becoming worthy of consideration.

We have people inquiring from us today on samples of ash from many installations so they can evaluate if they do have a basis to set up a marketing program.

THE CHAIRMAN: All right. Mr. Lazar.

MR. LAZAR: Mr. Howard, the ash, as you said, will now be used as a soil conditioner, but this is in spite of the high metal content.

Now, do you have any information which would indicate that this is safe to use to grow crops on?

MR. HOWARD: Well, I think, yes, we have, but you are faced with two situations.

We are faced with ash coming from municipal treatment plants which have very low quantities of heavy metals versus ash that comes from a plant used to decompose or destroy industrial waste.

So you could very well develop an ash from an industrial furnace that would not be acceptable for the land. On the other hand, the ash from the majority of the domestic sewage treatment plants, the level of these heavy metals is so low that they were not in there in the beginning -- this is what we

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

are saying. That the feeds in these furnaces were so low in these materials that the ash is still safe.

MR. LAZAR: Could you submit something to the record which would show the levels of the domestic original like sludge versus industry origin sludge?

MR. HOWARD: We have in the pamphlet tests of all the metals or a series of heavy metals run on sludges from a domestic plant. We do not have here, and I do not know if we have in our files from selected industrial wastes. So I can only at the moment comply with the first part, the domestic.

MR. LAZAR: Thank you.

THE CHAIRMAN: Mr. Bourns.

MR. BOURNS: I have a question from the floor, and I also have to ask one of my own which is similar. I will read the question from the floor first.

Are there any sludge incinerators operating in the Los Angeles area? If not, why not?

The question I had was: Has the LA Airport passed on your mobile incinerator for all types of emissions?

MR. HOWARD: The answer to the first part is, to the best of our knowledge, there are none operating in the LA Air Pollution Control Area District.

MR. BOURNS: Why not?

MR. HOWARD: And as far as passing on it, the first effect, you might say, was that if you put one in, it will not

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

pass, regardless. No standards were given for any manufacturer to meet. It was just the basic statement that at that time -- this is like five years ago -- that we sat down with the Board, and it was not an open subject for consideration.

And since then we have been approached to build a pilot test furnace. And it is our understanding now that because of the severity of the problem in the basin, the questionable continuation of ocean outfall, that they now wish to start collecting data. And to this end we will be cooperating with them as much as possible.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: I have two questions from the floor.

Has any work been done on pesticide manufacturer waste sludges? If so, what was found?

MR. HOWARD: We have done none. The only history that we have on handling some of these materials was that in the case of PCB's, they attempted incineration of 100 percent PCB, and in that case an elevated temperature for prolonged periods accomplished destruction. And I think that that is about the only information we have.

Our work has been conducted solely with these materials as found in the domestic waste that we are processing.

MR. KOVALICK: The second question from the audience was, what is the maximum concentration in NO_x issuing from the multiple hearth furnace system?

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. HOWARD: The maximum concentration?

MR. KOVALICK: Right. If it is in the statement, maybe we can --

MR. HOWARD: Yes, it is in the statement. But because the furnace operates at a comparatively low temperature, compared to other thermal devices such as automobiles, the NO_x production is very low.

It is only when you get into much higher temperatures that you increase your production of NO_x.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: I have several here from the floor and one of my own which I can combine altogether. They have to do with emission control and discovery.

First of all, what type of emission control equipment or scrubber equipment do you recommend for hazardous waste incinerators of this type?

MR. HOWARD: Well, we have used in our domestic installation, we used initially a three-stage impingement, and then as the more stringent regulations came out and the increased volume of secondary biological sludges which produce a finer particulate matter, we have now gone to a variable throat venturi operating in the rage of 20 inches pressure drop on up to 40, depending on the application.

MR. LINDSEY: Okay. The second part of these questions, if mercury and arsenic are removed in the scrubber, how are they

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673 7747

removed from the scrubber water?

In other words, what do you do with the scrubber water once you are done with it?

MR. HOWARD: This just brings the problem back to the treatment plant, which brings it around again to the control of dischargers to the treatment plant.

We have taken it out of the air and put it back into the water. If it is in sufficent concentration, you have it at a point where you can treat it, because you have less water volume than the total discharge volume of the treatment plant.

But, on the other hand, in effect what you have done is returned it to the water stream. And the first point of control is really the discharger.

MR. LINDSEY: Then what you are saying is that since the scrubber water is recycled into the sewage treatment plant you would have a circulating effect, in essence.

MR. HOWARD: Circulating or going out in the effluent.

MR. LINDSEY: Or in the sludge or in the ash.

MR. HOWARD: If it comes back in the ash, then you are going to have some recycing build-up in the ash. But you have it in a much more concentrated form, and you have it at a location where you can do something about it.

THE CHAIRMAN: Mr. Lazar.

MR. LAZAR: Mr. Howard, from the audience a question.

Have you studied the heavy metal air emissions as a

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

function of heavy metal content of the waste?

I presume the question is concerned about those wastes that have an exceptionally high amount of metal.

MR. HOWARD: Yes. We have. As I mentioned a little earlier, in order to get a measurable amount of the heavy metals, we had to dose the wastes with heavy metals. So we immediately had a material balance across the test program. We knew how much we put in, and we knew where it all dropped out, so we had to measure the sewages of the domestic wastes that may have high heavy metals -- we have found outside of those that you can identify. We have found that in some areas you have combined sewers, that they pick up zinc from guardrails and such. Because they are flushing the whole city street system at the same time they have an increase.

Philadelphia is a case in point.

THE CHAIRMAN: All right. Do you have one more question, Mr. Lindsey?

MR. LINDSEY: Yes, I have one more question from the audience.

What are the apparent difficulties with the San Jose mobile hearth sewage plant installation?

Would you care to comment on that?

MR. HOWARD: Yes, I would be glad to.

The San Jose installation is designed to burn grease or scum from the sewage process, and it is burning it in a

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

hundred percent concentration. It is not mixed in with sewage whatsoever. And, therefore, we had a tremendous load of this material. And when the system was tested with a moderate energy venturi scrubber, it was found that we could meet the hydrocarbon emissions, we could meet the actual particulate loadings, but because of a very fine sub-micron discharge of mostly calcium identified particles, we could not meet the Wringleman or the opacity. And therefore, the unit is being modified, and we are making changes on it.

But basically it was a problem of calcium sub-micron particles being outside of the efficiency range of the scrubber system.

THE CHAIRMAN: Thank you very much, Mr. Howard.

Next I would like to call Mr. James Burch of Project Survival.

Mr. Burch, please. Is Mr. Burch in the audience?

I will call on the next speaker and perhaps we can come back and check later on with Mr. Burch.

I would like to call Dr. Paul Palmer from Zero Waste Systems, Incorporated.

Dr. Palmer, will you accept questions?

DR. PAUL PALMER: I rise today to speak as president of Zero Waste Systems of Oakland, a broad spectrum industrial chemical recycling company. We were the first of our kind in the United States. After two and a half years we are probably

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673-7747

still unique. I am glad to be speaking in this capacity since all the discussions of industrial waste I have heard or read lately, including those of the EPA, have been dominated by the psychology of dumping with only a perfunctory nod toward the value of resource recovery. I will try to bring that balance back on center as I see it.

Anyone reading EPA publications recently would be justified in assuming that the EPA is our staunchest ally.

Listen, for example, to Roger Strelow, Assistant Administrator for Air and Waste Managmenet, writing in Seven Conference Papers (EPA/530/SW-156 Feb. 1975)

> "We at EPA are committed in making recycling happy -- for both energy and materials." Page 8.

In the same publication, on Page 25, John Lehman, Director of the Hazardous Waste Management Division, says:

> "We support the concept of an industrial and hazardous waste clearinghouse, that is, to use the waste as is, if possible. One man's waste is another man's feed stock. A firm in Oakland, California was recently formed to provide this service for the western area."

It may be immediately understood that the reference is to my company, Zero Waste Systems. What is not so immediately understood by the layman is that this kind of expression has become de rigeur in discussing hazardous wastes.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Even the most vociferous opponent of recycling is required today to endorse at least the concept of recycling "ultimately." If I may be permitted a trite phrase, recycling has joined motherhood and apple pie in the American pantheon. What separates the supporters from the sideliners today is actions, not words.

On the action scoreboard EPA has shown anything but support for chemical recycling. What I see instead is:

One. A pervading, arrogant blindness to the day-to-day realities of industrial waste recycling;

Two. The Aerospace Syndrome. A dedication to technology solutions and a rejection of common sense resolutions;

Three. The We-Could-Have-Built-Rome-in-a-Day Syndrome. An insistence on capital intensive approaches in a time of capital shortage and a rejection of labor intensive techniques in a period of unemployment.

Four. The Big-Bucks-Buy-Better Syndrome. A marriage between EPA and giant institutions for expensive proposals. There is no time for innovative approaches or small companies. TRW, Arthur D. Little, Battelle Corporation, Monsanto, Occidental Petroleum -- these are the grinning cheshire cats pocketing the grants.

Five. The Split-Century-Timing Syndrome. A willingness to dawdle along the country roads of waste management so long as some progress is made towards ultimate recycling. No tears

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

are shed for the valuable resources being buried today that we could already be recycling today were government policy not so dilatory.

Six. The Witch Doctor Syndrome. A three-year romance with an absurd bureaucratic solution to the waste problem -- the waste clearinghouse. By shaking the right rattle at the diseased patient the illness will suddenly disappear. We have tested this idea sufficiently to know that it does not work. Recycling cannot be divorced from hard work, intelligence, committed leadership and legislative support. The public is hardly crying for another governmental department to meddle in industrial affairs.

If unimpeachable proof of the lack of interest on the part of the EPA in industrial recycling is required, we could not do better than to turn to their own listing of EPA reports through June, 1975. Looking under the following topics we find:

Recycling -- no entries;

Resource recovery -- no entries;

Waste utilization -- no entries;

Waste recycling (excluding solid wastes, municipal wastes and automobile wastes) -- six entries.

Two on waste plastics; one on recycling assessments and prospects for success; one on a chemical microbial plant for converting cellulosic wastes into protein; one on marketing

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

sulfuric acid arising from sulfur dioxide abatement and one study of Federal subsidies to stimulate resource recovery.

Looking under "waste disposal" on the other hand, we find no fewer than 230 papers listed, many of which are long bibliographies. Where in these reports can we discern the EPA's commitment to recycling?

The EPA does further injury to the movement for recycling by accepting without question the traditional biases of the dumping industry. Admittedly these biases can be subtle and imperceptible ,so I will try to expose them to our scrutiny. Remember that dumping is an absolutely unique concept of chemical materials. The viewpoint of dumping is such as to reduce all chemicals to two physical measures -- gross weight and gross volume. In no other industry are chemical substances so insulted. Nevertheless, it is a fact of nature that all substances possess mass and occupy space. Therefore, all substances are more or less susceptible to the categories of the dumping process.

Recycling,on the other hand, attaches no more significance to gross weight and volume than any other industrial process does. More important are chemical properties, reactivity, safety of handling, purity, availability, utility of resulting products, pathways to commercial materials and closeness to markets. The recycling industry is incapable of dealing with wastes as either flammable or not, toxic or not, liquid or solid,

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

pondable or incinerable. We must slowly investigate an array of questions, data and problems before we even begin to come up with solutions. The biases referred to earlier come into play when a potential recycler of a waste is thrown a problem couched in all the terms of the dumping industry -- "take care of umpteen tons per day of anything we throw at you."

For a classic and disgraceful application of these biases see the EPA Request for Proposal No. WA 75-R528 which is out for a contract at this very moment.

Some simple corollaries flow from the above observations:

One. Time. Recycling solutions will not be found in response to crash study programs. They will require nurturing and development. The early exploratory stages cannot be dispensed with. They will take even more time than the implementation stages. If the process of developing recycling alternatives to dumping is delayed today, attainment of goals will be delayed by an equal amount of time. The EPA wasted two years fiddling with the national dumpsite concept. Now they are throwing more years into the waste exchange concept. How many years will it take before the EPA stops searching for magical, convenience solutions to the hazardous waste problems and begins to till the soil, sow the seed and prepare for the hard work that has always preceded the best crops?

Two. Recycling must be allowed to treat individual

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

problems. Any study, treatment plant or new invention which purports to solve a host of waste management problems all at once is construed to be a disposal technique. Recycling solutions will not emerge this way. Any funded project whose avowed goal is to treat enormous varieties of wastes will succeed only in effective destruction of resource values, not their conservation.

Three. Pushing back the generator interface. A recycling approach cannot afford to waste time and expense to unravel, decontaminate and unmix wastes which have been unnecessarily degraded by the waste generator. The majority of manufacturing processes are precision processes to manufacture precision products. By and large,they are capable of producing precision wastes. One of the main reasons we find so many gunky, sludgey, intractable wastes today is what I call the "garbage mentality." America has extended its Declaration of Independence too far for 1975. "All garbage is created equal!" Old furniture garbage, styrofoam cup garbage, sulfuric acid garbage, DDT garbage -- all have the same name and so can share the same fate. In millions of plants the wastes are allowed to mix in common drums, sumps and heaps. The dumper is unaffected. He swallows it all. The recycler has to spend much of his energy pushing back his interface with the generator into the manufacturing process itself to eliminate unnecessary waste degradation.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

The EPA has encouraged this process by its emphasis on effluent cleanup with no regard for the sludges produced in spite of the enormous quantity that are expected. If a former air and water polluter spends millions on equipment to produce garbage he has satisfied the EPA. How readily can you expect him to spend once more to replace that equipment with other equipment which produces a salable by-product instead of garbage? We are watching today as the EPA orchestrates a vested interest in producing garbage -- a vested interest which will resist recycling in years to come.

Putting the above three points together, we can conclude as follows: Any approach to waste management which makes a genuine contribution to resource recovery, rather than merely paying lip service to it, will need to separate waste treatment into many small chunks rather than the monster batches it is divided into now. It must begin immediately to explore the chemical and marketing subtleties of recycling which will not yield fruit this year or the next,but will eventually eclipse all other approaches. It must bring technology, common sense and American know-how into this field through the involvement of small innovative companies such as Zero Waste Systems.

Thank you.

THE CHAIRMAN: Do we have questions?

Mr. Lindsey.

MR. LINDSEY: Yes. Dr. Palmer, we have heard again and

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

again that the major problem with recycling generally -- talking now of municipal refuse as well as industrial wastes -- is one of economics, that unless and until the raw material crisis becomes high enough to make the process pay or unless and until new technology is developed which enables the treatment of these wastes to become cheap enough, why, recycling will not occur in the private field.

Can you comment further on that particular part of the problem as you see it?

DR. PALMER: Yes. I do not think that that is an accurate assessment of where recycling finds itself today. I think that is about six or seven years old.

Today, recycling is -- most of the time -- I do not know what figure to put on that percentage-wise, but most of the time it makes money for people, it is economical.

It is already -- I think the shortages of 1972, '73, the energy shortages have taken us beyond that point.

People talk about technology as though it is brand-new technology that is waiting to be developed. It is not so at all.

The technology for dumping, the dumping industry, so far as I understand it, is not yet developed. People cannot contain waste, they cannot incinerate them, they cannot do it well. In all fairness, they bite off a bigger job than a recycler who takes specific wastes and says, "I cannot handle

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

everything in the world." And dumpers try to handle everything in the world. So in all fairness it is not the same.

Whereas in recycling the technology that is required is 19th Century technology. It is well understood it is easy.

Now, it is a question of what you mean by recycling. Our concept of recycling is that it is not a way of selecting an industry taking its waste and returning it immediately to the same industry. We try and move to a different industry. We keep it in the materials pool for the benefits of recycling, and we do it in a different way.

MR. LINDSEY: Well, then, are you telling me where it is economically practical it is occurring?

For instance, I know of a number of companies that are in the business of treating hazardous materials and reclaiming large fractions of those materials. And they seem to be able to do it at a profit where it is profitable. And it seems to be being done.

Are you telling me that it is not in fact being done, that there is something further that needs to be done that we should do or undertake specifically?

DR. PALMER: As I understand it, most of the companies -- well, probably the companies you would be referring to have taken a specific industry or specific waste where there was some valuable components and then extract it attacks the problem on a fairly limited basis one at a time.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

We take the broad range of chemical materials and by moving them around different industries we essentially cover -- we treat recycling in itself as a separate discpline rather than looking for one valuable component here or one component there.

When you are dealing in valuable components you often end up with a worse sludge than you started with. But it just does not have that value in it any more, so you feel justified in disposing of it, but it does not necessarily solve the environmental problem.

THE CHAIRMAN: Mr. Lazar.

MR. LAZAR: Dr. Palmer, just the day before yesterday when we had an identical public meeting in Houston a Dr. William Brown from Bioecology Systems, Incorporated testified that to -- to give you an example how difficult it is to bring about recycling, that he had a shipment of 10,000 gallons of essentially potable ethyl alcohol, and he tried for a long time -- I believe he said for weeks -- and he just could not find a customer for it. He just did not know what to do with it. I presume he has to dispose of it.

What would you suggest as to how he could go about recycling it if the market in that particular area seems to be such that 10,000 gallons is probably not considered commercially feasible, not profitable for recycling?

DR. PALMER: Well, I think that judging by the fact that

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

he did testify that there is a real problem there.

Now, it sounds to me like the problem is one of information, of knowing what to do, knowing your markets, and knowing how to find markets than any technological problem or economic problem.

I cannot see why there would be any purely commercial obstacle encountered.

MR. LAZAR: How would you go about finding the market?

DR. PALMER: Well, rather than getting into the specific question of ethyl alcohol, let me point out that this is exactly what recycling is about. The heart of recycling is not technology -- well, it is the economics, but the heart of it is in marketing, finding a way to reuse materials.

There are dozens, hundreds of potential products you can make from a given waste or surplus or what have you with all kinds of different markets.

What we specialize in is ways of finding those markets. And so if that man had contacted us I do not think we would have had any problem in placing that material, because that is our daily business.

We have run into this before. In Stockton, the Army disposed of an equivalent amount of ethyl alcohol at the time of the worst shortage, in '72. They disposed of it while people were shutting down their shops because they could not find it, and yet they searched and were not able to find the people.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. LAZAR: Well, Dr. Brown made the specific point that if it had not been a one-time shipment he would have had no problem probably -- that is, if it was a continuous process of producing 10,000 gallons of ethyl alcohol.

But would you be able to handle just the one shipment?

DR. PALMER: Yes. That would be normal for us to handle one shipment. That is what I say, that the people you were referring to before, they take a continuous waste stream and look for one particular valuable component. A tremendous proportion of the wastes are one shot or erratic. In fact, it is the nature of waste and one of the problems in recycling is that wastes are not being produced for you to use, they are being produced accidentally against the will of the generator. And if he can cut it down, he will. If he can do something else with it, he will. And so, the sources are always erratic.

How do you handle erratic sources in this commercial world that requires constant markets? Well, that is what we are set up to handle, to know how to handle one-shot deals.

THE CHAIRMAN: All right. I just wanted to make a comment before we go on with further questions.

One of the questions from the audience is addressed to the EPA panel. And I just want to reiterate that the purpose of this is to gather information and not have the EPA expound. So if you have questions of EPA, this is not the appropriate forum. Please address your questions to the speaker and his

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

statement.

We would be glad to answer questions in another forum or directly by you writing to us, but not here.

Mr. Mausshardt, do you have a question?

MR. MAUSSHARDT: Dr. Palmer, I have two questions. These questions did come from the floor.

As a plant engineering manager concerned with the realities and costs of waste disposal, I can state categorically that any market for our wastes would be welcome. My question is, are you claiming to be a clearing house for waste materials sales or are you a processor?

DR. PALMER: All right. What we are claiming to be -- I have to shift it a little. It depends on our response to a particular waste.

What we would like to do is not be a clearing house for waste alone, but a clearing house for all of the processing, all of the marketing, all of the contracting out for processing that is required for our waste.

There was a statement in the question that he would be glad of any market. Well, I have to return that and ask would he be willing to consider his wastes as a resource in order to find a market? This is where the problem is that is called pushing back the generator or interface. And when I spoke about the psychology of dumping, I mean there is a feeling today that a plant manager can produce a waste, and he is used to

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

having a dumper take it away. Well, with the same convenience, he can go to a recycler and, hopefully, even have the recycler buy it. But he does not want to make the changes that are needed to make that waste recyclable rather than dumpable. And there has to be an effort on the part of the generators of the waste to make that a recyclable material.

This is where the EPA comes in, because the generators do not have much of an incentive. I think dumping fees should be ten times at least what they are today. I think it is outrageous that you can take these noxious materials and throw them into the ground, destroy the value of that ground, and society just accepts the price. That ground is essentially destroyed for anything but for surface use after that.

So I think EPA comes in in making it more desirable for people to want to recycle their waste.

MR. MAUSSHARDT: The second question I have from the floor is: Would you briefly comment on the recent report on an experience in West Germany that sounds like your firm's function?

I think the individual is specifically referring to a "Business Week" article a few months ago.

DR. PALMER: I have not read this specific article, so it slipped my attention.

MR. MAUSSHARDT: I believe it is on waste exchange.

DR. PALMER: Yes. I know that there is a waste exchange in West Germany. I am not familiar with the details

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

of it. My research director is right now in England studying a waste exchange. But I do not know that much about the German one.

THE CHAIRMAN: Mr. Bourns.

MR. BOURNS: Dr. Palmer, I have a question. Does your company take mixed waste for subsequent treatment to produce a resalable product, and also, do you store chemical products for later placement?

DR. PALMER: Yes, we do. Storage of chemical products is sometimes the processing that is required.

If you have a lot of small manufacturing houses that produce small quantities of waste -- it may be perfectly usable waste or it may be a processable waste or it may have a high value component in it -- whatever. Yet the mere fact that it has been manufactured in the small units means that nobody can afford to get into reclaiming it. And so each person individually contacts a dumper, and it gets hauled away. But merely storing it up until there is enough of a quantity to make some kind of processing economically viable, you have performed a recycling service without having to get into heavy industrial techniques.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: I have a couple of questions from the audience.

Have you encountered any waste materials that you could

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

not use or could not recycle such as arsenic sludges, spent catalyst materials? And do not most of these processes that are used to treat these materials end up with a sludge that creates a problem?

DR. PALMER: Well, it certainly is true that there are many materials that we run into that for one reason or another we cannot handle. But part of the reason we cannot handle them is that we have no support from outside of our organization.

We have had very little legislative support. To date we have had no financial support whatsoever. We cannot take on a problem which does not promise some kind of a return.

Now, that is not the position that the United States as a nation dealing with this problem should be in. The United States should be able to handle various problems if they are recyclable, but if they lose a little bit of money or they are not as profitable as you would want, we should be able to tackle problems like that from the recycling point of view.

And as I pointed out in my paper, you cannot simply take some sludge and immediately off the top of your head know if this is recyclable or not. There is a lot of work that has to be done to figure this out, to figure out markets, to figure out what kind of processes are possible.

This work has not even been started. The studies that I have seen, the EPA studies, the other governmental studies, they skim along so high off the ground that they do

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

not even catch the peaks.

We have made virtually no use of the EPA studies that we have in our possession on chemicals, methods of detoxification, et cetera, et cetera, because they are too general. The categories do not tell you anything about how to actually go about treating a waste.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: A related question from the audience.

Do you believe it is necessary for the government to support prices of recycled products in order to allow for larger scale recycling?

DR. PALMER: I do not know whether it would take that form or another form of subisidy, but I think right now dumping is so cheap and plentiful and available and subsidized that recycling will not get off the ground unless some kind of support -- either dumping is discouraged or recyclying is encouraged in one way -- and I do not know what form the encouragement should take.

THE CHAIRMAN: Mr. Kovalick, another question.

MR. KOVALICK: Now, following on that, you have obviously had just a little bit more than a little frustration with EPA, a variety of troubles with us, but given your awareness of our current legislative authority -- and I realize that that may not be a fair background -- but what several things do you want us to take away with us as to what we should do

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

or what you propose we should do to either redress things that you feel are incorrect or correct the approach that we have taken in the past?

DR. PALMER: Well, I would like to give you a neat, snap list, but I think that would take a longer answer than I have time for here.

To sum it up, what is required is consultation with people who are actually working in this field.

Now, for years we have been labeled as a waste exchange. And as I said we found that that is a primitive solution. It does not work. And yet we have not been contacted on the question of waste exchanges in general.

I pointed out that there is a request for proposal today. I have read the whole thing. It says in there, it has the traditional squib about resource recovery is to be given priority, but there is no way in the world that any resource recovery is coming out of that I can see. Now, I may turn out to be wrong on that, but I do not see how resource recovery can come out of that because of the way it is structured. It is structured so that someone can only come out with an enormous list on how to generate and dump and dispose of materials. I think you have to consult with the recycling people.

MR. KOVALICK: Well, if you have any further thoughts and you want to put them down in writing, we would be happy to

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

put them in the record in terms of proposals after you have given it some thought.

THE CHAIRMAN: One last question. Mr. Lazar.

MR. LAZAR: From the audience.

How much potentially hazardous waste do you recycle, let us say tons per month, something like that?

DR. PALMER: I do not feel that that is a legitimate question, because once again it partakes of the biases of the dumping industry, which is gross weight, gross volume -- how many tons can you slap through some kind of a system and be done with it.

It is a question I get all the time. There is no mention made in there of how toxic were the materials, how valuable were the materials, how injurious were they to wildlife. These are more to the point, and these are the questions that are not asked of the dumping industry. It is just how many tons per month.

I am not claiming that we are a very large outfit, but the ideas that we have developed, the styles, the approaches we have developed are capable of tremendous amounts of expansion of scale-up. And I think that is the more important answer to that question.

THE CHAIRMAN: All right. Thank you very much, Dr. Palmer.

Ladies and gentlemen, we have gone a little beyond the time

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

we set for a break, but I would like to take a break right now fo: 15 minutes. We will reconvene at 10:43.

(Short recess.)

THE CHAIRMAN: I call the meeting back to order and call upon Mr. G.F. Kroneberger representing the American Institute of Chemical Engineers.

Mr. Kroneberger.

MR. G.F. KRONEBERGER: Thank you, Mr. Lehman. I would like to thank the panel for the time to participate. I would like to thank the audience for their interest in the matter.

I would like to correct the record on one small point. I am actually speaking for the Environmental Division of the American Institute of Chemical Engineers. It is a rather big association, and you cannot clear everything you say through everybody. And it has been delegated to our association.

I am chairman of the Solid Waste Section of that division.

We would like to begin by saying that we do not intend to answer all the questions completely that were posed in the notice of this meeting.

We are supplying an attachment which I will abstract on the important points.

I would like to say that the reason we are here is to:

One. To demonstrate a willingness to cooperate on further development of this subject.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Two. To establish trial bench marks so that areas of agreement, or disagreement, can be established.

Three. To make suggestions, as to some of the next steps that should be taken, in our opinion.

Four. To establish a broad outlook so that all items can be placed in proper perspective.

One of the more important items, and one which did not fit in the format of our submittal, pertains to point three above.

The agency has accumulated a wealth of information and documentation on the subject of hazardous wastes. There also is a vast amount of data generated from other sources, perhaps so much as to be approaching inaccessibility of much of the important data.

What is needed at this time are master summaries and categorical summaries that can be reviewed, commented upon, and updated.

This in itself can be a great undertaking. One method of simplification can be to establish a priority list of hazardous substances so that the most serious items can be considered before spending much time on those items in the lesser categories. This does not say that all energies should be directed to the most serious items; but rather, that they should be given major consideration.

If we were to be asked what one of our first priorities

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

would be, I am inclined to quote the words of one of my colleagues which are: "It would be clearly in the best public interest for the agency to submit a summary and a status paper which distills the essence from the many millions of dollars of investigation to date."

In preparation for this, presumably a categorical bibliography would evolve. This should be made available to interested contributors shortly after it is in existence.

We agree with the EPA concept which was contained in a position paper generated in early 1973: that government involvement in the identification, control, and disposal of hazardous materials should be confined to data collection and dissemination, and the regulatory process; and that private enterprise and state and local governments should be used to the maximum reasonable extent in handling, controlling, and disposing of such materials.

We concur, that for the long-range outlook, the very hazardous wastes should be converted, reduced or reused, and in effect minimized at the source. This,of course, reaches to the very root of process applications and admittedly is not an overnight accomplishment.

That is the statement that is a complitation of a handful of interested people on the executive board of the Environmental Division.

I will just go through the more important points that

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

may have not been covered.

Harvey Collins covered the hazardous definition very well. We would like to add to that that what should be included on hazardous material are the triggers -- in other words, a material in most of its existence is not hazardous. Something has to happen to it to make it hazardous, whether it is ignition, pressure or force or somebody breathing it.

We have to start identifying these causative forces.

Also, the degree of the hazard has to be identified as: very bad, bad potential,minor, et cetera. And also the obviousness of the hazard. There are many hazards which are very obvious, there are many hazards that are not.

One good case in point: I believe you all read about the high school chem labs having materials that could be quite hazardous, yet there is no way of knowing this unless you are an expert on that particular material.

In some of these instead of reading a whole question, what we have done is itemized the answers -- very brief answers, I might add -- to the points specifically listed in the Federal Register.

I will just refer to them by letter. Most of you have a copy of that in case you wanted to see what the detailed question is.

Regarding "2.A.," What Responsibilities/Liabilities Rest With the Following for Ultimate Environmentally Acceptable

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Methods:

Generator: Should quantify the content, the characteristics, and the hazards of the wastes he generates.

The treater should know the waste characteristics he begins with, the effect of his treatment and the characteristics of the wastes he ends with.

The disposer should know the composition characteristics and hazards of the waste he emplaces.

I am just abstracting some of the points that have not been covered.

On point "2.B," Who should bear the costs of assuring envinronmentally safe disposal?

There is quite a bit of a disagreement on who should bear those costs, and I am going to skip over the controversial points, because I would like to present a, "what-we-all-agree-on" point of view.

One subletter under that paragraph is, "Each party should assume the costs of what he has to do to perform his function in a realistically environmentally sound fashion. This would then be reflected in his costs and therefore the costs of his services. If alternatives exist, which do not involve very high costs for proper treatment, then the most environmentally and economically usable method will evolve in the competitive business world.

"But it should be borne in mind that changes and

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

adaptations cannot be made with every 'change of the wind' and realistic long-term evolution has to be programmed.

"The great turn-around has already been made. While there is room for continued improvement, there is no need for unrealistic panic."

On "3.A," for which wastes, if any, should the following be required:

The subheadings are listed by the EPA.

a. Recovery/Reuse. We are saying whenever possible.

b. Incineration, which we are going to call combustion because in some cases incineration has been given a connotation that is not good because it used to be something that was wasteful.

We are saying, properly done, incineration can be an energy resource recovery operation. We are saying let us call this combustion now. For obnoxious toxic wastes can be recovered -- that was the answer to point "b."

c. Chemical Treatment -- if needed.

d. Physical Treatment -- when possible.

e. Bio. Treatment -- if adequate and considering costs and values.

One point under "3.B," for which wastes should the above be prohibited, we are saying only those processes which can produce dependable, acceptable results should be used.

The processes that qualify for point one should be

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

applied in the sequence that gives the most favorable ratio of benefit/cost. Special emphasis should be placed on conservation processes, such as: recovery/reuse and combustion with energy recovery.

As a supplement to point three we are preparing a detailed listing which probably in no way will meet what is already documented in some corner of some room, but we are going to list the specific processes, specific equipment processes for materials that have been known to be applied successfully. This has not been completed yet.

What data are available for the above-- for those that we submit, data will be available on costs.

"6.A." was covered very well by Harvey Collins. That was: What are minimal safety and security precautions for treatment, storage and disposal sites?

And on "11," regarding transportation regulations, we are suggesting that hazardous materials have an easily identified marking on the box. This can be different colors or different kinds -- red for flammable, yellow for something else -- but something easily identified. And I believe it has to be used sparingly. Because if you look at everything, everything in the world can be called hazardous.

One colleague made the comment that love to excess can be hazardous. The key there is "excess." Excess of anything can be hazardous. What we have to do is focus on the very

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL: (415) 673 7747

serious ones.

And that is about the extent of my remarks.

Thank you for your time.

RESPONSE TO

ENVIRONTMENTAL PROTECTION AGENCY

NOTICE OF PUBLIC MEETINGS ON

HAZARDOUS WASTE MANAGEMENT

By:
Environmental Division
of AIChE

12/11/75

1160

PREFACE

This response is supplied by interested responsible members of the Environmental Division of the American Institute of Chemical Engineers. The task set-out by the EPA is not a simple one, nor will we ever be able to state "this is it". The subject is controversial and parties can have honest differences of opinion from their own particular points of view. The views expressed herein are a melding of the points of view of professional Engineers from the actual facets of generators, treaters, disposers, intermediaries, the Government and of course the citizenry. At this time they probably do not represent the views of any particular individual, but should be looked upon as a brief, composite starting point for continued well guided evolution for the betterment of the whole without undue over-emphasis on a particular facet.

Note: Copyrights are reserved and nothing is to be abstracted or quoted out of context without prior permission.

The following sections are presented as itemized in the meeting announcement. The headings have been highly abbreviated to aid identification without repetition. Sub-headings have been added where multiple points were listed in the original documentation. The portion posed by the EPA has been underlined.

GFK/cs
11/75

HAZARDOUS WASTE (H.W.)

Answer Sheet

1.A. What is a Hazardous Waste:

The definiation used in EPA (A-107 is a good start. In some cases the effect that triggers the hazardous condition should be included; such as:

Ignition, Force, Pressure, Temperature, Air exposure, etc.

We need criteria for categorizing the degree of hazard, such as:

Very bad, bad potential, minor

We need to establish (or include) the obviousness of the hazard; such as:

Obvious, not normally obvious, latent, low potential.

1.B. Method of Collection of Waste Samples:

The waste source should list the types of hazardous materials that might be present and the content of known constituents. The best smapling methods should be known and established at the source. The goal should be to reduce "unknown" wastes.

1.C. What Analysis/Lab Methods for This Decision Process:

Most of the analysis/lab methods are known. The main item is to classify the material hazards.

2.A. <u>What Responsibilities/Liabilities Rest With the Following for Ultimate Environmentally Acceptable:</u>

Generator: Should quantify (reasonable ranges ok) the content, and characteristics, and hazards, of the wastes he generates.

Treater: Should know waste characteristics he begins with, the effect of his treatment and the characteristics of the wastes he ends with.

Disposer: Should know composition characteristics and hazards of the waste he emplaces.

2 Who should bear the costs of assuring Environmentally Safe Disposal:

(See notes which clarify or show objection to some of the following points

* A. The cost of what each one does would be born by the doer.

** B. What each one does "for the environment" rather than "for his business" should not necessarily be taxed.

* C. For known and established hazards known realistic requirements should be established.

*** D. Persons that may have unknowlingly (reasonably unknowingly rather than irresponsibly unkowingly) malacted should be given consideration in the event of damages.

E. Once restrictions and hazards have been established then irresponsibility would be more serious. However, we have to consider that this is not a completely hazard free world. And that every day every one is exposed to hazards. No one on this earth has been given eternal pain free life.

F. Each party should assume the costs of what he has to do to perform his function in a (realistically) environmentally sound fashion. This would then be reflected in his costs and therefore the costs of his services. If alternatives exist, which do not involve very high costs for proper treatment then the most environmentally and economically useable method will evolve in the competitive business world.

But it should be borne in mind that changes and adaptations cannot be made with every "change of the wind" and realistic long term evolution has to be programmed.

The great turn-around has already been made. While there is room for continued improvement there is no need for unrealistic panic.

Notes:

* Point A. is subject to misinterpretation. One respondee disagreed with A. But said "He who generates the waste must pay for its ultimate safe disposal. Costs must be internalized". This is the effect of "A"; if a generator subcontracts disposal, he will of course have to pay the costs (and profit) of the subcontractor. Though the costs are a carry through of the waste. The generator still pays the total bill. (Or else someone along the line did not know his costs, and will shortly go out of business if that continues.)

** Point B. was objected to by some.

*** Point D. was objected to by some.

3. A. For Which wastes, if any, Should the Following be Required:

Some generalizations can be made but in most cases it would be best to follow the procedures of 3B with guidance from 3C.

a. Recovery/Reuse

When ever possible.

b. Incineration (Combustion)

For obnoxious toxic wastes and especially when energy can be recovered.

c. Chemical Treatment

If needed.

d. Physical Treatment

When possible.

e. Bio. Treatment

If adequate and considering costs and values.

3. B. For Which Wastes Should the Above be Prohibited:

In a brief response such as this we can only generalize and leave the details to specific reports. The above treatment processes should be applied in the following sequence.

1. Only thos processes which can produce dependable, acceptable results.

2. The processes that qualify for point 1 should be applied in the sequence that gives the most favorable ratio of benefit/cost. Special emphasis should be placed on conservation processes, such as: recovery/ reuse and combustion with energy recovery.

3. C. Process Types That can be Applied (* indicates, actually used)

We anticipate submitting specific processes for the specific processes listed under 3.A. These will be forwarded at a later date.

4. WHICH PRACTICES HAVE BEEN ESPECIALLY SUCCESSFUL FOR WHICH PARTICULAR WASTES:

(These are being tableized in the response for 3.C.)

5. WHAT COST DATA ARE AVAILABLE FOR ABOVE

Cost data is available and can be up-dated for practically all of the above.

6. A. What are Minimal Safety and Security Precautions for Treatment, Storage and Disposal Sites:

Treatment: Should comply with established regulations.* Specific personnel safety has to be left to proper operating procedures in each particular plant.

Storage: Sites should be properly controlled * so as not to exceed the exposure conditions of the material, assuming the exposure conditions have been listed as recommended in other sections.

Disposal: Disposed materials should be properly treated so that they do not present emminent hazards, contemporarily or in the future. Materials that cannot be realistically treated at present should be **contained and stored in such a way as to be safe for the long term and treated, or recycled at some future time when the technology or capability is available.

* There appears to be a preference for state and local control, except for radioisotopes which should be under federal control.

** This statement is to be interpreted that consideration should be given to possible future treatment. However, the disposal system chosen should be adequate to cover the assumption that the storage may be "forever".

6.B. Which Are Required for Environmentally Sound Management:

All.

7. <u>What Provisions for Site Monitoring, Record Keeping and Reporting are Needed to Insure Integrity</u>:

A. Site monitoring procedures have to be established for particular types of facilities and can include ambient air measurements, sub-surface water monitoring, as well as normal esthetic requirements.

B. Record keeping should cover any of the items established above plus a log of quantities and form, (in and out) of specific known hazardous substances.

C. Reports to regulatory * agencies should be mandatory when quantities or concentrations approach within certain limits of hazard violations.

* There was a preference for control by state & local government.

8. <u>What has Been Availability and Price of Insurance and Other Mechanisms to Reduce Risks of Operators at HW Management Facilites</u>:

EPA should have data on this

9. <u>What are Requirements for Long Term Integrity of Closed and Operating HW Disposal Sites</u>:

A survey and open record should be made * of all existing (whether operating or closed) disposal sites. These should be categoried as to content and possible hazard type. Future land use should be governed by those findings and the findings should be made easily available to those that are, or may become, responsible for the land use in and around the disposal site.

Present disposal sites should be classified as to type and required treatment and operation.

Future sites should be carefully regulated with respect to materials handled, treatment and method of disposal.

* Preferably by each state, with records open to all.

10. <u>What Methods are Available Regarding Setting Limits on Amounts if H.W. to be Emplaced:</u>

Proper operation of 9. above, would cover this adequately. There is a preference to contain the really bad wastes in a few adequate sites rather than dispersing them to may sites.

11. <u>Are Existing Transportation Regulations Sufficient to Cover H.W. as Distinguished From Substances:</u>
(These are preliminary suggestions only)

Transportation regulations should require the external listing on containers of hazardous materials. This along with proper marking regarding exposure limitations would then give automatic coverage for hazardous materials regardless of whether they are called substances or wastes.

An item that is transported by non-agents of the shippers (those that may not know of the hazard) and/or to non-agents of the shipper shall have noted on the container exterior the "usual exposure" restrictions.

Usual can be considered to be 0 to 180°F.

The label should state whether restrictions are for hazard prevention or product quality.

For items that would be hazardous at normally obtainable conditions, say 110°F shipping container exterior should be color coded:

Yellow for shock
Red for temperature

With each color approximately 20% visible on container surface.

12. <u>What Labeling Should be Used</u>:

Labeling should list type of potential hazard and the exposure conditions that may trigger a hazardous condition.

In some important cases such as strong chemicals, brief do's and don'ts may also be desirable.

3. <u>What Damages/ Investigations of Improper H.W.</u>

We presume the EPA has these listings. Coverage of these instances should be included in the state regulations.

.4. <u>What is needed for Citizenry Acceptance of H.W. Management Facilities</u>

A. Most will realize that some facilities are required.

B. Most will acknowledge that those that exist have to be regulated.

C. The main sensitive question will be which, and where.

15. What Federal Facilities Generate What H.W.:

This is best answered by a survey of those facilities. Many will be the normal types of waste from small facilities such as munitions, gases, radioactive, etc., should be handled as listed below.

16. How Should the Private Sector be Involved in Treatment and Disposal of H.W. Including Federal Facilties:

A. The private sector is and should be involved in treatment and disposal with proper controls.

B. The private sector is and should be used for treatment equipment and services.

C. For specifically hazardous materials such as munitions, gases, radioactive wastes; Government Storage and disposal sites properly documented should be used.

D. As in other environmental matters, it is suggested that the EPA establish guidelines (because of its vast data base) with regulations to be submitted, and adopted by the states.

THE CHAIRMAN: Will you answer questions?

MR. KRONEBERGER: Sure.

THE CHAIRMAN: Any questions?

Mr. Lindsey.

MR. LINDSEY: Mr. Kroneberger, you indicated that lists of wastes and processes and costs and so forth are being prepared now.

Will it be possible to submit them as part of the record -- that is, before the end of January?

MR. KRONEBERGER: Some of them before January, certainly.

MR. LINDSEY: That would be very helpful.

You indicated that one of the crying needs that you saw that we -- that is, EPA -- might be able to help you out with is to summarize the data and information which has already been accumulated over the world, I guess, and to do that by choosing a group of high priority hazardous substances and pool this information together in that way.

Did I understand that correctly?

MR. KRONEBERGER: Almost. We are saying we have to summarize what information we have, rather than make a predetermination on what information we are going to try to

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

summarize. In other words, you have a lot of information in your category of solid waste, hazardous wastes right now. Let us get summaries of categories so that we can find a solution for a specific thing very fast.

Now, we as chemical engineers have a lot of these. You have more than we have. I think that the categorical summaries are what is needed, evaluating those. Then with input from health hazards and what all, you can say which of those can be then really pushed.

MR. LINDSEY: We have had some comment on that approach in that waste materials are seldom substances -- well, they are compounds or conglomerations of a lot of materials. If we were to put this together along the lines of, let's say, treating arsenic or handling mercury or whatever, would this be useful in the handling of wastes?

MR. KRONEBERGER: Certainly. We do have to categorize the process system that will minimize if not eliminate the hazard of a certain material. Then we have to categorize the wastes we have and how we collect them.

One of the other points in my statement was that shortly we should go through the chemical plants themselves, go back in their process and minimize that right at the source, as was mentioned by other speakers here.

So there are any many categories that have to be approached.

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: Mr. Kroneberger, I was interested in the comments that your panel or committee endorsed a number of responsibilities for the generator, the treater and the intended disposer of wastes, including characterizing them and so forth. And I would imagine that a number of your members represent industry as well as other sectors of our economy. So do I read that as an endorsement of the costs involved to do that, that when you compare that with Dr. Collins' comments about expenses --

MR. KRONEBERGER: We are saying that a person, one, should know what he is doing. Two, the common American system right now is, your costs is what you do, and you try to sell it for what it is worth.

If you have to do something to do your job properly, that cost is yours. Your reason for existence is that somebody wants your service that you are performing.

MR. KOVALICK: If I can follow on that, there were some comments in our other sessions that those who are less responsible than the kind of people you are talking about are not motivated to do things that cost more if they are not forced to do it.

Do your committee members feel that would not put them at a distinct disadvantage?

MR. KRONEBERGER: The Institute, and especially the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL: (415) 673 7747

Environmental Division, is made up of chemical engineers that solve problems, both environmentally -- that is,made up of people who run process systems who perhaps might be considered as causing the problems, citizens -- chemical engineers that are in matters not related to hazardous wastes. So it is a broad spectrum.

Of course, we did not poll every single member, but I think the responsible position is that you do what needs to be done and if you are not a responsible person, this is the reason for regulations.

THE CHAIRMAN: I think we have some questions from the audience that are coming.

Mr. Kovalick, do you want to take that?

MR. KOVALICK: From the audience.

Did we understand you to say that some generators feel they should not absorb all costs?

MR. KRONEBERGER: No. Well, when you say "all costs," we assume all of their costs.

MR. KOVALICK: For proper environmental disposal?

MR. KRONEBERGER: Right. The point of disagreement came more on interpreting different statements. We are saying if you have a waste that needs to be disposed of, if you do give it to a treater or a transporter or whatever, he is going to charge you for that. So the charge to you is actually going to represent his costs, which are the costs of this disposal. Right.

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673 7747

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: I have a question here from the audience.

As a chemical engineer, in your opinion, what fraction of large volume waste streams, directly from industrial processes, are not irresponsibly mixed in sumps, et cetera, by the producer?

MR. KRONEBERGER: I could not begin to give you a number on that.

MR. LINDSEY: Okay. Thank you.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: Thank you. If I could clarify one of the points you made, perhaps it bears reading also, about labeling and transportation of hazaroud wastes. I did not quite get the gist of your comment. What I thought I heard was that there was a need for better labeling of waste materials. You mentioned some color coding, or would you say you felt it was sufficient?

And, of course, we are not particularly interested in the transport base; we are primarily interested in labeling at the treatment side.

MR. KRONEBERGER: Right. I read an abstract of a statement which said in more detail that when a generator is transporting material on his own trucks and the party that is transporting it is to receive it all know what it is, that that is their own in-house business.

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

And what we did also was say that it could be a hazardous substance. In other words, we are not saying this should only be for hazardous wastes, because why determine at one point whether it is a material or a substance or a waste.

A hazardous material, if transported by means that are a separate agency where the people handling it might not know what that is, that it is hazardous, then if it is -- it is pertinent if they cannot store it at 150 degrees or if it is exposed to 150 degrees, all of a sudden you are going to have a problem -- it should be obvious to the person having the possession of that that there is some concern.

Now, granted, you cannot write a book on each shipment, but you should have some simple alerting signs saying special consideration is required.

THE CHAIRMAN: I believe that is all the questions.

Thank you very much, Mr. Kroneberger.

MR. KRONEBERGER: Yes. Thank you.

THE CHAIRMAN: Our next speaker on our list specifically asked for a time of about 11:30 this morning. It is a little early. But if he is here in the audience, we would take his appearance now.

Mr. Tom Torlakson of the Sierra Club. If not, we will return at the time he requested.

I would next call on Mr. Don Degruchy from Lockheed Missiles and Space Company.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

MR. DON DEGRUCHY: Mr. Chairman, panel, ladies and gentlemen. My name is Don deGruchy I am with the Lockheed Missles and Space Company Waste Systems Group, and my comments today are going to be quite brief and very simple. And I would like to qualify the "simple."

I did not know, I still do not know in total who I am addressing today, and I wanted my discussion of what can be a fairly technical topic to be simplified to the point where anybody, irrespective of their background, can take away with them an understanding of the process's capabilities and perhaps the problems that it purports to solve.

My purpose here today is to acquaint you with a technology advance -- not new technology -- which has direct bearing on the problems which concern you and ultimately all people. My review of past meetings indicates attendance largely by people, organizations and agencies who are concerned with the safe disposition of toxic and hazardous waste. You are voicing your concerns in this public forum. Lockheed is concerned as well and has expended considerable amounts to develop a technology which can do something about the problem. It is my intent today to simply acquaint you with this process, describe it in very general terms to enable you to understand how it works and most importantly tell you what it does, which distinguishes it from other treatment alternatives. In all candor it is equally important that I tell you what it cannot do,

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

and I intend to do just that.

The process is known as wet oxidation. It consists of a flameless combustion or oxidation which takes place in the liquid phase in a water waste stream. It occurs naturally in nature. For example, the rusting of iron in water is oxidation. This wet oxidation process hastens and enhances that natural reaction by means of elevated temperature and increased availability of oxygen.

Let me describe briefly the sequence of events so that you can appreciate that the process is simple and safe. A waste stream containing organic wastes and water is pumped to an elevated pressure, pressurized air is added as the source of oxygen, and the stream is heated to operating temperature to accomplish the oxidation. Pressure is required to keep the water from boiling at temperatures of 500 to 600 degrees Fahrenheit. Oxidation takes place in a matter of minutes, and the organic material is either burned, i.e., destroyed, or rendered non-toxic -- and that is an important factor -- by virtue of changes in the chemical composition of the toxic compounds. Heat is then transferred to the incoming waste in order to both heat up the influent material and cool down the processed waste. This both conserves energy and prevents thermal pollution.

Now that is basically the process. I would be glad to discuss it in greater detail with those who are interested, but

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

I think only that amount of detail which I have presented is appropriate for the moment.

Of primary interest to you is "what can it do?" What kinds of problems can it solve?

Let me first qualify my subsequent statements by saying the process will treat all organics in all concentrations in time, at varying rates. However, the situations which I will identify are only those where it fits best, is practical and has reasonable economics associated with it.

The process is useful only on organic materials -- that is, material composed of organic compounds. And it must be used in association with an aqueous or water-based stream. Ideally, these materials should be dissolved in water. For economic reasons the process favors higher organic concentration, typically one to seven percent, lower flow rates, five to five hundred gallons per minute.

I want to stress again that I am citing ideal operating circumstances and not the limits of the process. Deviation from the numbers I have given you can be accommodated by many simple engineering techniques -- surge tanks, dilution and so on.

All right. Now, you know how the process operates and the regimes in which it operates best. Now what can it do?

Toxic materials have long been hidden or stored by such means as deep well injection, landfill and dumping at sea. These are not destructive processes, and toxic characteristics

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO CALIFORNIA 94102
TEL (415) 673 7747

still exist and no one can predict when they will reappear to present a problem by means of infiltration of the deep well material into the water cycle, leaching from the landfill or accumulation in large water bodies. The wet oxidation process would have destroyed these materials -- changed them from toxic or hazardous compounds into carbon dioxide.

The other elements in the compounds are released as salts of nitrogen sulfur or phosphoric which are generally not harmful,and in any case could be collected if so desired as useful material. Chlorine in organic particles is converted to chloride of which the sea is naturally full. Cyanide is converted to carbon dioxide and nitrogen.

Another important economic feature of the process is that without complete oxidation and in a much shorter time only partial treatment of toxic organics results in a non-toxic biodegradable effluent.

This last feature would enable a relatively small wet oxidation plant to convert a toxic waste stream into a non-toxic biodegradable stream which could be processed either in municipal plants or even spray irrigated to degrade naturally on the ground, not unlike organic fertilizers.

I did promise, and it is equally important for you to understand that the process does not solve all problems. It, like most other processes,is not a panacea. It does not significantly affect inorganic materials. It has, except for

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

a few instances, no effect on metals in the waste material. It must know beforehand what it is treating so it can assure the achievement of adequate treatment objectives.

Let me quickly list a partial summary of the types of materials for which it is known to be very effective: cyanide, phenols, herbicide, pesticide, toluine, vinyl chloride, xylene, formaldehyde, dye waste, coke still water, explosive waste, PCB, amines, alcohols.

And I could go on.

I think in closing I should clarify one question which may have occurred to some of you. How is this different from incineration, which is also an oxidation/combustion process?

It is different in several important respects.

First of all, you will recall that we are working with an aqueous waste stream, not solids.

The process is controlled and oxidation can be terminated when it is no longer required.

Two. It produces no air pollution. It is in effect self-scrubbing.

Three. It is a lower temperature process, typically 5 to 600 degrees Fahrenheit as opposed to 1000 to 1500 degrees Fahrenheit, therefore corrosion is more readily controllable.

Four. Because the water is not vaporized it is conservative in the use of fuel, and therefore less costly to operate.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

And in closing, finally, I do not mean to be commercial, but for those of you who would like additional information, I have some literature here in the form of a brochure which I will leave in the lobby, or I would be glad to talk to any of you when it is appropriate.

And I am willing to answer questions if there are any.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: Mr. Degruchy, first of all, let me urge you, if you can, to submit supportive data for this information if you have it. It would be helpful to us -- tests which have been run, results and so forth.

If that could be given to us in writing, we would sure appreciate it.

MR. DEGRUCHY: Fine. I think I can give you curves which will show you what you might be interested in.

MR. LINDSEY: Fine. That would be good.

Could you give us some information on the economics of the process compared to the other alternatives such as incineration?

MR. DEGRUCHY: Let me not get into someone else's domain too much. As to the other alternatives, I can give you the economics of this process, and they will be general figures, just as guides.

Typical processing costs -- that includes, now, the power for operating the pumps, compressors and heaters and so on

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

and so forth, labor, insurance, depreciation and so forth -- typically run about one-tenth to one cent per gallon.

Capital costs are to a large degree a function of hydraulic flow, but they vary very widely with the treatment objectives and so on. But you are talking about systems that are at least several hundred thousand dollars in scope.

MR. LINDSEY: Along the same lines, the processes used -- and I believe I am speaking correctly -- vary widely for treating sewage sludge materials. Is it possible also to destroy a variety of hazardous materials along with sewage sludge in this same facility?

MR. DEGRUCHY: I guess I would say -- and I would assume you are talking about organic hazardous materials --

MR. LINDSEY: Yes.

MR. DEGRUCHY: It depends largely on how the sludge processor -- and we do not -- would elect to employ the system -- the operating parameters, residence time, et cetera. The objective is quite different from our objectives in using this process.

As I said, it is not new technology. We are working it for a different objective. Sludge treatment has traditionally been for hydrolysis, for de-watering and subsequent sterilization -- not complete oxidation, which we are after in some cases.

MR. LINDSEY: So it takes a different set of conditions --

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. DEGRUCHY: Probably.

THE CHAIRMAN: Yes, Mr. Lazar.

MR. LAZAR: Mr. Degruchy, in our public meetings in Chicago last week a gentleman who represented the explosives manufacturing industry told us about the big problems incurred in getting rid of explosive wastes. And he said that open burning seems to be the only available alternative.

And I would like to ask you, could the wet oxidation process be used to get rid of these explosive wastes, and to what extent, and how safe is this?

MR. DEGRUCHY: Let me qualify the answer in several ways.

Broadly, the answer is "yes."

For most explosives you are dealing with solid materials In many instances they are relatively insoluble. If the material is not soluble in the water stream, which I presume it must be in, your oxidation is going to be inefficient.

If, on the other hand, you have explosive wastes such as the TNT production red water wastes, it is a good candidate for that. And as far as the safety goes, it is quite safe. There is no means to detonate those kinds of things. You control the concentration of things you are putting in such that even in the case of open deflagration, you do nothing to your temperature-pressure situation.

THE CHAIRMAN: Mr. Mausshardt.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. MAUSSHARDT: I have a question from the floor, and I would like to follow it with a broader question.

MR. DEGRUCHY: Fine.

MR. MAUSSHARDT: Must the waste product be soluble in the water, first of all, or can it appear in some other medium, such as in organic solvent, or in some other semi-liquid state possibly?

MR. DEGRUCHY: There are limitless answers to that question.

Ideally, it should be dissolved, however, some solid materials can be hydrolized by the process and subsequently dissolved in the stream that came in as solids.

As far as solvents, they will be affected on the assumption they are miscible with the water and the fact that you will get oxygen transferred to the materials as opposed to a bubble of this material.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: I have a question here from the audience.

Is the process termination immediate? That is, doesn't it require a general lowering of oxidation by a general lowering of the temperature?

MR. DEGRUCHY: The temperature is lowered gradually. I did not dwell on it, but the heating of the influent material and the cooling of the effluent material does take place in the heat exchanger. Now, obviously, there is a passage of time

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

during which the material flows through that.

We seek rather efficient heat exchange to the point where Delta T of, oh, say, 30 degrees would be expected, and the material would be cooled in that heat exchanger. But it is gradual.

THE CHAIRMAN: All right. I believe we have one more question that a gentleman is preparing now.

Mr. Kovalick.

MR. KOVALICK: Perhaps I could get you to comment generally on the use of your process for the non-sewage variety of treatment in this country.

Is it widespread?

MR. DEGRUCHY: Is it being used widely? If it were, I'd be out selling it and not here today trying to tell you about it.

(Laughter.)

No, it is not. As long as we are waiting, I will digress a bit and tell you why a missle or an airplane company as we are commonly known is in this game at all.

One of our product lines is space activities, and in that vein we got into life support, and in the life support area we developed a technology utilizing wood oxidation for the reduction of human waste to potable water.

In being acquainted with that process over a period of in excess of ten years now, only relatively recently did we

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

feel that it has application to the chemical industry, particularly the chemical industry.

We have worked for not quite two years on trying to find adequate applications. We made many wrong ones. Now I think we have gotten it down to the point where we know where it does fit and we can eliminate the broad contenders. And we are working closely with several chemical companies in the proposal stage where we will have a system in, I hope, by the next time you have a meeting.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: Yes. This is a question from the audience.

Homogeneous catalysis of industrial liquid phased material is a well-established technology. Has catalysis been investigated for wet oxidation of waste -- I guess in conjunction with your type of . . .

MR. deGruchy: Yes. We avoid it when possible. It is an added expense. In some circumstances where the maximum temperature and maximum reasonable residence times will not give you adequate achievement of whatever your treatment objective is, we will employe catalysts, both homogenous and heterogeneous. We prefer the heterogeneous, because with homogeneous you start having to take metals back out of the waste stream, which is an added step. But they are both effective.

THE CHAIRMAN: Mr. Bourns.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. BOURNS: I have a question here from the floor.

What would a typical retention or flow through time be for waste, say, cyanide?

MR. DEGRUCHY: Cyanide reacts quite quickly, and of course that is dependent on concentration and your operating parameters, but you are talking about something significantly under ten minutes.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: One more from the floor.

Is your oxidation from atmospheric oxidation, can it be super charged by another oxidant such as hydrogen peroxide?

MR. DEGRUCHY: You asked the one question I cannot answer, because we have not tried it.

Let me say in general terms we have used chemical oxygen additives, not hydrogen peroxide in this case.

It does in some certain circumstances enhance the process.

Let me further answer a question that you did not ask, and say that were we to use pure oxygen or oxygen enriched air, does it help? It does not enhance the process. It does reduce the pumping requirement to compress so much gas to put it into the system, so there are economies there, depending on what you have to pay for the oxygen.

THE CHAIRMAN: Mr. deGruchy , I believe that is all of the questions.

Thank you very much, sir.

MR. DEGRUCHY: Thank you very much.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Lockheed
MISSILES
& SPACE
COMPANY,
INC.

17 December 1975

United States Environmental Protection Agency
Office of Solid Waste Management Programs
Washington D. C. 20460

Attention: Mr. John P. Lehman, Director
Hazardous Waste Management Division (AW-465)

Gentlemen:

At your request, subsequent to the Lockheed wet oxidation presentation at your hearing in San Francisco on December 11, 1975, I am submitting additional data regarding the capability of wet oxidation to treat toxic and/or hazardous wastes.

The material enclosed is in the public domain and not sensitive as proprietary in any manner. Much additional information is on hand in our files and can be used for personal discussion. However, since each stream and the data pertaining thereto is in essence the property of a private client, we are obligated to restrict the written dissemination of that data.

I recognize that the enclosed data is not wholly complete. Details as to flow rates, residence time and cost are missing. I would like to suggest the following in order to provide you with definitive information regarding the performance of the process for any specific material or waste which may be of concern. If you can obtain prior permission (in writing) from a responsible party who is the source of a problem waste stream to share with you detailed test results, we would provide on a specified distribution basis the following information at no cost to the waste source or the government:

1. Test results showing COD, TOC, or BOD_5 removal with time under various operating conditions.
2. An analysis of the detoxification of the waste including a bio-assay if appropriate.
3. A specification detailing component size and cost, for a total capital cost estimate.
4. Estimated operating cost based on the test results.

BROCHURE DETACHED AND RETAINED
IN SOLID WASTE MANAGEMENT FILES

1189

A SUBSIDIARY OF LOCKHEED AIRCRAFT CORPORATION
1111 LOCKHEED WAY • SUNNYVALE, CALIFORNIA • 94088

In order to provide you with this test and economic data we would require only a five gallon sample of the waste stream and information regarding the character of the waste and treatment objectives.

Should you have an interest in pursuing this offer, you could call me at 408-742-6202 and I would be glad to discuss the arrangement. I believe that is the most effective way to provide you with meaningful technical data which you have requested.

I want to thank you for the opportunity to speak at your December 11th meeting. I would very much like to receive a copy of the Proceedings.

Very truly yours,
LOCKHEED MISSILES & SPACE COMPANY, INC.

D. C. deGruchy
Manager Waste Treatment System Marketing

DDd:jal

Enclosure

D. C. deGruchy
Lockheed Missiles & Space Company
Dept. 50-20 Bldg. 151
P.O. Box 504
Sunnyvale, Ca. 94088

THE CHAIRMAN: Next I would like to call upon Mr. Tom Torlakson of the Sierra Club.

Mr. Torlakson, will you accept questions after your statement?

MR. TOM TORLAKSON: Yes.

I am chairman of the Mount Diablo Regional Group of the Sierra Club and speaking here today representing our regional group.

I would like to illustrate some of the problems of hazardous waste disposal and point out Sierra Club concerns in this area by referring to an open pond evaporation dump for liquid waste adjacent to the City of Antioch. It is the city I live in, and I have had personal experience with the operation of the dump and the problems with the administrative agencies dealing with controlling and regulating the input of materials into the dumps and the air pollution problems that result from that.

For several years this industrial waste site has been operated on a 60-acre site with about a half dozen ponds receiving much of Contra Costa County's toxic wastes including heavy acids, heavy metal solutions, referinery sludges, et cetera.

As the City of Antioch expanded, the odors emanating

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

from the ponds became an increasing nuisance to the new homes and the residents in those new homes.

From the mere annoyance of the acrid smelly odors, the problem took on dimensions, more serious dimensions as home owners noticed evidence of corrosion to paints, aluminum and metal fixtures on their homes.

Now, the prevailing wind in the area happened to blow the fumes and odors evaporating off from the ponds into the adjacent neighborhoods. Some of the neighborhoods were as close as 300 yards. Some, which still suffer severe air pollution problems, were within about a half-mile away.

At times the local residents had further apprehensions and concerns concerning their actual health and safety. The airborne chemicals were actually corroding metals and damage might be done to one's lungs or to one's body by having been exposed to these chemicals.

From the nuisance of not being able to enjoy one's dining room or patio in this area in these neighborhoods from having to keep one's windows closed at night on hot summer nights when the fumes were evaporating off the ponds and drifting into area -- there were further annoyances and problems with actual eye irritation, throat irritation, congestion in the throat -- complaints of physical distress by residents in the area.

Fairly often people could observe visible emissions,

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

visible fumes, coming off from the ponds after a particular load from a truck was dumped into one of the ponds.

Several small fires occurred at the site during the early '70's. And in 1973 a larger fire and accompanying explosion busted open some containers labeled "beryllium."

This was a scare to the local residents and fire officials. It was never determined for sure if the beryllium escaped into the atmosphere and was airborne into the neighborhoods.. But, again, it illustrates the type of problem that can occur in these types of sites.

The Sierra Club had an additional concern regarding the danger to wildlife. The City of Antioch is located where the Sacramento-San Joaquin combine. And this is a part of the Pacific flyway. A lot of water fowl flying back and forth. And we received reports that water fowl were landing in the ponds and being gunked up by the chemicals and killed this way.

The problem which I think that would be most interesting to this forum is the problems the citizens had in dealing with what regulations were required of this operation, what could be done about the problems they were suffering.

First, phone calls to local police didn't come up with anything, because that was outside of their jurisdiction.

The City Council would not help, because it was outside of the city limits of Antioch. It was just adjacent to the city limits.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

The District Attorney couldn't help, even though we could point out the certain regulations that did not seem to be met.

Then there were the two regional agencies which could have been helpful, and which had jurisdiction over the problem. One was the Bay Area Pollution District. And here at this time one of their major tools was that public nuisance -- this was a very hard type of problem to define, just how many people are being annoyed. What is the extent of a nuisance? And how do you take legal action to resolve such a problem.

The other district which had the primary interest and regulation was the Central Valley Water Quality District.

The county originally let out permits for garbage for the site -- just a simple garbage permit. Then the Regional Water Quality District set up classification standards and began to review different sites throughout California and give them Class One, Class Two sites -- designations.

Well, Central Valley Water District determined that this particular site would not meet Class One or hazardous waste standards, and only issued a Class Two permit for regular garbage. However, they kept on extending the cease and desist order for the operation of this dump, at which time the residents continually trying to get their problems heard by different agencies, trying to get it resolved, formed a group to take legal action against it, the dump owners.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

Once this legal action was taken and publicity generated on the subject, a cease and desist order was finally upheld as of January 1st, 1975. Bay Area Pollution had been holding back from getting involved, because they said another agency was in charge, the Central Valley Water District. Yet at this point they also stepped in and did some pioneering work defining what is a public nuisance and held some hearings to try to get to the bottom of the problem and how to solve it.

Consequently, standards were worked out with the operator throughout these hearings, which were quite lengthy. The chemists and the engineers from the industrial waste facility met with chemists and engineers from Bay Area Pollution and the Central Valley Water District and together worked out a plan for closing such a site down. And I think this is another concern, area of concern, that the Environmental Protection Agency should look into is what kind of standards you should set up for closing down such facilities that contain potential caustic and poisonous susbstances.

In this particular case each agency was running around trying to find out what do you do, because there is no -- were no standards at that time.

The procedure that was finally adopted was one of skimming and draining one of the most toxic ponds and filling the other with garbage.

Again, this is sort of a pioneering stage of the game.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

We are not sure how this is going to eventually resolve the problem. There are still odor problems -- not anywhere near as severe as they were before to the local residents.

We had a fire in July with flames 100 feet high or so -- this is after six months after the closure of the site -- where the garbage either was still smoldering and combusting itself and was fed by methane gas from the decomposition of the garbage plus chemicals that were in the pond.

So you can see that there are multiple problems involved with such an open pond evaporation system. And it is the opinion of our Sierra Club group that it is a rather primitive method. It is a much better a method than letting these toxic substances go up stacks or out into the water. But there are alternative methods we feel should be looked into and required, either closed types of systems or recycling to be encouraged. And hopefully some standards and regulations will be set up in this direction.

Unfortunately, when the local citizens were handling the problem and trying to deal with it at that time, AB 598 was not in effect. This, however, we feel is a landmark piece of legislation which does require some type of standards for dumping so that you have compatibility of materials going into the pond so you do not have explosive reactions; you have plans and procedures developed for actually closing down these particular types of industrial waste facilities.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

So we would hope that the Environmental Protection Agency -- Congress would develop some kind of regulations and standards which would help other states in the United States protect and handle this type of waste facility.

One problem that may have been brought up by the person from Zero Waste Management is the fluctuating price of different types of toxic chemicals and acids and so forth in fluctuating markets. And perhaps government support of prices would be helpful here, so that it will be cheaper to recycle materials and sell them than to dump them in an open pond system or to just dump them into a water system.

That is the conclusion of this background.

I think these various problems as you see the citizen groups trying to find out who is in charge -- well, now, under AB 595 the Public Health Division is sort of coordinating -- California Health Division -- is sort of coordinating the development of standards. And the administration of these standards hopefully, there will be some enforcement strength added to their administrative ability.

THE CHAIRMAN: Thank you, Mr. Torlakson.

Do we have questions?

Mr. Bourns.

MR. BOURNS: Mr. Torlakson, you mentioned or passed over a very important point that I think I would like to have you speak to further, and that is concerning the particular site

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

in question is one which is facing us across California -- the same kind of question.

Which was there first, the disposal site or the new development? And should zoning have separated the two so that you would not have the conflict between the citizens and the disposal site?

MR. TORLAKSON: As I mentioned, the disposal site was there first. I think this is going to be a problem. As urban areas expand and move out to where these sites were located, you are going to get this conflict.

And, yes, there should have been some regulation of the zoning or some forethought on the part of the -- maybe the developer or the City Council involved.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: It was not entirely clear in your statement -- was the owner of the site the one who paid for all of the corrections that you described -- that is, the draining and the -- I presume that that was taken somewhere and disposed of?

MR. TORLAKSON: Yes.

MR. KOVALICK: What was the amount of that?

MR. TORLAKSON: I do not hare the cost figures on that. It was several hundred thousand dollars, I'm sure, to close the site. It is not a cheap operation at all.

THE CHAIRMAN: Mr. Lazar.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. LAZAR: Mr. Torlakson, could you tell us, has anyone analyzed the air as to the toxic constituents, and what type of pollutants have been identified in the lab report?

MR. TORLAKSON: Bay Area Pollution did set up some monitoring sites at different times, but did not come up with hard-core data. Part of the problem is that when you have some of these caustic reactions or explosive reactions where fumes were emitted, this would be in frequent points. In other words, after you dump a load residents in the area would see the fumes coming up, but the equipment was not there to monitor it.

I believe some samples were taken of metal in the area and chlorides and nitrates which may have been a result of acids that were airborne or something to this effect -- I'm not a chemist. But the main opinion that the Bay Area Pollution based their hearing and procedures on was the public nuisance.

I understand since the closure and since the hearings, tney have developed new tools and regulations regarding visible emissions and organic emissions which give them more of a handle on being able to go in and quantify what is going on and say, "Here's a problem. You have to meet these standards."

MR. LAZAR: Have any organic substances also been dumped there?

MR. TORLAKSON: I believe materials from the paper mills and this type of material, organic material, would have

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

been used as fill material.

They are using municipal garbage from nearby cities, and I believe they are also using solid waste garbage from industries in the area.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: Question from the floor.

Was the dump owner willing to purchase the land adjoining his dump? If not, is it not an example of public subsidy of the dump site.

I am not sure I understand the last part of it.

MR. TORLAKSON: No. They had approximately a 60-acre site, and the residential areas leap-frogged and moved closer. There was quite a confrontation between the citizens and the owners of the site, because they were looking at it from two different sides. And the owners, of course, would say the citizens shouldn't have moved into the area. The citizens said somebody should have warned us before having moved into this area where there was this potential problem.

But, no, the owner did not offer to buy the land.

THE CHAIRMAN: Well, I believe that is all the question that we have.

Thank you very much, Mr. Torlakson.

Next I would like to call Jean B. Siri of the West Contra Costa Conservation League.

MS. SIRI: It is a pleasure, gentlemen. I did not

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

expect to be on until this afternoon late because I failed to get my name on the list.

We are very grateful to you in our part of California for holding this hearing in our area, because we believe it is one of pur most grievous problems.

You have heard Mr. Torlakson speak on the problem, and it is a growing one for us with no real solution in sight.

We urge you to help us with this problem. We live in Contra Costa County, surrounded by oil refineries and their satellites. We have 80 percent of Northern California's hazardous industrial waste in Contra Costa County. We are about -- supposedly -- to get two new plastic plants and a new large refinery or possibly two. We already have five refineries in the county, one being tremendously large, Standard Oil of California.

We in the Air Pollution Authority live in fear of disastrous explosions and fires. We expect the barrel storage to go. No one knows, especially the operators, what is dumped and what is buried in the sites. We suspect that the high tides flushing areas of hazardous waste is the reason for the absence in the ten years of larva crab in San Pablo Bay as well as other valuable resources in the San Francisco Bay.

The State Solid Waste Management Board, after hearings around the State of California, has concluded that we need more Class One dump sites. That means to us more solar

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

evaporation ponds.

We read this marvelous little booklet that you put out which sounded like Dr. Palmer's presentation about the wonderful chemical solutions to all our problems. And then we read that you had just let a pilot project in the Midwest for more solar evaporating ponds. We cannot live with the solar evaporation ponds that we have with the hydrocarbon emissions, the fires, et cetera.

The Bay Area Water Quality staff thinks that Bay mud is just the ticket for these ponds because the clay is impervious, and therefore it is geologically great.

Though California has excellent new regulations, they are only that, unless the enforcement and the funding for enforcement is as good as the regulations -- and they are not.

In the Richmond area the enforcement seems to be non-existent, at least to date.

We do not believe the usual Class One operator is knowledgeable enough to cope with the chemical problems he is faced with. And we do not believe that any of the people in the state are capable of handling the bootlegged material that is either going in the sewer or is being dumped on the ground or being handled in a regular dump site.

There must be some kind of an incentive to industry. Our organization finds itself inclined towards a club approach rather than a carrot. Industry must be responsible for more

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

recycling or for the sale of industrial waste, or they must be responsible for the disposal of same. It must become too expensive to just dump on the ground where it poses a long-term human and natural resource hazard.

My organization has worried for years about the dangers to the employees at the dump.

We have heard from the wives saying they are in fear for their husbands' lives from explosions and so forth.

And there is nothing we can do. There seems to be nothing that Cal OSHA is doing about that. Everybody knows that the most hazardous job in the world is the operators at the dump sites.

And we worry about the truckers who haul the waste. We have had some explosions in which the truck and the trucker have disappeared.

There must be a better way than burying mountains of valuable steel barrels full of hazardous mixed waste. There must be some way to keep it and recycle it so the hazard of hauling it through city streets -- which happens in my community all the time -- and through the freeway is diminished.

Another extremely crucial problem in Contra Costa County is that which you have heard from Mr. Torlakson of local government permitting housing developments next to hazardous waste ponds. We now have the dilemma of people living in the subdivisions and suing the hazardous waste people who in

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673 7747

turn are suing them and the developer of the home, when the real villain, we believe, who should be sued is the local governmental authorities who permitted this proximity.

We like to think that it would be better handled, better financed and controlled in a more scientific manner and through enforcement by the Federal government handling the entire hazardous waste problem.

It is very much like saving San Francisco Bay was for us. At the local level it was a disaster. The state controls are still not strong enough. But when we got the Corps of Engineers to move with strong public support, the Bay stopped disappearing.

We urge you to speedily help us with this problem. The combination of industry, garbagemen, hazardous waste men and local government is very difficult for the citizens in this part of California.

Thank you.

THE CHAIRMAN: All right. Thank you, Ms. Siri.

Will you accept questions?

MS. SIRI: Yes.

THE CHAIRMAN: Do we have questions?

Mr. Mausshardt.

MR. MAUSSHARDT: I would like to restate a request that if you have any information on documentation on these explosions or trucks disappearing we would very much like to

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

receive them.

Thank you.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: For the record, when you were speaking about Cal OSHA, you were referring to the Occupational Safety and Health Administration?

MS. SIRI: Yes.

MR. KOVALICK: Could you elaborate a little bit on what your frustation has been there. Is it a matter of insufficient enforcement or the lack of understanding of the kind of site involved?

MS. SIRI: I am not sure. Contra Costa County has an extremely high industrial health problem which we have not been able to get much money spent on studying or much help from the Public Health Department. And it seems to me with this kind of record that Cal OSHA has not done much as yet. We are hopeful that they will be able to.

THE CHAIRMAN: We have one question coming.

Mr. Kovalick?

MR. KOVALICK: This is a two-part question.

Would you repeat your name and affiliation.

And how many fires and explosions have occurred in the past ten years?

MS. SIRI: My name is Jean Siri. I am the president of West Contra Costa Conservation League.

I cannot document all the explosions, although you could get this from the Regional Air Pollution Board who have records on this. With luck we see an item in the paper, or if we inquire of the Bay Area Pollution Board we can usually get the record.

But I know there have been a couple in the last year. I know there was one where the truck exploded. A barrel fell off the back when the gate went down. There was one recently in the area in which an extremely toxic insecticide, I believe, had been sent. It started at Shell Chemical and was to go to an industrial tanks area in the south. And they refused to accept it there and recommended it to be sent to the Nevada Hazardous Waste, Radioactive Waste Site, because it was so hazardous. But instead they brought it to my town of Richmond and dumped it on the ground, and there was a resulting explosion. That was in September.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: I have a question from the audience.

Having worked on a resources recovery subcomittee at the state level, would you comment on the potential and feasibility for resource recovery and recycling of hazardous wastes?

MS. SIRI: Well, I made a presentation to the State Board hoping that since we had a committee on resource recovery at the advisory council level we would study hazardous wastes.

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

At the moment, as I understand it, most of the authority has gone to state and public health. And state and public health, as far as I know, is not into resource recovery. So I was trying to get the State Board to take a great deal more interest in this, and I hope that they will.

THE CHAIRMAN: All right. Thank you very much, Ms. Siri.

Next I would like to call Major Wyatt McGhee -- is he in the audience -- representing the Western Federal Regional Council Task Force for Hazardous Waste Management.

MAJOR WYATT McGHEE: I am Major Wyatt McGhee from McClellan Air Force Base representing the Western Federal Regional Council Task Force on Hazardous Materials Management.

I will be commenting briefly on items 15 and 16 in the announcement of "What Federal facilities typically generate what types and amount of hazardous wastes," and, "To what extent and by what mechanisms should the private sector be involved in the treatment and disposal of hazardous wastes, especiall those from Federal facilities."

We in the task force will be submitting a report which hopefully we will have in draft stage before the January 31st cutoff date for written comments. We will make a point to get the draft report into the group here.

I would like to go over some of the background involved with the formation of our task force and why it was

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673 7747

established.

Back in August of 1973 a large number of shipments of retrograde cargo were coming back from the Pacific area from the phase down of the war effort. These were materials that had been stored outdoors in containers. For one reason or another they had corroded. In some cases there were defoliates, pesticides which would no longer go into solution properly -- just a large amount of waste products that were hazardous and did have to be controlled.

Many of these were retrograded into Okinawa and other areas where they have now become a political problem. And they are, of course, trying to find a suitable disposal site for these types of materials.

Back in that time frame of August, '73, there were several requests made to Mr. Bourns and others in the Environmental Protection Agency here in Region IX to try to find out what is the best way of handling this type of a problem and how great a magnitude is this problem.

So they sent out a few letters to some of the local Federal agencies within Federal Region IX which consists of California, Nevada, Arizona, Hawaii and the Pacific Trust Territories to see what kind of response they would get in holding a little session to try to talk this thing over.

Well, they were inundated by requests to attend the meeting. Yes, we do have problems. I think every military

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

facility in the region responded with wanting to bring a representative and their boss along to discuss the magnitude of the problem.

So it ended up we had several hundred people responding to this little round-table session.

Without any official sponsorship by any one particular group, it was decided that we should have some official sponsor to try to pursue our efforts of how big a problem is it and what are we going to do about it. So we did talk to the Western Federal Regional Council, and they agreed to adopt the effort.

We did come up with a steering committee of about 15 people representing the various Federal agencies in this region to try to lay out some objectives.

And I have a listing of what we have attempted to address in our task force.

One, to provide a mechanism for technology and information transfer relating to the management of hazardous materials and in an environmentally safe manner for personnel within agencies who have assigned responsibilities in this area.

I might point out that at least annually we call together our full task force of about 115 people now representing over 35 Federal agencies including the military services, and we do have at least an annual meeting. And at each meeting we do set aside a part of that meeting for technology transfer.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

So that is one of the ways these objectives are being handled.

The second work element here is to develop and maintain a directory of individuals within Federal agencies who are designated for contact regarding management of hazardous materials and environmental matters. That directory has been completed. It was put out by the Navy. It is into the second edition now. It does let us know who to talk to within our own region to try to solve some of our mutual problems.

The third work element, to develop an inventory of excess hazardous materials and wastes including related information pertaining to these which are in the purview of these Federal agencies.

The inventory has been completed by the civilian Federal agencies. Thirty-five civilian agencies were inventoried. They came up with quantities in the realm of about eight million pounds, 350 to 450,000 gallons, and about 10,000 contaminated containers which were generated on an annual basis by these Federal agencies.

The military services are also being inventoried. This is being done on a national basis. However, we will be getting the information broken out on a statewide basis, which is being developed through the defense supply agencies, so we will have that information available also for military in this region.

The fourth work element was to identify, develop, and

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL: (415) 673 7747

disseminate recommended plans of action for environmentally safe management, transportation, storage, resale, recycling, reuse, modification, and ultimate disposal of these materials.

One of the things that we have attempted to do here is to inventory our existing capabilities for hazardous waste disposal within this region. And we are now circulating a questionnaire to each one of the facilities within this region to try to put together an overall listing of what can we do at this time.

I know on my own base we can handle four things which were identified at the last meeting. We have a capability to redistill and reclaim mercury. We have a capability to dispose of waste acid, waste cyanide, and waste chromes.

However, of course, this is limited at the present time to disposal of materials that are generated there on the base, but we hope to be able to work out some type of cooperative arrangement with the other Federal agencies.

The fifth work element was to explore and develop and recommend courses of action to the council to manage hazardous materials safely where problems are identified.

This may involve either recommending action to the individual agencies concerned or implementing a multi-agency cooperative approach.

One of the things we have attempted to do as part of this item is to come up with a set of criteria for identifying

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

a proper waste disposal site, not limiting this to a Federal facility type disposal site or a private sector site or public or what have you, but just simply putting together information on what is acceptable criteria for a Class One type of site.

Also, a second part of that is to put together a separate set of criteria as to how should such a site be operated and managed. Simply identifying all of the different aspects of these two questions.

Work element six is to coordinate interagency action relating to hazardous waste management when requested by the agencies concerned.

And finally, work element seven, to coordinate final disposition action with appropriate state agencies.

We will be putting together this final report. We hope to have the draft, as I say, by 31 January.

A couple of the recommendations that we feel will be made to the Western Federal Regional Council is that, yes, we do have a problem. We are identifying the problem of hazardous waste within the Federal agencies. We are hoping that the Western Federal Regional Council will make recommendations to the governors of the four states to take action to set up appropriate waste disposal sites or other means for recycling or recovering these waste products. But this was the main emphasis of our task force, to try to get together appropriate information on where and how these sites can be developed.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Comments and Supportive Materials for Hazardous Waste Management Public Meeting, San Francisco CA, December 11, 1975

DATE: JAN 29 1976

FROM: Chairman, Federal Task Force for Hazardous Materials Management, Western Federal Regional Council, Region IX

TO: John P. Lehman, Director, Hazardous Waste Management Division, Office of Solid Waste Management Programs, (AW-465)

In support of introductory testimony given by MAJ Wyatt L. McGhee, USAF, at the subject meeting, representing the subject task force, he promised that the Task Force would forward an executive summary of its findings, data, and recommendations. At the direction of Mr. Webster Otis, Chairman of the Western Federal Regional Council, I am forwarding herewith an Executive Summary of the Task Force activities with accompanying appendices which detail its actions, findings, data, and recommendations, for your consideration.

If you have need of clarification or further information, please contact me. My telephone number is (415) 556-4606.

Charles T. Bourns

cc: Mr. Webster Otis, Chairman WFRC
Task Force Executive Committee Members
Paul DeFalco, Regional Administrator, IX

1213

EPA Form 1320-6 (Rev. 6-72)

FEDERAL TASK FORCE FOR HAZARDOUS MATERIALS MANAGEMENT

of

THE WESTERN FEDERAL REGIONAL COUNCIL

EXECUTIVE SUMMARY OF ACTIONS TO JANUARY 15, 1976

Background

The Federal Task Force for Hazardous Materials Management came into being almost spontaneously as an "ad-hoc" working group on August 2, 1973, as a result of a discussion of related problems in the area of hazardous waste management as experienced by a number of Federal agencies in standard Region IX. This problem discussion session was announced by the Environmental Protection Agency, Region IX, for the dates of August 1 and 2, 1973, for any Federal agency representatives in Region IX who were interested in participating. The response of over one hundred persons, representing fifty-three agencies indicated the wide-spread interest in this subject area.

Organization

The fruitful discussion at this meeting led to a consensus decision to continue meeting on an "ad-hoc" basis and to work through an Executive Steering Committee toward resolution of identified problems in a number of areas relating to hazardous waste management. An Executive Steering Committee was chosen, composed primarily of representatives of those agencies with the most severe problems or who indicated an interest in serving on the committee. The membership of the Executive Steering Committee of fifteen persons has varied but little from its inception. The members of the Steering Committee and the agencies they represent are shown in Appendix I of this summary.

The Executive Steering Committee was given broad powers to further delineate and define the problems discussed at the first task force meeting, to prepare workplans for arriving at solutions, appoint sub-committees to work on specific problems or designate individuals where a committee effort was not needed, to act for the whole Task Force, to schedule further meetings of the whole Task Force, and to attend to any other business deemed necessary. The area of concern was restricted to standard Region IX.

Problem Identification

The Committee identified several problem areas in Region IX related to hazardous waste management for which there did not appear to be environmentally acceptable or adequate solutions. The foremost problem appeared to be that there either are not treatment facilities or disposal sites located within reasonable

distances of origin of these materials such to be economically usable and that those few sites which had been designated by a State agency appeared to present a potential for either present or future environmental insults. This problem seemed to be composed of two parts: (1) the designation of existing disposal sites and locations were not based on adequate consideration of all necessary parameters for environmental, social, or political protection and (2) the inadequate manner in which the disposal or treatment sites appeared to be operated and managed.

A second problem identified was that information was needed for planning purposes as to the types of materials that were being generated as hazardous wastes within the Federal establishment. The quantities and time of generation were also unknown. It was discovered in discussions that large volumes of many types of materials, particularly pesticides, were being returned from Pacific military operations and that there were large residual stocks still on hand from World War II at some locations.

A third major problem area was in the lack of a listing of people and functions within the various Federal agencies who were concerned with hazardous waste management. It was felt such information would be useful in coordination of actions. Still another concern was that there was also a lack of a catalog of facilities for treatment or disposal of these materials which already existed or were being planned and constructed by Federal agencies and which might have potential for treating or receiving another's wastes.

In another problem area it was discovered that many materials were merely "excess" to a particular agency's needs and still had a "value" to others who were procuring the same materials; some materials had value for uses other than for that which they were originally bought for, or had value but required reconditioning - a "recycling" strategy was needed. It was found, also, that there was a great need to share hazard waste management technology and to present new technology to the participants.

Further, but not least in importance, it appeared that a mechanism to motivate local and/or State or Federal government agencies into establishing facilities and regulatory programs is needed.

It was decided by the Committee that the best approach to such an array of problems was to assign specific tasks to subcommittees that would contribute to solutions and present their recommendations to the Task Force for assigned subject areas of concern.

Procedure

A second meeting of the whole Task Force was held in February, 1974. At that meeting, an additional problem was discussed, that of the need of "official recognition" of this effort and of sponsorship - to justify the expenditure of the resources being employed in this activity. It was decided to seek the sponsorship of the Western Federal Regional Council (WFRC). In view of the multi-agency nature of this

coordinated action and of the need for joint Federal response to the overall problem area, the Council, on April 24, 1974, agreed to sponsor the Task Force, who specified a lead agency, designated a chairman, and established a set of objectives.

The Environmental Protection Agency was designated as the lead agency with Mr. Paul De Falco, Jr., EPA Regional Administrator, responsible to the Council for accomplishment of actions indicated above.

The WFRC concurred with the Task Force which had at its February, 1974 meeting, elected Mr. Charles T. Bourns, Chief, Solid & Hazardous Waste Management, Hazardous Materials Control Division, Region IX, Environmental Protection Agency (Address: 100 California Street, San Francisco, California 94111; Telephone: 415/556-4606).

The seven original objectives that were designated by the Regional Council for the Task Force to pursue were as follows:

Objectives

1. Provide a mechanism for technology and information transfer, for responsible agency personnel within the Region relating to the management of hazardous materials in an environmentally safe manner;
2. Develop and maintain a directory of individuals within agencies who are designated for contact regarding management of hazardous materials and environmental matters;
3. Develop an inventory of excess hazardous materials and wastes (including related information pertaining to these) which are in the purview of these Federal agencies;
4. Explore, develop, and recommend courses of action to the Council to safely manage hazardous materials where problems are identified. This may involve either recommending action to the individual agencies concerned, or implementing a multi-agency cooperative approach;
5. Identify, develop, and disseminate recommended plans of action for environmentally safe management (transportation, storage, resale, recycling, re-use, modification, and ultimate disposal) of these materials; and
6. Coordinate inter-agency actions relating to hazardous waste management when requested by the agencies concerned.
7. Coordinate final disposition actions with appropriate State agencies.

Plan of Work

To accomplish the objectives set forth by the Western Federal Regional Council, the Executive Steering Committee, with later concurrence of the whole Task Force, developed a plan of work with a timetable for accomplishment. The Task Force primarily operated through several subcommittees or individuals indicated for each work item identified in the plan of work during FY-75 (See Appendix II). In FY-76, the plan of work was revised as some goals had been achieved, and some work plans were changed to reflect a more efficient attack on the specific problem area (See Appendix III). The Executive Steering Committee primarily serves to coordinate, receive,

review, and approve subcommittee actions.

Activities of the Task Force are now scheduled for completion by June 30, 1976, but, as mentioned above, some actions are now complete, and most others are now in final review stages. All actions of the Task Force, however, are subject to the final approval and acceptance of the Western Federal Regional Council before becoming official actions of a Federal inter-agency function.

The Director of the Western Federal Regional Council, however, has authorized the transmittal of this Executive Summary and the draft outputs of reports and summaries of actions of the Task Force to date to the Environmental Protection Agency, for informational purposes, as an input to that agency's Public Meetings on Hazardous Waste Management in support of oral testimony presented by a representative of the Task Force at the Public Meeting held December 11, 1975, in San Francisco, California.

Summaries of present Task Force actions and final draft copies of reports being prepared by the Federal Regional Task Force for Hazardous Waste Management are included herewith, as Appendices IV through IX, and itemized as follows:

* I. Executive Steering Committee as of January 15, 1976.
*II. Task Force Work Plan for FY 75.
*III. Task Force Work Plan for FY 76.
IV. Criteria for Selecting a Site.
V. Guidelines for Operation and Management of Sites.
* VI. Report: Sierra Army Depot Retrograde Chemicals, Herlong, CA.
VII. DOD - Region IX Pesticide Inventory and Disposal Actions.
VIII. Civilian Agency Hazardous Waste Inventory.
IX. A Databank System for Recycling, Recovery, and Disposal.
X. Inventory of Existing Federal Hazardous Waste Disposal and Treatment Facilities.
* XI. Directory of Federal Hazardous Waste Management Personnel.
*XII. Coordination of Task Force Actions with State Agencies.
* XIII. Meeting Agenda Showing Technology Transfer Subjects.

There will be additional reports yet to be completed, relating to efforts to get sites actually established and States to establish regulatory programs. The latter will be transmitted to EPA at appropriate times.

* DOCUMENT DETACHED AND RETAINED IN HWMD FILES

CRITERIA FOR SELECTING A SITE FOR THE LAND DISPOSAL OF HAZARDOUS WAST

Appendix I

CONTENTS

Abstract

Acknowledgments

.100 Introduction

.101 Scope

.102 Purpose

.103 Assumptions

.200 The Site Selection Process

.201 Triggering Mechanism

.202 The Screening Process

.203 Site Selection

.204 Site Operation

.300 Description and Application of Site Screening Factors

.301 Hydrogeologic Element

.302 Biological (Ecological) Element

.303 Land Use/Status Element

.304 Socio-Economic Element

.400 Recommended Bibliography

Appendices

CHAPTER

CRITERIA FOR SELECTING A SITE FOR THE LAND DISPOSAL OF HAZARDOUS WASTE

ABSTRACT

Large volumes of chemical residuals and process byproducts are found in the Federal establishment that are irreducible and environmentally hazardous. Presently, the only logical disposal is land burial. The sites now available for disposal in Region IX have evolved as hazardous waste sites over the past 25 years because of their proximity to waste generators, and were not selected for long-term environmental safety. A few sites must be selected that will serve for ultimate disposal in perpetuity.

A Screening/Selection Process for disposal site selection has been developed by the Site Selection Criteria Subcommittee based upon successive site rejection through the proposal, screening, selection, and on-going site evaluation phases. Four basic elements describe a potential site; hydrogeologic, biological, land use and status, and socio-economic. A selection procedure was developed for site evaluation. There are a number of factors that must be analyzed under each element in each of three levels of investigation; office review, field reconnaissance, and detailed site study. The factors primarily describe the geographical setting of the desert southwest and would have to be modified for use elsewhere. The selection process on the other hand has universal applicability.

These criteria provide guidance for responsible Federal officials to help select a site specifically for Federal waste, to evaluate a site proposed by a commercial proponent to which Federal waste would be taken, or evaluate the environmental safety of an existing site.

ACKNOWLEDGMENTS

Chairman: Walter S. Weaver
Sanitary Engineer
USDA Forest Service
California Region

The "Criteria" is the product of the considerable experience of the following specialists, who selflessly contributed their time and their energy to write the "Criteria:"

W. L. Burnham
Hydrologist
USDI Geological Survey
Menlo Park, Calif.

L. E. (Ed) Horton
Ecologist
USDA Forest Service
California Region

G. Lewis Meyer
Geologist
EPA Radiation Programs
Washington, D. C.

Stuart Porter
Watershed Specialist
USDI Bureau of Land Management
California

Robert Scott
Hydrologist
EPA Water Supply Program
Region IX

The following persons who acted as a steering committee to define the scope of the Subcommittee's work, develop the screening and selection process, and provide helpful criticism during the writing of the "Criteria:"

Myron Allen (Ret.)
Planning Coordinator
USDI Bureau of Land Management
Arizona

Kenneth Boll
Civil Engineer
USDA Forest Service
Southwestern Region

David Fishel
Industrial Hygienist
ERDA - Nevada Operations Office

Stuart Porter
Watershed Specialist
USDI Bureau of Land Management
California

Thomas George
Civil Engineer
USDA Forest Service
Intermountain Region

Raymond Jorgensen
Environmental Coordinator
USDI Bureau of Land Management
Nevada

G. Lewis Meyer
Geologist
EPA Radiation Programs
Washington, D. C.

The Task Force acknowledges the support given these members by their respective Agencies and supervisors. The various Agencies have perservered through what sometimes appeared to be an interminable task.

Special accolades are directed to: Mrs. Sadie Johnson, Clerk-Typist, USDA Forest Service, California Region, for her skillful interpretation of bad penmanship, and for putting up with the continual redrafting of the "Criteria," and Mrs. Charles Bourns who graciously accepted the task of copy editing the final draft of the Criteria. Her only relationship to this Task Force activity is an emotional one.

CHAPTER

CRITERIA FOR SELECTING A SITE FOR THE LAND DISPOSAL OF HAZARDOUS WASTES

.100 Introduction

.101 Scope

.101-1 Authority

These criteria were developed as an assigned task of the Site Selection Criteria Subcommittee, an entity of the Western Federal Regional Council's Task Force for Hazardous Materials Management.

.101-2 Region IX

The mechanism and guidelines herein for the selection of sites for the disposal of hazardous materials are for the use of all Federal agencies in Standard Federal Region IX that use or generate hazardous materials. It is not necessarily implied that sites selected will be for the sole use of the Federal Government.

.101-3 Hazardous Waste

"Hazardous waste" means any waste material or mixture of wastes that is toxic, pathogenic, corrosive, flammable, an irritant, a strong sensitizer, or which generates pressure through decomposition, heat, or other means. In addition, these wastes or mixtures of wastes can cause substantial personal injury, serious illness or harm to man or wildlife, during or as a proximate result of any disposal of such waste or mixture of wastes. The terms "toxic," "corrosive," "flammable," "irritant," and "strong sensitizers" shall be given the same meaning as in the Code of Federal Regulations, Title 16, Chapter II. However, these criteria do not apply to Class A explosives or radioactive materials (except for low specific activity radioactive) as defined in the Code of Federal Regulations, Title 49. (The definition from S.2150 may be substituted).

.101-4 Disposal

There will certainly be some irreducible portion of many processes that are considered a waste (1) by virtue of their environmental danger, (2) their resistance to being effectively changed to an innocuous state, or (3) all reuse or recycling potential has been exhausted. Therefore, disposal is the only alternative remaining.

The management of the site, as a waste disposal site, will be in perpetuity because of the extreme persistence of the materials handled. Once interred, the wastes are considered to have been disposed of. Retrievability, although possible, was not really considered herein, but is in the Guidelines for Site

Operation.[1/] It is believed, however, that any site qualifying as a disposal site under these criteria would also quality as a site for the temporary storage and processing of hazardous wastes.

.101-5 Federal Wastes

The site(s) selected shall be the preferred disposal site(s) for all excess hazardous materials, residues developed through use of hazardous materials, their containers, and all process wastes generated by direct action of the various Federal agencies or their contractors.

.102 Purpose of the Selection Criteria

.102-1 Protect Environment

These guidelines are developed to facilitate the selection of a site whose natural characteristics will reduce the possibility of the release of hazardous substances disposed of therein in quantities harmful to man and the environment.

.102-2 Guidance to Responsible Officials

These Criteria are for the use of Federal agencies and may serve as guidance to other agencies or persons. They should not be confused with the "Guidelines" developed and promulgated under the authority of the Solid Waste Disposal Act (42 U.S.C. 3251) by the Environmental Protection Agency.

Site Selection Guidelines are being developed by the Hazardous Waste Management Division (EPA) and will probably be promulgated as "Guidelines", either supplementing or superseding this Chapter.

.102-3 Supplements National Environmental Policy Act

The intensity of investigations required by these guidelines will provide the background data for subsequent environmental analyses and Statements. The disposal of Federal hazardous waste at existing sites will be a significant Federal action with environmental impacts, which will be discussed through a complete environmental analysis, and subsequent Environmental Statements for new sites. Therefore, this screening and selection process is not intended to be nearly as detailed regarding socio-economic impacts as is called for in NEPA (42 U.S.C. 4321). Using these guidelines, existing sites may be screened before use for "environmental safety."

.103 Assumptions

.103-1 The problem exists

All Federal agencies which generate or use hazardous materials are finding that the locations available for disposal of surplus supplies, of by-products or residues, and of containers are becoming less available because of limitations

[1/] Guidelines for operation and management of hazardous waste disposal sites -

and problems at existing authorized sites.

.103-2 Disposal site in public domain

Either Federal or State owned or acquired lands will be utilized to insure control of ownership in perpetuity. "Private ownership" - even with so-called "perpetuity insurance (funds)" does not provide an adequate guarantee for future monitoring and action should the private owner move.

.103-3 Proposals for locating specific sites will be made by an advocate:

(a) Waste owner or landowner, Federal Government, State or County agency,

(b) Commercial operator or Federal agency operator.

.103-4 Users

The Criteria are intended to be used by many different technical specialists, their number and their mix being dictated by the intensity of the screening process applied to the site investigation. The screening agency should assure itself of the competence of assigned specialists to perform the various complex hydrologic, geologic, and biologic engineering and land management assessments.

.103-5 Factors and ratings are subject to modifications during use.

(a) The Criteria are designed specifically for use in the States of Arizona, California and Nevada, Federal Region IX, and may have to be revised for use elsewhere.

(b) The procedures for implementing an analysis will be prepared by the agency (Lead Agency) having ultimate jurisdiction. This will probably require an interagency team organization.

(c) The Criteria may have to be modified to fulfill the needs of the team using it.

.200 The Site Selection Process

A flow chart of the Process is shown in Figure 1.

Figure 1

---

201 Triggering Mechanism

There is an urgent need for environmentally safe disposal sites for hazardous waste. The impetus for specific site analysis could be generated by one of the following:

- Congressional mandate.
- EPA or WFRC commitment.
- Separate or joint agency need.
- Application for a site by a proponent other than a Federal agency.

.202 The Screening Process

After potential areas or candidate sites are identified through proposals by an advocate, the process outlined in these guidelines provides a means for investigating, screening and rejecting unsuitable sites. At least three levels of investigation are visualized, namely (1) office review, (2) field reconnaissance, and (3) detailed site study. These levels and their interactions are shown diagramatically in Figure 1. Each level is expected to reject the clearly unsuitable sites and pass suitable and satisfactory candidates on to the next investigative level.

Factors to be investigated and evaluated are the same for each level of investigation, but the intensity, detail, and cost become progressively greater with each succeeding level. Screening leaves only the most promising sites, which will then require detailed study. Some of the "surviving" sites may well be more acceptable than others for factors other than those discussed herein; cost effectiveness, acceptability, etc.

It must be reemphasized that the screening process, if carried through Detailed Site Study, is both costly and time consuming, but is necessary to insure the long-term safety of a selected site. The need for safe disposal sites is so urgent that the investigator minimize repeating the process to further refine the analysis, i.e., making a situation estimate through tasks such as map-literature survey, preliminary reconnaissance, intermediate reconnaissance, then turning around and going through the same phases in a more detailed manner, leading up to an even more "detailed site analysis."

.202-1 The Elements

Four elements describe a candidate site for waste disposal in sufficient detail to allow the decision to commit resources for a detailed investigation of the site. They are:

- Hydrogeologic

- Biological (Ecological)

- Land Uses and Status

- Socio-economic

The first two elements are physical descriptions of the environment that will be affected by the commitment of a particular tract of land to the disposal of hazardous waste. The last two elements are more transient in nature because they can be changed through legislation, regulation, or changes in lifestyle. Section .300 of this Chapter has a more complete description of the elements and their major factors.

.202-2 Factor Analysis

The four elements are subject to analysis through a number of factors in each of the three levels of investigation (office review, field reconnaissance and detailed site study. Since the detailed site study will determine a site's suitability for selection, the intensity of investigation required is greater than in the previous two levels.

The factors and their ratings, for other than those specifically noted under Detailed Site Analysis (II.B.2.C), are shown on Plates 1, 2, and 3.

Plates 1, 2, and 3

(a) Office Review - Includes the review of historical records, agency inventories, research of broad area indicators, land status and use factors, socio-economic factors, and other literature.

(b) Field Reconnaissance - Should include a validity check on the office review as well as an analysis of many of the physical (environmental) factors of the Hydrogeologic, and Biological Elements. The product of this level of investigation is the arraying of indicators on the Rating Charts. See Plates 1, 2, and 3.

Two separate levels of field reconnaissance may be required for both Hydrogeologic and Biological Elements, preliminary and intermediate reconnaissance to lessen impact on expenditures and resources. The former requires the time of competent investigators; the latter requires the extensive use of instrumentation and exploration equipment.

(c) Detailed Site Analysis - If confidence in a particular site's environmenta safety has not been confirmed through the previous phases, a more intense investigation may be necessary, especially in the Hydrogeologic and Biological elements. It might be more appropriate to consider this phase as one of the aspects of site selection (See Section .203) rather than screening, because this intensity of investigation would be carried out only on a few highly qualified candidate sites.

These analyses are complex in nature and are addressed at the prior two levels by a professional investigator; at least, subjectively, On-site investigations of specific items, if necessary, may entail large expenditures of resources. Investigation may include, but not be limited to, the following analyses:

(1) Hydrogeologic

- Streamflow Data: Streamflow data for perennial and ephremal streams in sufficient detail to determine base flow, maximum flows for evaluating the flooding potential of the site, and for constructing a stream hydrograph.

- Soil Moisture Tension: In situ measurements of soil moisture tension of the upper 15-30 feet of the proposed burial media. Measurements are made with a tensiometer inserted into the soil at a desired depth to measure soil-water tension. After a site passes the initial screening phase and is selected for more detailed analysis, these measurements should be conducted for a period of two or more years.

- Soil Moisture Measurements: In situ measurements of soil moisture content of the unsaturated zone down 30-45 feet should be made in specially constructed holes using a neutron soil moisture gauge or an equivalent method. The measurements should be made for a period of two or more years after a site passes the initial screening phase and is selected for more detailed analysis.

- Water Chemistry: Chemistry of the water in the aquifers and aquitards beneath the proposed disposal facility to the base of the shallowest confined aquifers. This includes the pH, Eh, cations, anions, specific conductance, dissolved and suspended solids, and other factors which are needed to establish original baseline conditions in each formation, to differentiate between waters from the different formations, and to estimate the potential reactivity of the natural waters in the formations with leachates and contaminated waters which might result from disposal operations.

- Stratigraphy: Composition, sequence, thickness, age, correlation and other relationships of the stratified and non-stratified rocks beneath and within the vicinity of a proposed site which might affect the movement of water, stability of the rocks, site operations, or long-term retention of wastes disposed of therein.

- Hydraulic Data on Sub-surface Formations: Permeability, porosity, effective porosity, hydraulic conductivity, storage coefficient, hydraulic head or potential, and other hydraulic parameters of the subsurface water-bearing formations which are required to calculate the direction and rate of movement of groundwater beneath the site. Pumping, bailing, or slug tests of wells and physical property measurements of samples from these wells are usually required to make these determinations.

- Natural Fluctuations of Water Table: The natural fluctuations of the regional water table and of perched water tables beneath the proposed site should be known, particularly the expected maximum high water levels.

- Distribution of Hydraulic Head with Depth: Definition of the hydraulic head or potential of each aquifer and aquiclude beneath the site down to the base of the shallowest confined aquifer. The hydraulic head (potential) of each individual aquifer is commonly determined: (1) by testing each formation individually as it is penetrated during the drilling of a test well; (2) by testing the formations with inflatible packers after the drilling of the test well is completed; or (3) by constructing a group of wells, each of which is completed in a single waterbearing formation (commonly called a piezometer nest).

- Water Table Contour Map: A map showing by contour lines the upper surface of the water table, or zone of saturation, in the area around the proposed site. On occasion, a similar map showing the piezometric surface, pressure potential surface of the shallowest or other significant confined aquifer may be required. Areas where perched water tables occur should be shown where possible.

(2) Biological Communities

In addition to its physical characteristics, an ecosystem is composed of plants and animals organized by dependency relationships into communities. In order to assess the influence and importance of one element of the ecosystem to another or to predict the effects of a new activity, it is necessary to have inventory information concerning plant communities and their animal associates.

- Plant communities.

- Animal associates.

(3) Ecological Relationships

The ecological integrity of an area is dependent upon an array of processes and interactions which work to bind the various parcs of the ecosystem into a functioning whole. Predominant relationships vary from ecosystem to ecosystem.

- Primary productivity.

- Plant successional trends.

- Stability (population and ecosystem).

- Predation (including parasite).

- Interspecific competition.

- Territoriality.

.202-3 Screening Process Re-evaluation

The rating charts are for guidance only and it is not to be inferred that a low ranking on any single factor, or a few factors automatically rejects a site from further investigation. Two alternatives would be appropriate if a site appears to be rejected based on these Guidelines:

(a) First, consider a larger number of sites and if then no viable candidate is found, proceed to the next step, which is

(b) Reassess the most likely site from a total resource foregone basis. The need for a "safe" disposal site may be greater than the loss of one or more factors. See Section .304.

.203 Site Selection

Selecting a site for the disposal of wastes may be an irreversible land use decision in that it commits a tract of land to this use to the exclusion of other uses in perpetuity. Therefore, the same evaluation of values foregone and other trade-off questions must be made as for any other land use decision.

Those sites not rejected by any of the three investigation levels (1) office review, (2) field reconnaissance, and (3) detailed site study, are considered to have physical and biological characteristics that are compatible with the proposed use.

Sites that survive this progressive rejection system must still receive public acceptance through the NEPA and political process. The data collected through Factor Analysis should be easily convertible to Environmental Statement format. Obviously the site(s) may ultimately be rejected in the political arena, even if assessed as acceptable by the process outlined herein.

.204 Site Operation

Once waste is accepted for disposal, a site is committed in perpetuity. Future generations will be responsible for monitoring. The data base assembled during the Screening/Selection process, however, will become the baseline for future monitoring procedures and requirements. The results of the monitoring are necessary to give the site operator sufficient lead time to take corrective action, and to mitigate unwanted effects resulting from disposal of wastes at the site.

.300 Description and Application of Site Screening Factors

.301 Hydrogeologic Element

.301-1 Every effort is to be made to prevent or reduce contact between water and wastes.

.301-2 Factor scale ranges are based on the special conditions existing in mainland Region IX, i.e.,

(a) Very large areas of unpopulated land with relatively low economic value.

(b) Significant areas with arid or semi-arid climate.

.301-3 The screening factors are highly selective in that they force a site into a "very low water" location (i.e., low precipitation, absence of surface waters, and great depth of ground water).

.301-4 Although the factors are ultra conservative regarding potential contacts of water and waste, they are somewhat liberal in other respects. For example:

(a) Once buried, it is assumed that seismic activity will have little effect on the wastes unless land surface rupture or displacement occurs within the site.

(b) Fluctuation of the water table, monitorability, remediability, etc., are not as important in a "low water" situation as they would be in a humid climate. In the latter, the relative impermeability of the underlying strata, site engineering design, and construction methods become more important.

.301-5 The data collected must be sufficient to predict the waste retention capability of a site, both in quantity and in time, as related to the type and toxicity of the wastes.

.301-6 This screening process can be very useful for: (1) identifying sites which have potential and are worth investigating further; (2) flagging critical factors which could limit or prohibit use of the site, and (3) indicating the need for specific engineering and construction. However, it has a danger which should be clearly recognized and guarded against. The comprehensive results obtained from each individual measurement are tabulated into a combined value. One or two critical factors, if negative, could negate the whole. The evaluator would then be in the position of averaging 20 excellent measurements with one or two unacceptable values and could obtain an excellent overall rating for a potential site which would be an inherent threat to health and the environment. Engineering modifications to the site to correct these unsatisfactory factors may be acceptable in some cases. However, there are some factors which are irremediable and require total rejection of the site (i.e., high precipitation, closeness to fracture bedrock, or shallow water table).

301-7 The factors chosen deal with the availability, location, and movement : water, the properties of the burial medium and underlying strata, and rocesses which could disrupt the site, introduce water to the waste, expose ıe wastes or otherwise return the wastes to contact with the environment nd man. A brief description of each factor is found in Appendix B.

301-8 Where possible, common units of measure and specific limits were ıosen for the factors. However, there are not standard units for describing ertain factors, so a "qualitative" description must be used; for example, the eomorphic stability of a site cannot be easily quantified. For this type : factor, a qualitative evaluation must come from professional judgement of ıe site selection team. The unit of measure and range of value for each ıctor is shown on Plate 1 and given in Appendix B.

301-9 Each factor is ranked and given a weighting value based, in general, ı the estimated importance of the factor in causing the release of contaminants rom the waste, in reducing the retention capability of the site, or in hastening ɔntact of the waste with man and the environment. The highest ranking is .ven to water and its potential to contact the wastes. Physical isolation of ıe wastes by distance from man and water is ranked second. Factors which could .ter conditions at the burial site, add to the complexity of the site ·drogeology, or affect the characteristics of the burial medium are ranked ıird. Included also and ranked last are those factors which definitely should ɜ known about a site but are considered less important because it is presumed ıat there will be very little precipitation or inflow of water at the site. ıe relative importance and weight of hydrogeologic factors used in this creening system are displayed in Appendix B.

.301-10 This screening/selection system tries to develop a qualitative numeric rating of the hydrogeologic factors at a potential burial site (or area). A rating chart for screening the potential hazardous waste burial sites is presented in Plate 1. The chart provides places to enter the raw value for each factor graphically and numerically. After this is done, the weighted value for each factor can be determined by 1) locating the raw value on the graphic scale; 2) reading upward (or downward) to the relative scale and determining its relative value; and 3) multiplying its relative value by the weighing or ranking of the factor. A qualitative - numeric rating of the site can be obtained at each investigative phase.

The range of weighted values corresponding to the relative values is as follows:

Relative Value	Range of Numerical Weighted Values
Ideal	624-521
Excellent	520-417
Above average	416-313
Average	312-207
Below average	206-105
Marginal	104-1
Unacceptable	0

The ideal result shown on the screening/selection display (See Plate 1) would be a vertical line to the left of the chart. A left leaning trend is naturally desired.

.301-11 A hypothetical rating of the commercial radioactive waste burial facility at Beatty, Nevada, by this screening/selection system is presented in Example 1 as an example of how the system works. The Beatty site is located a

---

Example 1

---

the north end of the Amargosa Desert, Nevada; has low rainfall; and has relatively good isolation from surface waters, ground waters, and use points. Most of the factors used are real. However, some values are not known and were estimated or put in for the purpose of presenting this example.

.301-12 Detailed hydrogeologic site analysis

See Section II.B.2.c.(1).

.302 Biological (ecological) Element

The factors identified represent those biotic elements needed by the investigator to:

- Predict environmental changes occasioned by establishment and operation of a disposal site in terms of biological (ecological) components.

- Assess potential effects (both adverse and beneficial) on each element caused by the disposed materials in place or displaced by the disposal activity, and by permanent protection from other uses within the site enclosure on the site area, and on surrounding areas.

- Evaluate the relative significance of such changes and effects as an aid in site selection.

.302-1 A factor analysis and rating scheme has been developed to display the sensitivity of candidate sites regarding the primary biological factors. See Plate 2. Appendix C contains descriptions of some of the Biological Screening Factors.

The biological factor analysis and rating scheme can be applied to only a portion of all the factors that must be investigated, but it provides a minimum checklist for those factors that must be addressed during the Office Review and Field Reconnaissance Phases.

The following constraints will be applied to the use of this rating scheme:

(a) Each factor will be inventoried for existence on site or nearby.

(b) Each factor will be evaluated for potential, compatibility, mitigation or forfeiture, and relative significance of site to the whole.

(c) Tentative rejection criteria - reject sites with value of 2 or less for any factors.

.302-2 Interrelationships

There are additional subtle processes and relationships that are recognizable only by a skilled observer. These are not separable biological factors, but are basic considerations that must be taken into account during all three levels of investigation intensity (office review, field reconnaissance, and detailed site study). They are present on all sites and are investigated to determine relative significance, and to evaluate the effects of the disposal activity on them.

(a) Biological Communities

See Detailed Analysis .202-2(c)(2).

(b) Ecological Relationships

See Detailed Site Analysis .202-2(c)(3).

.302-3 Biological Factors Critical to Waste Disposal Sites

The following are factors that would tend to directly affect the selection of a particular site for waste disposal (as opposed to the effect of a waste disposal operation on the indigenous biological community):

(a) Rare or unique species or ecosystems. Includes organisms or places that have local interest or have received public attention for other special reasons (i.e., bristle-cone pine).

(b) Poisonous, noxious, ruderal, or other undesirable plant species. A selected site containing such species could become a sanctuary or source area for future spread of such undesirable species.

(c) Deep-rooted plant species who have the capability of translocating waste materials into above ground tissue where they may enter food chains or otherwise be transported off site.

(d) Burrowing animals (See (C) above).

(e) Wildlife incursion of the site for migration, browse, or water, as it affects the spread of contaminants.

.303 Land Use/Status Element

.303-1 Use of the factors

Man's past and present use of land and his actions regarding the sites considered for waste disposal must be fully known before a site can be selected to incure a site free from incumberances and modification that would jeopardize the environment safety of the site.

Past, present, and future uses/actions on adjacent and surrounding lands must be tested for compatability with the disposal of hazardous wastes.

Careful review and reconnaissance is necessary to ascertain the relative compatability of a land use or status by displaying the existence of a conflict with waste disposal. Plate 3 is a chart to highlight potential land use conflicts. A leftward array of checks is most desirable.

.303-2 Land Use/Status Descriptors

(a) Transportation System

Roads, trails, highways, railroads, communication system lines (above and below grade), and air strips for both public and private use.

(b) Water Resource Management

(1) Federal Power Commission licenses.

Hydroelectric dams, reservoirs, and associated transmission lines.

(2) Watershed - domestic and other beneficial.

(3) Water source - domestic and other beneficial.

(4) Geothermal Energy Source.

(5) Power generation facilities.

(6) Water treatment facilities.

(7) Flood protection facilities.

(8) Other adverse actions by man to affect water resources.

(c) Mining Claims and Operations

(1) Location and purchase - metallic or other substance in quantity sufficient to render the lands valuable on account of it, considering its location: Lode - "Rock in Place"; Placer; and necessary associated millsites.

(2) Leasable minerals - coal, oil, gas, sodium phosphate, potash, sulphur, etc.

(3) Common varities - Sand, stone, gravel, pumice, cinders, and clay.

(4) In situ leaching.

(5) Heap leaching.

(d) Encumberances

(1) Permits

Permitted occupancy and use of public lands under specific regulations of the agency with stewardship over the subject lands, including free and fee, covering a multitude of uses, with variable terms.

(2) Easements (R.O.W.'s)

Oil, gas (pipelines), railroads, irrigation, drainage, dams, and reservoirs, road, bridges, trails, water transmission, power transmission, telephone/telegraph, radio/electronics, etc.

(3) Withdrawals

Certain public lands withdrawn from appropriation and entry and reserved for governmental purposes under provisions of several acts of the Congress and EO 10355, i.e., power, reclamation, military, and mineral.

(e) Outdoor Recreation

Any activity on public lands that contributes to inspiration, relaxation, and enjoyment of the outdoor.

(f) Designated Areas and those of Special Interest

(1) Parks; National, State and local.

(2) Game refuges (See Biological; Wildlife).

(3) Significant archeological, historical, ecological, geological, or scenic area.

(4) Wilderness - An area designated by Congress as undeveloped Federal land retaining its primevil character and influence without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.

(5) Primitive and Roadless Areas - Lands suitable for inclusion in the National Wilderness Preservation System.

(g) Agricultural

Grazing (range allotments), timber production, cultivated lands, etc.

.304 Socio-Economic Element

These factors must be quantified or otherwise described or discussed. They are typical of all sites to be investigated and the list is not at all exhaustive

.304-1 Proximity to waste source(s).

.304-2 Adequacy of transportation system for the delivery of hazardous materials.

.304-3 Resources foregone by the commitment of land to waste disposal in perpetuity (energy, mineral, water, etc.).

.304-4 Institutional constraints (politics at all levels).

.304-5 Population and density.

.304-6 Ownership and use pattern.

.304-7 Employment and community impact.

.400 Recommended Bibliography

GENERAL

1. Brunner, D. R. and Keller, D. J., Sanitary Landfill Design and Operation, Washington, U. S. Government Printing Office, 1972, 59 p.

2. Digest of Public Land Laws, Public Land Law Review Committee, Washington, D. C., June 1968.

3. Fields, Timothy, Jr. and Lindsey, Alfred W., Landfill Disposal of Hazardous Wastes: A Review of Literature and Known Approaches, Cincinnati, U. S. Environmental Protection Agency, June 1975.

4. Guidelines for the Land Disposal of Solid Wastes, Federal Register 39(158):29333, Environmental Protection Agency, August 14, 1974.

5. Guidelines for the Preparation of Environmental Impact Statements, 40 CFR 1500 et seq., Council on Environmental Quality, August 1973.

6. Waste Discharge Requirements for Waste Disposal to Land, Disposal Site Design and Operation Information, California State Water Resources Control Board, November 1975.

HYDROGEOLOGIC

1. Cherry, J. A., Grisak, G. E. and Jackson, R. E. 1973. "Hydrogeologic Factors in Shallow Subsurface Radioactive Waste Management in Canada," Proceedings, International Conference on Land for Waste Management, Ottawa, Canada.

2. LeGrand, H. E. 1964. "System for Evaluation of Contamination Potential for Some Waste Disposal Sites," American Water Works Association Journal, Vol. 46, Denver, Colo.

3. Papadopulos, S. S. and Winograd, I. J. 1974. "Storage of Low-Level Radioactive Wastes in the Ground: Hydrogeologic and Hydrochemical Factors." U. S. Environmental Protection Agency Technical Report, EPA-520/3-74-009, U. S. Environmental Protection Agency, Washington, D. C. 20460.

4. Swift, W.H. 1973. Feasibility Study for Development of a System of Hazardous Waste National Disposal Sites, Battelle Northwest, Richland, Washington.

5. Williams, Roy E. and Wallace, Alfred. 1970. Hydrogeological Aspects of the Selection of Refuse Disposal Sites in Idaho. Pamphlet 145, Idaho Bureau of Mines and Geology, Moscow, Idaho.

BIOLOGICAL (ECOLOGICAL)

1. Allee, W. C., et. al., Principles of Animal Ecology, W. B. Saunders Company, Philadelphia. 1949.

2. Daubenmire, Rexford, Plant Communities: A Textbook of Plant Synecology, Harper and Row, New York. 1968.

3. Greig-Smith, P. Quantitative Plant Ecology, Academic Press Inc., New York. 1957.

4. Kormondy, Edward J. Concepts of Ecology, Prentice-Hall Inc., Englewood Cliffs, N. J. 1969.

5. Odum, Eugene P. Fundamentals of Ecology, Second Edition, W. B. Saunders Company, Philadelphia. 1959.

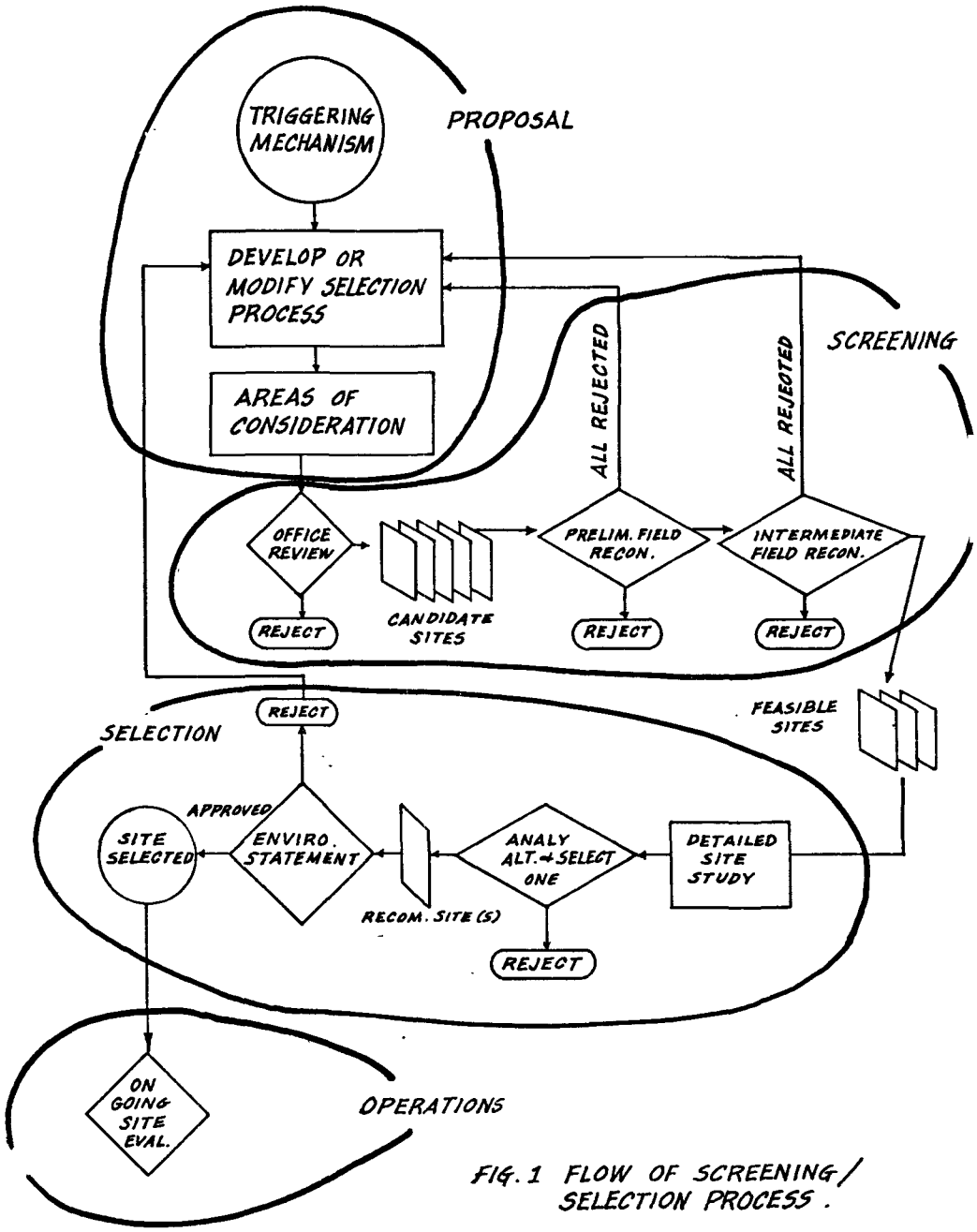


FIG. 1 FLOW OF SCREENING/ SELECTION PROCESS.

PLATE I

RATING CHART FOR SCREENING OF HAZARDOUS WASTE DISPOSAL SITES

RELATIVE VALUE

CREENING/SELECTION CRITERIA	6 IDEAL	5 EXCELLENT	4 ABOVE AVERAGE	3 AVERAGE	2 BELOW AVERAGE	1 MARGINAL	0 UNACCEPTABLE	ACTUAL VALUE	÷ RELATIVE VALUE	X WEIGHT OF CRITERION	= WEIGHTED VALUE
CE REVIEW											
IPITATION (INCHES / YEAR)	< 5	6	7	8 9	10	15	> 18			10	
REST SURFACE WATER OR STREAM (MILES)	> 20	15	0	5	4 3	2	< 1			5	
REST USE (DISCHARGE POINT)(MILES)	> 20						< 1			5	
MIC ACTIVITY (MILES)	> 15	10		5			< 2			2	
IMINARY FIELD RECONNAISSANCE											
PE (PERCENT)	1.5 / 1.8	2 / 1.2	3 / 1.0	4 5 / 9 8		10 / 7	> 15 / < 0.5			4	
MORPHIC STABILITY (QUALITATIVE)	STABLE						UNSTABLE			4	
DDING POTENTIAL (QUALITATIVE)	LOW						HIGH			4	
D EROSION POTENTIAL (QUALITATIVE)	LOW						HIGH			2	
TH TO WATER TABLE (FEET)	> 1000	700	500 400	300	200	100 80 70 60	< 50			5	
TH (DISTANCE) TO FRACTURED BEDROCK (FEET)	> 1000		500 400	300	200	100	< 50			5	
E OF BURIAL MEDIA (QUALITATIVE)	VERY FINE SANDS & SILTS						GRAVEL / CLAY			4	
SIDENCE (FEET)	0						> 5			3	
IMUM WIND DIRECTION (QUALITATIVE)	GOOD						BAD			2	
RMEDIATE FIELD RECONNAISSANCE											
ANCE TO KNOWN FAULT (FEET)	> 5000		4000	3000		2000	< 1500			3	
IAL MEDIA AND UNDERLYING STRATA											
SORPTION CAPACITY (ME/100 GM)	> 50	40 30	20		10	5	< 2			4	
THICKNESS (FEET)	> 500	400	300	200		100	< 50			4	
ENGINEERING PROPERTIES (QUALITATIVE)	GOOD						BAD			4	
PERMEABILITY (GAL/DAY/FT²)	0.1	2 3 4 5			10	2 3 4 5	> 10 / < .001			4	
EFFECTIVE POROSITY (PERCENT)	INTERMEDIATE	.05	.02		.01	.005 .002	HIGH / LOW			4	
STRUCTURE (QUALITATIVE)	SIMPLE						COMPLEX			4	
IATIO OF PAN EVAPORATION TO CIPITATION MINUS RUNOFF	> 84	80	70		60	50	< 40			5	
DROGEOLOGIC COMPLEXITY (QUALITATIVE)	SIMPLE						COMPLEX			5	
ITABILITY FOR CONTROL OF WATER TABLE JALITATIVE)	EASY						DIFFICULT			2	
NITORABILITY (QUALITATIVE)	EASY						DIFFICULT			3	
MEDIABILITY (QUALITATIVE)	EASY						DIFFICULT			3	
DRAULIC GRADIENT (FEET/MILE)	< 10		20	30	40 50	70	> 100			4	
	6	5	4	3	2	1	0			TOTAL	

PLATE 2

Biological (Ecological) Factor Rating Chart for Office Review and Field Reconnaissance

1242

FACTORS	Compatible				May be mitigated or foregone				Not Compatible			
	Does not exist			EXISTS	Does not exist			EXISTS	Does not exist			EXISTS
	Recognized Potential				Recognized Potential				Recognized Potential			
	No	Low	High		No	Low	High		No	Low	High	
Factor Rating →	6	5	4	3	5	4	3	2	3	1	0	0
Threatened and Endangered Species:												
1. Fish: Population												
Critical Habitat												
2. Wildlife: Population												
Critical Habitat												
3. Plants: Population												
Critical Habitat												
Areas of Unique Biological Interest:												
1. Research Natural Areas												
2. Botanical Areas												
3. Zoological Areas												
4. Wildlife Refuges												
Wild Free-Roaming Horses and Burros Territory												
Vital Habitat for Fish and Wildlife.												

0=unacceptable; 1=marginal; 2=below average; 3=average; 4=above average; 5=excellent; 6=ideal

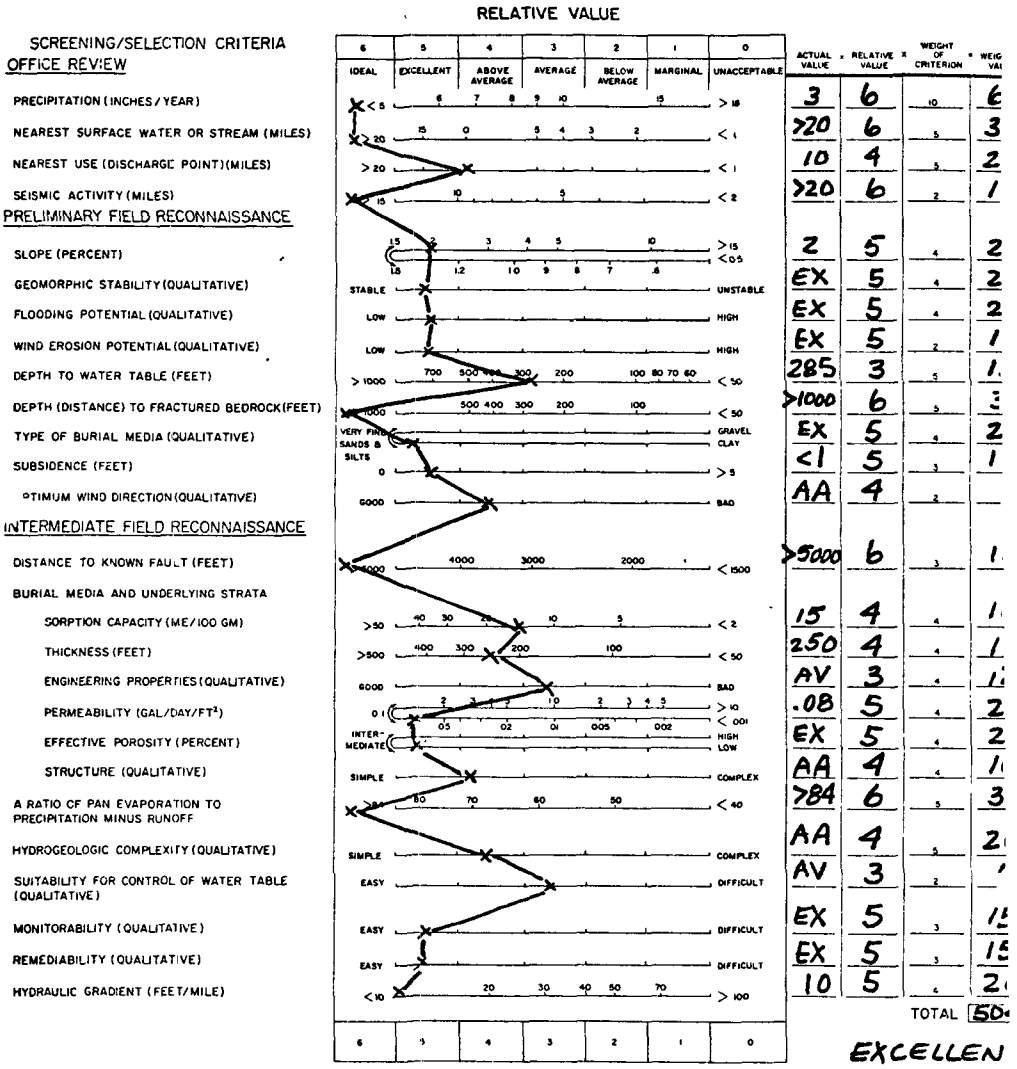
PLATE 3

Land use status factors for proposed sites or adjacent lands	Does not exist Low potential land use	Existing Compatible with waste disposal	Does not exist High potential for land use	Existing Not compatible with waste disposal
1. Transportation System				
2. Water Resource Management				
3. Mining Claims and Operations				
4. Permits, easements (R.O.W.'s) and withdrawals				
5. Outdoor recreation				
6. Especially designated areas and those of special interest				
7. Agricultural				
8. State and local Government's Land Use Plans and Zoning				

(Check where appropriate)

EXAMPLE 1

RATING CHART FOR SCREENING OF HAZARDOUS WASTE DISPOSAL SITES



APPENDICES

Appendix A	Comparision of Hydrogeologic Screening Factors suggested by several sources.
Appendix B	Description of Hydrogeologic Screening Factors.
Appendix C	Description of Biological Screening Factors.

APPENDIX A

A COMPARISON OF SCREENING AND SELECTION FACTORS FOR HAZARDOUS WASTE LAND DISPOSAL SITES SUGGESTED BY SEVERAL SOURCES

FACTORS	Level of Expenditure	Phase	SOURCES 1/ TF	2/ P/W	3/ G/C	4/ L	5/ BNW	6/ W/W	7/ TL
OFFICE REVIEW	MINIMUM	SCREENING							
- Precipitation			X	X		X		X	
- Nearest Surface Water			X	X	X	X	X	X	
- Nearest Use or Discharge Point			X	X	X	X	X	X	
- Seismic Activity			X				X		
-									
FIELD RECONNAISSANCE									
- Slope	SIGNIFICANT		X	X	X	X	X	X	
- Geomorphic Stability				X	X		X	X	X
- Flooding Potential			X				X	X	
- Wind Erosion Potential			X		X		X		
- Depth to Water Table			X	X	X	X	X	X	
- Depth to Fractured Bedrock			X	X	X	X	X	X	
- Type of Burial Media			X	X		X	X	X	
- Subsidence			X						
- Optimum Wind Direction									X
INTERMEDIATE RECONNAISSANCE									
- Distance to Known Fault			X	X	X		X		
- Burial Media									
- Sorption Capacity			X	X		X	X	X	
Thickness			X	X			X	X	
Engineering Properties							X		X
Permeability			X	X	X	X	X	X	
Effective Porosity				X					X
- Structure				X			X		X
- Ratio of Pan Evaporation to Precipitation Minus Runoff				X					X
- Hydrologic Complexity				X	X				X
- Suitability for Control of Water				X	X				X
- Adequate Water Supply							X		X
-Monitorability				X	X				X
- Remediability									X
- Hydraulic Gradient			X	X	X	X	X	X	

1246

APPENDIX A cont.

A COMPARISON OF SCREENING AND SELECTION FACTORS FOR HAZARDOUS WASTE LAND DISPOSAL SITES SUGGESTED BY SEVERAL SOURCES

ACTORS	Level of Expenditure	Phase	SOURCES 1/ TF	2/ P/W	3/ G/C	4/ L	5/ BNW	6/ W/W	7/ TL
ETAILED SITE ANALYSIS	DETAILED STUDIES	SELECTION							
Three Dimensional Head Distribution				X	X				X
Burial Media and Underlying Units Including Nearest Confined Aquifer									
- Water Chemistry				X	X	X	X		X
- Stratigraphy				X	X				X
- Ion Exchange Capacity				X	X	X	X	X	X
- Moisture Content of Unsaturated Zone				X	X				X
- Soil Moisture Tension				X					X
- Transmissivity				X	X	X			X
· Natural Fluctuation of Water Table				X	X				X
· Flow Data for Nearest Streams (Underflow)				X	X				X
· Water Table Contour Map				X	X	X			X
INIMUM BASIC REQUIREMENTS		GOALS							
- Degree of Contact of Water with Waste			X	X	X	X	X	X	
- Distance (s) Along Critical Flow Lines			X	X	X	X		X	
- Direction and Rate of Movement of Critical Elements			X	X	X	X	X	X	
- Residence time in the Site for Critical Elements			X	X	X	X			

1/ Criteria identified during studies by the Task Force Sub-committee on Site Selection.

2/ Criteria identified or implied by Winograd and Papadopulis, 1974.

3/ Criteria identified or implied by Grizak, Cherry, et. al., 1973.

4/ Criteria identified or implied by Legrand, 1974.

5/ Criteria identified or implied by Battelle Northwest, 1973.

1247

6/ Criteria dientified or implied by Williams and Wallace, 1970.

7/ Criteria adopted from other technical literature because of its apparent need

APPENDIX B

DESCRIPTION OF HYDROGEOLOGIC SCREENING FACTORS

FACTOR	UNIT OF MEASURE	RANGE OF VALUES: IDEAL	RANGE OF VALUES: UNACCEPTABLE	WEIGHT OF FACTOR
PRECIPITATION	Inches per year	5	18	10

Total precipitation per year, including rainfall and snowfall; the less precipitation, the better.

NEAREST SURFACE WATER OR STREAM	Miles	20	1	5

Distance of surface and subsurface travel path(s) along which contaminants from site must migrate to reach nearest surface water or stream; the longer the travel the better. A site conceivable could be located physically within several miles o a stream without penalty, if it were clearly separated from the stream by topograp and hydrologic divides.

NEAREST USE OR DISCHARGE POINT	Miles	20	1	5

Distance of surface and subsurface travel paths along which contaminants from site must migrate to reach the nearest use of discharge point, the longer the travel path, the better. Similar exceptions as for preceding factor.

SEISMIC ACTIVITY	Miles	15	2	2

Distance in miles of site from a seismically active zone or area; the greater the distance, the better. It is assumed that the wastes, once buried, will be little affected by regional seismic activity such as earthquakes. The intent is to keep the site away from areas of high acceleration, known tectonic stress, suspected potential locii of earthquakes, active faults, and other seismic phenomena which could rupture or damage the disposal facilities.

SLOPE	Per cent	1.5	15 (max) 0.5 (min)	4

General slope of land surface measured in per cent. Land surface which are too steep, too flat, or too irregular present problems in construction, operation, and long-term maintenance. In example, steeper land surfaces increase the potential for cap maintenance, erosion, and denudation of the buried wastes; whereas, water (precipitation) will not run off fast enough, will tend to pond, and can infiltrat into the trenches and soak the wastes, if the land surface is too flat. Therefore, two unacceptable values for slope, one too high and one too low, and only one idea

GEOMORPHIC STABILITY	Qualitative	Stable	Unstable	4

The land should be geomorphically stable for thousands of years; that is, the rate of weathering and erosion should not be sufficient to affect the position and surface of the land surface for thousands of years. Because there is no generally accept unit of measure for geomorphic stability, relative terms were used.

FLOODING POTENTIAL	Qualitative	Low and Infrequent	High	4

The potential for flooding of a site should be low. A site should not be located in the flood plain at a stream where rising flood waters can flood it. Nor should a site be located in a drainageway where descending runoff from a flash flood could fill an otherwise dry channel and flood it. Relative rating terms are used for the preliminary stages of investigation. In later detailed investigations, it might be necessary for certain sites to calculate the size of a flood event which would flood a site.

WIND EROSION POTENTIAL	Qualitative	Low	High	2

Wind could possibly cause construction and maintenance problems, serious erosion of the trench caps, and denudation of the wastes; the lower the potential, the better.

DEPTH OF WATER TABLE	Feet	1000	50	5

Depth below land surface to regional water table; the deeper the water table, the better. The depth to any perched aquifers; known or suspected in the area and the shallowest confined aquifer should also be known.

DEPTH OR DISTANCE TO FRACTURED BED-ROCK	Feet	1000	50	4

Separation between burial zone and fractured bedrock; the greater the separation, the better. The values presented herein are for fractured bedrock which underlies the burial zone. If fractured bedrock lies downgradient along a travel path from site, a different set of values should be used.

TYPE OF BURIAL MEDIA	Qualitative	Very fine sands and silts	Clean sands and gravel / clay	4

It is assumed that a granular medium such as clastic sedimentary rocks, strongly weathered bedrock, soils, glacial deposits, and certain pyroclastic rocks would be used as the burial medium strictly on the basis of its favorable engineering and workability properties. A brief description of the granular character of the deposit is desired. Strata of intermediate permeability, such as silt, siltstone, and silty sandstone, are preferred for burial media. Trenches in strata of low permeability may act as bathtubs which collect water during unusual precipitation events and overflow or soak the wastes. Contrawise, strata of high premeability allow water to pass too freely and in general, have poorer ion exchange characteristics.

SUBSIDENCE	Feet	0	5	3

Subsidence is the net lowering of the land surface caused by man's activities in four unrelated processes which are caused by (1) the intensive pumping of ground water, (2) the collapse of moisture-deficient deposits when water is first applied (hydro-compaction), (3) the oxidation of organic soils, and (4) the local extraction of fluids from producing zones in oil fields.

OPTIMUM WIND DIRECTION	Qualitative	Good	Bad	2

Wind can play an important role in the transport, resuspension, and diffusion of particulare and gaseous contaminants in arid and semi-arid regions. This factor is not well-defined but should be considered in locating a disposal site.

DISTANCE TO KNOWN FAULT	Feet	5000	1500	3

Distance in feet of the site from a known fault; the farther from a fault, the better. This factor is intended to include any "inactive" fault (a fault where no recent movement is suspected) which was not included under "Seismic activity."

BURIAL MEDIA AND UNDERLYING STRATA SORPTION CAPACITY	Milliequivalent per 100 grams	50	2	4

The sorption capacity of the burial medium as evaluated in the laboratory by the distribution coefficient, or K_d, method. The K_d is the ratio of activity concentration, or mass of a sorbed nuclide per unit of mass of solids to the activity or concentration of dissolved nuclide per unit volume of water (Thompkins and Mayer, 1947, Kaufman, 1963). The K_d is usually expressed in

milliequivalents per 1000 grams; the larger the ratio, the better. The K_d is determined in the laboratory and is a function of a number of variables. At best, it can only approximate the potential sorption and ion exchange capacity of a burial media under limited laboratory conditions. Detailed studies in the field, or which duplicate field conditions, will be required if the site is selected for further evaluation. So far as practicable, the sorption capacity of underlying strata down to the base of the shallowest confined aquifer should also be determined.

JRIAL MEDIA

THICKNESS	Feet	500	50	4

Thickness of burial medium as a relatively uniform, homogeneous, non-fractured stratum; the thicker and more homogeneous the burial medium, the better. Fractures, sub-strata of lower permeability, and other heterogenities which reduce the ability to predict how and where contaminants may migrate should be subtracted from the overall thickness of the burial medium when they are encountered. The thickness and stratigraphy of underlying strata down to the base of the shallowest confined aquifer should also be determined.

ENGINEERING PROPERTIES	Qualitative	Good	Bad	4

The ease and facility with which burial medium can be worked in landfilling and burial operational the easier the medium can be worked, the better. This factor relates to the economics and engineering factors of disposal. A site and burial medium might otherwise be ideal; however, if the burial medium is too cemented or too indurated to rip or to work, the site cannot be used. A silty sand strata which can be easily excavated by dragline or bulldozers, and which would form trench walls that stand vertical seems to approach the ideal (See AASHO Classification of Soils).

PERMEABILITY	Gallons/day/foot^2	0.1	10 (max) .001 (min)	4

Permeability of burial medium in gallons/day/ft^2; burial media with permeabilities in the range of 0.1 g/d/ft^2 are more desirable; permeabilities significantly higher or lower are generally less desirable. The permeability of underlying strata down to the base of the shallowest confined aquifer should also be determined.

EFFECTIVE POROSITY	Per cent	Intermediate (No scale yet)	Too high (Max) Too low (Min)	4

1251

Effective porosity of burial medium in per cent; burial media with intermediate effective porosites are more desirable, effective porosites which are too high or low are undesirable. No range of acceptable values or "ideal" intermediate value have been arrived at yet. The effective porosity of the underlying strata down

to the base of the shallowest confined aquifer should also be determined.

STRUCTURE	Qualitative	Simple	Complex	4

The internal structure of the burial medium, the burial medium's relationship to the strata underlying it, and structures within these underlying strata should be determined. They all affect the ability to predict the movement of contaminants after they leave the trench; the more simple the structure, the better.

RATIO OF PAN EVAPORATION TO PRECIPITATION MINUS RUNOFF	Ratio	84	40

The ratio of pan evaporation to precipitation running off; the higher the ratio, the better. (U. S. Weather Bureau Tech. Paper No. 37-1959).

HYDROGEOLOGIC COMPLEXITY	Qualitative	Simple	Complex	5

The hydrogeologic complexity of the site in relation to local and near-Regional hydrogeologic, the simpler and more predictable, the better.

SUITABILITY FOR CONTROL OF THE WATER TABLE	Qualitative	Easy	Difficult	2

The degree to which the water table beneath the burial zone can be controlled by dewatering or other engineering techniques; the easier it can be controlled, the better. This factor is possible of marginal interest in Region IX because of the potential for finding sites with deep water tables.

MONITORABILITY	Qualitative	Easy	Difficult	3

The degree to which contaminants migrating from the site can effectively be monitored; the easier they can be monitored, the better.

REMEDIABILITY	Qualitative	Easy	Difficult	3

The degree to which hydrologic and civil engineering manipulative actions can effectively correct the failure of, or milit the threat to, the contaminant affected by the site; the easier the corrective manipulation actions, the better. Examples of remedial actions might include installing additional berms to divert unexpectedly large snow-melt runoff or installing a series of dewatering wells to lower a water table that was threatening to rise into the burial zone during an

HYDRAULIC GRADIENT	Feet/mile	10	100	4

The gradient of the water table from the site down gradient along the travel path(s) which contaminants from the site would migrate.

APPENDIX C

DESCRIPTION OF BIOLOGICAL SCREENING FACTORS

1. Endangered Species

PL 93-205 requires all Federal departments and agencies to insure that actions authorized, funded or carried out by them do not significantly jeopardize the continued existence of endangered and threatened species.

Fish and their habitat including species of fresh or salt water fishes, crustaceans, and mollusks.

Wildlife and their critical habitats including nondomesticated mammals, reptiles, amphibians, birds, and certain groups of insects living in their natural environment. Cautionary note: critical habitat for most species have not yet been determined so all habitat may be judged critical until more precise determinations have been made.

Plants and their habitat including grasses and vascular plants living in their natural environment. Natural units of classification of dominant species associations and communities are identifiable with the various climatic zones in the Western States.

2. Designated Areas of Biological Interest

An active program exists for the preservation by formal classification of areas of unique biological interest, scientific values or educational opportunity and for other purposes. These areas may or may not be included in the National Registry of Natural Landmarks. This factor is concerned not only with those areas in which values have been identified and designated, but with the potential for future designation as well.

a. Research Natural Areas (many agencies, universities, etc., have similar programs currently coordinated in California through the California Natural Areas Coordinating Council).

b. Botanical Areas (including areas of ecological interest).

c. Zoological Areas.

d. Wildlife Refuge.

3. Wild free-roaming Horses and Burros

PL 92-195 establishes wild free-roaming horses and burros as an integral part of the natural system of the public lands and directs that all management activities shall be conducted so as to achieve and maintain a thriving natural ecological balance on these lands regarding wild horses or burros territory and their vital habitat.

4. Vital Habitat for Fish and Wildlife

For a wildlife species to survive and thrive, habitat needs for all stages of its life cycle must be met. Some stages often have extremely critical requirements, while others are much less sensitive to habitat conditions. The welfare of the species can, in part, be accommodated by focusing management attention on those stages most critical and assuring that required habitat conditions are met. Since both critical life cycle stages and the characteristics of required habitat vary from species to species, an all-inclusive checklist of critical requirements cannot be made. Vital habitat elements for some of the many species are presented but the list is intended to be suggestive only.

a. Migration routes.

b. Wintering areas.

c. Water sources in areas of limited supply.

d. Spawning areas.

e. Nesting and fledging habitat.

f. Calving, fawning, kidding, etc., areas.

g. Breeding areas.

h. Competition pressures.

Appendix V-B

DRAFT

GUIDELINES FOR OPERATION AND MANAGEMENT OF HAZARDOUS-WASTE DISPOSAL SITES

Part A—General Provision

.100 Scope.

(a) These guidelines are generally applicable to the disposal of all hazardous waste materials. However, these guidelines do not apply to Class A explosives or radioactive materials (except for low specific activity radioactivity) as defined in the Code of Federal Regulations, Title 49 (Refs. 1,2).

(b) These guidelines are mandatory for Federal agencies. In addition, they are recommended to state, interstate, regional, and local government agencies for use in their activities.

(c) These guidelines are intended to provide for environmentally acceptable disposal site operations. The guidelines do not establish new standards but set forth requirements and recommended procedures to ensure that the design, construction, and operation of both existing and future hazardous-waste disposal sites meet the health and environmental standards for the area in which they are located. The guidelines are intended to apply equally to all hazardous waste generated by Federal agencies. Determination of compliance to meet the requirements of these guidelines rests with the regulatory/licensing agencies.

(d) The requirement sections contained herein delineate minimum levels of performance required of any hazardous-waste disposal site operation. The recommended procedures sections are presented to suggest preferred methods by which the objective of the requirements can be realized. If techniques other than the recommended procedures are used, it is the obligation of the operator of the proposed facility to demonstrate to the licensing/regulatory agencies (in advance by means of engineering calculations and data) that the techniques to be used will satisfy the requirements.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

---

(1) Code of Federal Regulations, Title 49, Chapter I, Part 173, Subpart B "Explosives; Definitions and Preparations."

(2) Code of Federal Regulation, Title 49, Chapter I, Part 173, Subpart G "Radioactive Materials: Definitions."

(e) The proposed hazardous-waste disposal site should represent the ultimate in environmental safety. Large volumes of untreated liquid wastes shall not be deposited directly onto or into the earth. Burial, infiltration, and soil mixing of untreated wastes shortens the operational life of the site, and increases the potential for eventual leachate or water pollution. In addition, materials of potential value are rendered more difficult, if not impossible, to recover at a future time. Bulk liquid waste should be treated prior to disposal. This may include physical, chemical, and biological treatment. Sludges, solids, concentrates, and other residues resulting from such treatment shall be disposed of by engineered burial. Records should be maintained in the event that future recovery and reclamation may be justified. Large volumes of treated aqueous waste are best disposed of by solar evaporation if the climate allows. Other types of wastes, such as low-volume materials or extremely hazardous wastes, may be more difficult to process prior to disposal and should be buried in containers in engineered trenches. The area accepting untreated hazardous wastes should remain separated from that accepting residues treated to inertness.

(f) Disposal sites will be required to maintain operations for temporary storage, processing for disposal, disposal, and engineered long-term storage. Intermediate-term storage for purposes of eventual reclamation of wastes will not be required, but will be allowed as an operator's option, as long as the additional storage capability does not interfere with efficient operation of the disposal facility.

.101 Definitions.

As used in these guidelines:

(a) "Cell" means compacted solid or hazardous wastes that are enclosed by natural soil or cover material in a disposal site.

(b) "Cover material" means soil or other suitable material that is used to cover solid or hazardous wastes in a disposal site.

(c) "Disposal" means to abandon, deposit, or otherwise discard waste as a final action after its use has been achieved or a use is no longer intended.

(d) "Engineered burial" means the systematic burial and daily cover of wastes in trenches, pits, or vaults designed by qualified engineering personnel. The trenches, pits, or vaults may include but are not limited to impermeable liners, access ramps, proper sloping, leachate collection facilities, and final cover with properly sloped, impermeable soil.

(e) "Groundwater" means water present in a saturated zone beneath the land surface.

(f) "Hazardous waste" means any waste material or mixture of wastes that is toxic, pathogenic, corrosive, flammable, an irritant, a strong sensitizer, or which generates pressure through decomposition, heat, or other means. In addition, these wastes or mixtures of wastes can cause substantial personal injury, serious illness or harm to man or wildlife, during or as a proximate result of any disposal of such waste or mixture of wastes. The terms "toxic," "corrosive," "flammable," "irritant," and "strong sensitizer" shall be given the same meaning as in the Code of Federal Regulations, Title 16, Chapter II.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

(g) "Holding" means short-term storage of hazardous wastes.

(h) "Incompatible wastes" means any two or more wastes that, when combined or mixed in an uncontrolled manner, can cause or create the potential to cause explosions, violent chemical reactions, fires, extreme heat, toxic substance formation, hazardous waste discharge, or any other event that may endanger the public health or environment.

(i) "Intermediate cover" means cover material that must resist erosion for an indeterminate period of time, pending terminal use and final disposition of the site.

(j) "Intermediate-term storage" means storage of wastes in physically retrievable form for future recovery.

(k) "Leachate" means liquid that has percolated through or from solid or hazardous waste and has extracted dissolved or suspended materials from it.

(l) "Licensing/regulatory agencies" means the organization elements that have the legal duty to ensure that operators or users of disposal sites comply with these guidelines.

(m) "Long-term storage" means storage and control of wastes that are too hazardous to release to the environment via known disposal technology, e.g., wastes that might return to the biosphere before a degradation process is completed. Such long-term storage should be prepared in an engineered physicall retrievable form for future treatment for recovery or burial.

(n) "Municipal solid wastes" means normal residential and commercial solid waste generated within a community. This solid waste is composed of garbage, refuse, sludges, and other discarded solid materials resulting from industrial and commercial operations and from community activities.

(o) "Processing" means to treat, detoxify, neutralize, incinerate, bio-degrade, or otherwise process a hazardous waste to remove its harmful properties or characteristics for disposal.

(p) "Residue" means all materials that remain after completion of any pretreatment.

(q) "Runoff" means the portion of precipitation and/or applied water that drains from an area as surface flow.

(r) "Sanitary landfill" means a disposal site employing an engineered method of disposing of solid wastes in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

(s) "Short-term storage" means the temporary storage of wastes only until disposal or processing operations can be applied.

(t) "Sludge" means the accumulated semiliquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants.

(u) "Vector" means a carrier that is capable of transmitting a waste from one organism to another, or away from the disposal site.

(v) "Water table" means the upper surface of a body of groundwater.

NOTICE

This document is in preliminary draft. It has not been formally released by EPA and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

Part B—Requirements and Recommended Procedures

.200 Hazardous waste accepted.

.200-1 Requirement.

The site shall be designed and equipped to identify, accept, process, detoxify, store, and dispose of most hazardous materials. It shall be capable of accepting waste materials, which if handled at an inferior facility could result in severe hazard to human health and the environment. The site shall be capable of long-term engineered storage so that it can accept materials which cannot be safely disposed of to the earth and for which no satisfactory treatment exists.

.200—2 Recommended procedures:
Design.

Equipment and facilities at the disposal site should be designed to ensure safe and convenient acceptance and inspection of hazardous wastes at the site.

.200—3 Recommended procedures:
Operations.

(a) Special techniques of certifying the character of waste, segregating it into classes for handling, and moving it to processing, storage, or disposal sites should be used.
(b) Procedures for handling especially bulky wastes, or wastes in unusual volume or state should be made a part of standard operating plans.
(c) There should be stringent waste identification requirements in any acceptance plan. All detailed analysis or characterization is the responsibility of the site user. All potential site users should notify the site prior to the delivery of any new waste to the site.
(d) The site operator should evaluate each new waste to be disposed at the site. A written storage/disposal plan should be prepared for each new waste prior to its acceptance at the site.
(e) A blanket permit may be granted for up to one year for disposal of recurring waste items as long as the waste characteristics remain the same as described in the original application. Recurring waste, for which a waste permit is in effect, may be accepted upon 24 hours' notice to the site operator. The permit and disposal plan for a recurring waste should be renewed at least once every 12 months.
(f) Each incoming waste load should be inspected upon delivery to the site to ensure proper identification and characterization.
(g) At least one person on the site operations staff should be involved full time in accepting, inspecting, and sampling incoming waste loads.
(h) An analytical laboratory for screening and inspecting should be operated on the site.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

.201 Hazardous wastes excluded.

.201—1 Requirement.

(a) The licensing/regulatory agencies and the site owner/operator shall jointly determine specific hazardous wastes to be excluded, shall identify them in the plans, and shall display a description of excluded wastes to the users and the operating personnel.

(b) Hazardous wastes may be excluded at the operator's discretion if:

(1) The waste is too hazardous for release to the environment by disposal or possible escape from storage or transports, and full or partial detoxification technology exists.

(2) Conversion is necessary to render the wastes suitable for storage or disposal and is not available at the site.

(3) The waste is incompatible with site restrictions or a more suitable hazardous waste site is reasonably proximate.

(c) Appeals to such discretionary decisions can be made to the licensing/regulatory agencies, which may then require the acceptance of the waste for disposal.

.201—2 Recommended procedures:
Design.

Provision should be made for the continuing assessment and evaluation of both the site and new or changing waste types to derive recommendations for acceptance or rejection by the licensing/regulatory agencies.

.201—3 Recommended procedures:
Operations.

All users of the site should be provided with up-to-date lists of excluded wastes. These lists should be prominently displayed at the entrance to the site. Exclusion rules should be rigorously enforced for all users.

.202 Site selection.

.202—1 Requirement.

Site selection and use shall be consistent with public health and welfare, air- and water-quality standards, and appropriate land-use plans. The selected site shall have the maximum capability to isolate wastes from the environment as well as to observe, control, and monitor the wastes and their by-products or effluents in perpetuity.

.202—2 Recommended procedures:
Design.

Not applicable.

NOTICE

This document is in preliminary draft. It has n been formally released [redacted] and should not at th stage by construed to represent Agency policy. is being circulated for comment on its technic ccuracy and policy implications.

.202–3 Recommended procedures:
Operations.

"Hazardous Waste Land Disposal Site Screening/Selection Guidelines," developed by the Hazardous Materials Management Task Force, Western Federal Regional Council should be the preferred site-selection tool so as to ensure that environmental, political, and sociological tradeoffs are addressed.[1]

.203 Site Design.

.203–1 Requirement.

(a) Plans for the design, construction, and operation of new sites or modifications to existing sites shall be prepared and approved by a registered professional engineer and shall be submitted to the licensing/regulatory agencies for review and approval prior to any operation. The design shall maximize the isolation of wastes and all processing and operations from the ground- and surface-water resources, from the public, and from wildlife.
(b) The design shall include all facilities necessary to ensure safe and environmentally acceptable operation of the site.
(c) The site's operational design shall maximize the capacity of the area to accept wastes.
(d) An environmental assessment shall be prepared for the licensing/regulatory agencies before the plan and design of the site is completed.

.203–2 Recommended procedures:
Design.

(a) The design should be based on a thorough survey of the types and volumes of hazardous wastes to be handled.
(b) The design should fully recognize the requirements for segregation of incompatible wastes, the need for separate facilities for processing, conversion, temporary storage, and disposal of wastes, and for the long-term monitoring of the waste and site effluents.
(c) Site development plans should include the various design factors addressed elsewhere, as well as:

---

(1) Hazardous Materials Management Task Force, Western Federal Regional Council, "Hazardous Waste Land Disposal Site Screening/Selection Guidelines." (1975).

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

(1) Initial and final topographies at contour intervals of 1 foot or less.

(2) Land use and zoning within 10 miles of the site boundary, including locatio of all residences, buildings, wells, water courses, mining operations, roads, soil or rock borings, and water-supply utilities.
Location of all other utilities should be known within 500 feet of the site boundary.

(3) Employee convenience and equipment maintenance facilities.

(4) Determination of soil excavation and compaction characteristics.

(5) Plans for construction, land removal and replacement, and building placement.

(6) Plans for cutoff walls, impermeable barriers, and berms to isolate or contain wastes. Also, plans for drainage ditches and diversion structures to control runoff, spills, seepage, effluent from washdown areas, and leakage from repackaging and processing areas.

(7) Plans for design and operation of areas for short-term storage of wastes.

(8) Plans for retrievability of wastes that can be converted or otherwise processed after storage.

(9) Areal extent of soil types, faults, and active and potential landslip areas.

(10) Local wind patterns.

(11) Plans for segregation of wastes into compatible groups based on recoverability (e.g., heavy metals, etc.) and chemical reaction prevention, etc.

(12) Plans for final grading and cleanup so as to close the site and maintain it under surveillance.

(13) Intended points of entrance and exit.

(14) Interior roads and ramps with traffic flow patterns.

.203-3 Recommended procedures:
Operations.

Not applicable.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

.204 Water quality.

.204—1 Requirement.

The location, design, construction, and operation of the site for hazardous waste conversion, storage, or disposal shall ensure reasonable nondegradation of water quality. If standards for particular facets of water quality exist, the site shall conform to the most stringent of applicable water-quality standards established in accordance with or effective under the provisions of the amended Federal Water Pollution Control Act,[1] the Safe Drinking Water Act,[2] or other applicable more stringent standards.

.204—2 Recommended procedures:
Design.

(a) The general criteria established by the California State Water Resources Control Board for Class I sites are recommended as criteria in selection and design of the site with regard to protection of water quality.[3]

(b) In addition, the following topics should be addressed:

(1) Detailed determination of the groundwater and surfacewater occurrence, natural water quality, and flow regimens within the site and at least 1 mile beyond the site boundary.

(2) An inventory of all water uses within the potential area of influence of the site, with projections of future potential uses.

(3) Sufficient determination of the regional groundwater and surfacewater systems so that the effect of future land use in the immediate vicinity can be projected in terms of site impact.

(4) Groundwater elevation and movement and the proposed separation between the water table and any wastes in whatever mode of storage or disposal.

(5) A thorough inventory of historical records and sources of information on the local aquifers and surfacewaters to permit identification of possible long-term hydrologic changes that may influence site design and management.

(6) Description of the soil and geologic materials to a depth adequate to allow evaluation of the water-quality protection provided by the soil and geologic materials.

---

(1) PL 92-500 "Federal Water Pollution Control Act." (U.S. Code, Title 33, Sec 1151, et. seq.)
(2) PL 93-523 "Safe Drinking Water Act."
(3) Title 23, Chapter 3, Subchapter 15, California Administrative Code, "Waste Disposal to Land."

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

(7) An evaluation of potential leachate and effluent generation, and the proposed control system for excluding it from the hydrologic environment.

(8) A detailed analysis of the background quality of water resources in the potential zone of influence of the site. The analysis should include (but not be limited to) measurements of: pH; hardness; BOD; COD; the ionic, molecular, and/or atomic composition of suspended and dissolved material at trace levels; and the types and concentration of organisms which may be present. The background quality should be monitored for at least one year prior to operations.

(9) The intended water-quality monitoring program, which must include monitoring provisions during operation of the site and afterwards until the site is no longer a credible threat to water quality.

.204–3 Recommended procedures:
Operations.

(a) Surfacewater courses and runoff should be completely controlled within the site so as to exclude all surfacewater inflow to the site, to prevent infiltration to the greatest extent possible, and to channel runoff from the site to treatment facilities or to other approved disposal facilities. Site construction and grading should be such as to avoid ponding or flooding and to avoid erosion. All effluent or surface runoff from the site should be collected and treated to assure no discharge of hazardous materials from the site. Hazardous wastes and leachates should be continuously monitored to prevent contact with groundwater and surfacewater resources.

(b) The site operator should be aware of the bases for all design features and operating procedures so that any unforeseen circumstances which can affect water quality may be properly evaluated.

(c) An analytical laboratory should be available for doing routine water-quality analyses including, but not limited to, trace elements, organic and inorganic compounds, and indicator or pathogenic organisms.

.205 Air quality.

.205–1 Requirement.

(a) The site design, facilities, and operation shall be planned to minimize the discharge of dangerous levels of airborne hazardous materials into the working environment of the site or the surrounding area.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

(b) If standards for particular facets of air quality exist, the design, construction, and operation of the facility shall conform to applicable ambient air-quality standards and source-control regulations established under the authority of the Clean Air Act,(1) as amended, or state or local standards effective under that Act, or other applicable, more stringent standards.

.205—2 Recommended procedures:
Design.

(a) The site should be equipped with or have available, state-of-the-art equipment for collecting, measuring, and analyzing the airborne emissions of materials.
(b) All unit operations at the site should be equipped to adequately prevent the discharge of dangerous levels of airborne hazardous materials.
(c) The monitoring plan should also include periodic on-site and off-site sampling and analysis of soils and flora in order to detect the accumulation of deposited hazardous substances that may have been discharged through the air.
(d) A detailed study of the meteorology of the site and its environs should be performed in order to: determine the frequency and extent of unfavorable and extreme weather; locate specific operational features within the site; guide the planning of a monitoring program; and determine preoperational ambient air quality.

.205—3 Recommended procedures:
Operations.

(a) Dust-control measures should be initiated as necessary to protect the health and safety of facility personnel and nearby populations.
(b) A comprehensive air-quality monitoring program should be designed to cover the period of operation of the site and until such a time that the site is no longer a credible threat to air quality.

.206 Gas control

.206—1 Requirement.

Vapors and decomposition gases generated within the disposal site shall be controlled on site, as necessary, to avoid posing a hazard to occupants of adjacent property.

---

(1) PL-604 "Clean Air Act" (U. S. Code, Title 42, Sec 1857, et. seq.)

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

.206—2 Recommended procedures:
Design.

Plans should assess the need for vapor and gas control and indicate the locatio and design of any vents, barriers, or other control measures to be provided.

.206—3 Recommended procedures:
Operations.

Vapors and decomposition gases should not be allowed to migrate laterally from the disposal site to endanger occupants of adjacent properties. They should be vented to the atmosphere directly through the cover material, cutoff trenches, or ventilation systems in such a way that they do not accumulate in explosive or toxic concentrations, especially within structures.

.207 Vector control and wildlife protection

.207—1 Requirement.

Conditions shall be maintained that discourage the incursion, harboring, feeding, and breeding of vectors.

.207—2 Recommended procedures:
Design.

Plans should include contingency programs for vector control and wildlife protection and the operator should be prepared at all times to implement those procedures.

.207—3 Recommended procedures:
Operations.

Vector control or wildlife protection contingency programs should be implemented when necessary.

.208 Aesthetics.

.208—1 Requirement.

(a) The disposal site shall be designed and operated at all times in an aesthetically acceptable manner.
(b) The disposal-site operator shall maintain a continuing program to ensure orderly and systematic operation of the site so as not to create odors and other public nuisances to neighboring communities, residents, or other persons frequenting the area.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

(c) Programs shall be implemented to cover the handling, returning, and disposing of emptied containers.
(d) Operational noise will be minimized.
(e) An effective litter-control program shall be included.

.208–2 Recommended procedures:
Design.

Not applicable.

.208–3 Recommended procedures:
Operations.

Not applicable.

.209 Cover material.

.209–1 Requirement.

Cover material shall be applied as necessary to minimize resuspension of soil or wastes, fire hazards, infiltration of precipitation, odors, and blowing litter; control gas venting and vectors; and shall be compatible with the surrounding natural environment.

.209–2 Recommended procedures:
Design.

Plans should specify:
(a) Cover material sources and soil classifications.
(b) Surface grades and side slopes needed to minimize infiltration and to promote maximum runoff without excessive erosion.
(c) Procedures to promote vegetative growth as promptly as possible to combat erosion and improve appearance of idle and completed areas.
(d) Procedures to maintain cover material integrity, e.g., regarding recovering.

.209–3 Recommended procedures:
Operations.

(a) Intermediate cover should be applied on areas where additional cells are not to be constructed for extended periods of time; normally, one day to one year.
(b) Final cover should be applied on each area as it is completed or if the area is to remain idle for over one year.

NOTICE

This document is in preliminary draft. It has not been formally released and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

.210 Safety.

.210—1 Requirement.

OSHA[1] and health and safety working orders of state and local governments shall be observed as they relate to the general working environment; design, operation, and maintenance of equipment; and the handling of hazardous substances. A vigorous and continuing accident-prevention and safety program shall be instituted at the site.

.210—2 Recommended procedures:
Design.

Adequate design, facilities, and equipment should be available to ensure the safe handling of hazardous wastes and to respond to emergencies that may arise. Storage areas should be designated as high-security areas. All temporary storage should be protected from contamination degradation, and loss.

.210—3 Recommended procedures:
Operations.

In preparation of the general operating plans of the site, safety precaution and contingency procedures should be detailed. Site personnel should know the characteristics of hazardous wastes. They should be thoroughly trained for the proper operation and use o equipment and safety gear, and on proper accident-prevention and emergency procedures. They should be thoroughly familiar with chemical hazards.

.211 General operations.

.211—1 Requirements.

General operations shall be coordinated to assure that they are compatibile with the physical characteristics of the site and provide for the health and safety of operating personnel.

---

(1) PL 91-596 "Occupational Safety and Health Act." (U. S. Code, Title 29, Sec. 651, et. seq.)

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

.211—2 Recommended procedures:
Design.

(a) A plan should be prepared that details all operations at the site. It should include:
(1) Description of sequence of operations.
(2) Evaluation of waste compatibility.
(3) Periodic maintenance schedule.
(4) Emergency plans.
(5) A medical monitoring program.
(6) A safety program.
(b) The operational plan should not be confused with the planning and design stages, which details the specific components of the site. The plan should be kept current and contain information relating to site operation.
(c) The operational plan should include a flow scheme indicating how various wastes are processed, reclaimed, or disposed of, and should also include the proposed development stages of processing systems or waste-disposal areas.

.211—3 Recommended procedures:
Operations.

(a) Operational details that should be included in the plan are:
(1) Acceptance of wastes.
(2) Monitoring and analysis of wastes.
(3) Safety and emergency procedures.
(4) Transportation of wastes within site.
(5) Unloading of wastes.
(6) Holding and storage of waste.
(7) Processing of waste.
(8) Disposal of waste.
(9) Equipment maintenance.
(10) Personnel qualifications.
(11) Record keeping.
(12) Site security.
(b) The operational plan should be reviewed periodically by the operator and the licensing/regulatory agencies to ensure its adequacy.

.212 Records.

.212—1 Requirement.

The owner/operator of the disposal site shall maintain and provide records and monitoring data to the licensing/regulatory agencies.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

.212–2 Recommended procedures:
Design.

(a) Plans should prescribe methods to be used in maintaining records which document the operations of the disposal site. Information on recording and monitoring requirements should be obtained from the licensing/regulatory agencies.

.212–3 Recommended procedures:
Operations.

(a) Records should be maintained covering at least the following:
(1) Major operational problems, complaints, or difficulties.
(2) Qualitative and quantitative evaluation of the environmental impact of the disposal site, with regard to the effectiveness of gas and leachate control, including results of: (i) leachate sampling and analyses; (ii) gas sampling and analyses; (iii) groundwater- and surfacewater-quality sampling and analyses upstream and downstream from the site.
(3) Vector control and wildlife protection efforts.
(4) Dust- and litter-control efforts.
(5) Inventory of waste identification and location for all wastes on the site (in perpetuity).
(6) Major site operations, especially with respect to their effects on the soil profile, topography, etc.
(7) Local meteorological data for a period of 10 years. These data should include, but not be limited to, records of precipitation, wind speed and direction, average daily temperature, and relative humidity.
(8) Personnel health records.

.213 Monitoring and surveillance.

.213–1 Requirements.

Plans shall detail methods for detecting discharge of hazardous materials from the site (in perpetuity), hazardous operations, hazardous designs in the site, and creation of aesthetically unpleasing situations. The licensing/regulatory agencies shall participate in monitoring and surveillanc activities.

.213–2 Recommended procedures:
Design.

Not applicable.

.213–3 Recommended procedures.
Operation.

Not applicable.

NOTICE

This document is in preliminary draft. It has not been formally released and should not at this stage be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

.214 Quality-assurance program.

.214—1 Requirement.

A quality-assurance plan shall be written to cover all structures, systems, components, and operations whose proper function is necessary to prevent uncontrolled release of hazardous materials to the environment.

.214—2 Recommended procedures:
Design.

The foremost objective of the quality-assurance program should be to assure that the site operator's procedures offer maximum protection to the environment, all commensurate with the scope, complexity, and duration of the task being undertaken.

.214—3 Recommended procedures:
Operations.

(a) As a minimum, the plan should include the following key elements: a definite assignment of organizational responsibility for quality; a means of specifying the level of quality required for the job; the procedures for implementing the quality-assurance program; and an independent system for verifying compliance with and adequacy of quality requirements.

(b) Consideration should also be given to inclusion of the following elements in establishing a quality-assurance program:

(1) Indoctrination, training, and qualification of personnel.
(2) Document review and approval.
(3) Document release and change control.
(4) Control of interim storage and final burial of waste materials.
(5) Inspection, examination, and testing of waste materials when delivered to the site.
(6) Measuring- and test-equipment calibration and control.
(7) Lifting, handling, storage, and shipping control.
(8) Nonconformance reporting and analysis.
(9) Corrective-action control.
(10) Process and equipment qualification.
(11) Operations control.
(12) Records collection, storage, and maintenance.
(13) An internal audit system to assure that actions of the plan are properly implemented and that the plan is updated when necessary.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

Appendix—Recommended Bibliography

1. Banta, J., et al. Sanitary landfill; manual of engineering practices, No. 39, American Society of Civil Engineers, 1959.
2. Black, C. A., D. D. Evans, J. L. White, L. E. Ensminger, F. E. Clark, and R. C. Dinauer, EDS. Methods of soil analysis, Pt. 1. Physical and mineralogical properties, including statistics of measurement and sampling. Madison, Wis., American Society of Agronomy, Inc., 1965.
3. Brashares, W. C., and R. M. Golden. Occupational Safety and Health Act. Special bulletin. Washington, National Solid Wastes Management Association, 1972.
4. Brunner, D. R. and D. J. Keller, Sanitary Landfill Design and Operation, Washington, U. S. Government Printing Office, 1972, 59 p.
5. Ottinger, R. S. et al, Recommended Methods of Reduction, Neutralization, Recovery or Disposal of Hazardous Wastes, U.S. EPA, 16 Vol, NTIS, U. S. Dept. Commerce, 5285 Port Royal Road, Springfield, Virginia, 22161.
6. Zausner, E. R. An accounting system for sanitary landfill operations. Public Health Service Publication No. 2007. Washington, U.S. Government Printing Office, 1969. 18 p.
7. Federal Environment Pesticides Control Act of 1972; Public Law 92-516, 92d Cong., H.R. 10729, Oct. 21, 1972. Washington, U. S. Government Printing Office, 1972.
8. — Guidelines for Hazardous Waste Land Disposal Facilities — California Department of Health, 1973.
9. — Handbook of chemistry and physics. 54th ed., Cleveland, CRC Press, Inc., 1973.
10. — Hazardous Waste Management, California Department of Health, 1973.
11. — The Solid Waste Disposal Act as amended; Title II of Public Law 89-272, 89th Cong., S. 306, Oct. 20, 1965; Public Law 91-512, 91st Cong., H.R. 11833, Oct. 26, 1970. Washington, U.S. Government Printing Office, 1971. 14 p. Reprinted 1972.

NOTICE

This document is in preliminary draft. It has not been formally released [redacted] and should not at this stage by construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

Appendix VII-A

Department of Defense
Office of the Assistant Secretary
for Health and Environment
Washington, D.C. 20301

JAN 15 1976

COPY

Mr. Charles Bourns
EPA (Rm 358)
100 California Street
San Francisco, Calif. 94111

SUBJECT: DoD Management of Waste Hazardous Materials

The subcommittee for the inventory and assessment of Department of Defense waste hazardous materials respectfully submits the following report. All inventory data was furnished by the Defense Supply Agency, Cameron Station.

The Purpose of the subcommittee was to identify the location, condition, and quantity of waste hazardous materials generated by DoD installations within Region IX. In order to limit the scope of the endeavor, the following definition of hazardous materials was utilized: "Those wastes that pose a substantial danger immediately or over a period of time, to human, plant, or animal life and as such must be handled and disposal effected with special precautions."

Approximately thirty DoD installations within Region IX are listed as possessing excess hazardous materials: almost all of the material was pesticides and herbicides and these items, other than DDT, were being disposed through contractor operations.

During the past year, the Agency for International Development (AID) entered into an agreement with the Government of Mexico whereby the GOM would purchase all of the DoD DDT. Since the negotiations have not yet been finalized, the DoD has decided to proceed with the disposal of DDT overseas and in the Continental United States except in those states in close proximity to Mexico namely, Arizona, California, Louisiana, Mississippi, New Mexico, and Texas. A stock freeze was imposed upon those six states and any redrumming costs incurred subsequent to July 25th 1975, will be billed to AID when the transfer to GOM takes place.

Upon review of the entire disposal system, it appears that the Department of Defense/Defense Supply Agency program is functioning satisfactorily. If there are any "problems",

they are minor and resolution has always been effected. We recognized that new legislation addressing the hazardous waste disposal problem will be forthcoming eventually. Based upon this premise, the following recommendations are offered to ensure that all hazardous wastes are disposed of in an environmentally acceptable manner.

1. That the Environmental Protection Agency continue its efforts to designate items/classes of items that will require disposal consideration.

2. DSA continue to monitor the excess listings for materials requiring special handling and disposal.

3. All DoD incinerators and land fill operations be surveyed to determine capabilities, capacities, and conditions of facilities.

4. A Federal Agency be designated as lead agency to manage the hazardous waste disposal program.

5. The Interagency Committee on Resource Recovery (ICORR) evalue the merits of interagency disposal proposals vs. continuation of existing programs of contractor disposal.

Sincerely,

s/ John P. Meade

John P. Meade
LTC, USAF
OASD (H & E)
Pentagon, Wash., D.C.

Appendix VII-B

"DOD PESTICIDE MANAGEMENT & DISPOSAL" -- LTC John P. Meade

(A Report to the Federal Regional Task Force for Hazardous Materials Management, Annual Meeting, November 12-13, 1974)

One innovative management tool introduced into the Department of Defense last year, was the concept of management by objectives. Under this program, departments and agencies have now identified their most important goals, termed Presidential objectives, and have established regular monitoring procedures. These proposed objectives are submitted each year for review by the Office of Management & Bureau for further refinement and then submitted to the President. If the President accepts the objectives, the agency is held accountable for achieving them. This year, the Deputy Assistant Secretary for Environmental Quality had our proposal accepted. The proposal was to exercise environmental control in the accomplishment of the military mission.

There are eight sub-actions supporting this action. I'll address the sub-action by developing a program for control of hazardous material during use and disposal operations and dispose of in environmentally safe manner 50% of the hazardous materials declared excess.

The first sub-action was to develop a program for the control of hazardous materials. The first step was to review all Department of Defense Pest Control Programs. The Armed Forces Pest Control Board and the Federal Working Group on Pest Management, who was under charter of CEQ (Council of Environmental Quality), is now reviewing all the Department of Defense Pest Control Programs for (1) use of registered pesticides, (2) use of pesticides in accordance with labeling, (3) if the use is inconsistent with labeling, then alternative pesticides and newer methods of application will be evaluated, and (4) on minor use pesticides, when the manufacturer cannot or will not register the item for a minor use, the Department of Defense will then seek to act as its

own registrant. We will follow all of the EPA procedures for registration as any other agency or company would. Our goal under this program is to insure that the Department of Defense Pest Management Programs are being conducted in an environmentally acceptable manner. The program is on track in meeting the Nov 74 milestone.

The second sub-action is to survey excess hazardous materials. The Department of Defense has gone to DSA for identification and survey of excess hazardous materials. This phase of the program is just that, identification and survey the materials to obtain an estimate of the quantities and types of materials we possess. This procedure could also involve the identification of potential markets. For Region IX, we will be contacting the various military commands for a more accurate inventory. Once this channel is established, the data can be periodically updated to reflect current problems. One special interest item that may be noted, the matter of DDT disposal. This is being handled by the State Department. They are into negotiations with the government of Mexico now for transfer of the material. Points now under discussion involved Department of Transportation repackaging requirements and acceptance by the government of Mexico for funding of the program. Another item of interest is herbicide orange. The draft environmental impact statement submitted by the Air Force proposed at-sea incineration on the Dutch Ship, Vulcanis. The Dutch ship, the Vulcanis, conducted similar incinerations for Shell several weeks ago under supervision by EPA personnel. The preliminary data indicates that most test objectives were satisfied. The Air Force is also considering selling that portion of the orange that meets commercial

criteria as a result of EPA dropping an injunction against usage of 245T. The Vulcanis is the first and only ship of its kind, and this is a new concept. Although Shell contracted for use of the ship last summer, EPA with strong urging from the National Wild Life Federation announced on September 27th, that an ocean dumping permit would be needed for incineration; this is a critical point. The permit was granted on 10 October. The research permit issued to Shell to test the potentially invaluable alternative to conventional dumping authorizes as many as four test burns. Each trip into the Gulf of Mexico, about 130 miles south of Galveston, will burn about 4200 tons of chlorinated hydrocarbon waste. A preliminary review of the high temperature incineration process shows that it should destroy well over 99.5 percent of the wastes, by converting them into harmless carbon dioxide and hydrochloric acid droplets which will quickly turn to salt after falling into the sea. Operating temperatures of 2500 to 3000 ° F will be used on the sailing incinerator.

The next sub-action is identification of DOD toxic wastes. In addition to the so called normal effluents, the DOD is identifying and evaluating the potentially hazardous waste products of waste incineration, land filling operations, and recycling programs. We are now concerned with lechates, sludges, viruses, and pathogens. The military departments will be reviewing their operations in reporting on these wastes. At this time we are concerned with identification of the materials. Later, tasks will be levied to develop control techniques and technology for safe disposal of toxic and hazardous solid and liquid sludge waste. We do not anticipate any difficulty in meeting our

April 1975 milestone in so far as emission inventories have already been completed at DOD facilities.

The next sub-item is the modification of DOD training and certification program to meet the Federal Working Group Pest Management Standards. The Federal Working Group for Pest Management, under the auspices of the Council on Environmental Quality, is currently evaluating the Federal Pesticide Applicator Certification Programs. The Federal Insecticide, Fungicide and Rodenticide Act, as amended, Public Law 92-516, requires that pest control personnel applying restricted use pesticides become certified by 22 Oct 1976. The government agency plan will have as a minimum the most stringent of state standards. The plan calls for the Federal Working Group on Pest Management to be the central contact point for the Environmental Protection Agency, and will incorporate common elements of agency certification plans into one unit, to insure comparability and consistency of agency programs. The states may then recognize the acceptability and uniformity of the agency plans. The agencies will issue appropriate, uniform credentials verifying applicator certification. The Federal Working Group Pest Management Program will furnish certification information to the administrator, EPA, for evaluation. We do not envision difficulty in meeting the milestone of May 1975 for this program.

- END -

Appendix VIII

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
345 Middlefield Road
Menlo Park, California 94025

JAN 2 10 10 AM

December 30, 1975

Mr. Charles Bourns, Chairman
Task Force for Hazardous Materials Management
Western Federal Regional Council
U. S. Environmental Protection Agency
100 California Street
San Francisco, CA 94111

Subject: Summary of results -- Ad hoc subcommittee for assessment of non-Defense Department federal agencies for hazardous waste

Mr. Chairman:

Between June and November, 1975, all federal agencies other than the Defense Department with offices or operations within Region IX were requested by mail questionnaire to report their annual hazardous material waste load. The results of the assessment were reported to you by letter preliminarily on October 28 and in more formal detail on November 6, 1975. The attached summarizes these results.

Very truly yours,

Will Burnham

W. L. Burnham
Assessment Chairman

Enclosure

ABSTRACT

Results of an Assessment of Civilian Federal Agency Hazardous Wastes in Region IX

As an ad hoc committee function of the WFRC Task Force for Hazardous Material Management all Federal agencies within Region IX other than Department of Defense were inventoried to assess annual load and type of non-radioactive hazardous wastes. All agency units believed to generate or have disposal responsibility for hazardous materials responded, except one (GSA did not respond). Methods and accuracy of documentation of waste loads varied greatly among agency units, with some unable to provide quantitative reports. Narrative descriptions of operations, however, along with detailed accounting by most agency units suggests the assessment was reasonably complete and the indicated annual load reported was essentially correct, although probably a minimum value. The forty-three units of the twenty-six agencies responding reported more than 4,500 tons and from 250,000 to 350,000 gallons of hazardous waste generated, with 8,000 to 10,000 containers requiring disposal. In addition to these quantities, large amounts of hazardous materials in small-volume lots are utilized annually in laboratories and in normal operations of some agencies. These yield no reportable wastes, but there is a large estimated additional container disposal load not accounted for in the reports.

Other than the large volume of non-radioactive waste materials resulting from specialized functions of the Nevada Test Site (ERDA), the majority of wastes and containers are the result of herbicide and pestcide uses by the land-management agencies. Minor quantities of chemical wastes are developed through laboratory functions and enforcement or policy activities. The points of generation are widespread within the Region, and disposal through commercial facilities, through return of unused materials and containers to suppliers, and by modification or neutralization does not appear to be a serious problem.

In addition to the indicated volumes and locations of waste generation, the assessment revealed a need for more detailed and precise procedures by most agencies and offices for the recording and documentation of hazardous material handling. Such procedures, if utilized by all agencies, would most probably reveal a waste material and container load considerably greater than that indicated by the assessment.

Task Force for Hazardous Materials Management
Western Federal Regional Council
Non-Defense Agency Assessment Subcommittee

Agency Assessment Listing

Key to Agency responses:

1. Report annual types and quantities of wastes.

2. Report annual types and quantities acquired, on-hand, or used--waste quantities estimated.

3. Report annual types and quantities stocked or on-hand--waste quantities not reported or estimated.

4. Report negative--no wastes requiring disposal.

5. Did not submit a report.

I. Dept. of Agriculture (USDA)

A. Animal and Plant Health Inspection Service

1. California/Nevada District-Sacramento	4
2. Alameda, California	
a. Hawaii/Pacific Islands	4
b. San Pedro, California	1
c. San Diego, California	1
d. San Francisco, California	1
e. San Luis, Arizona	1
f. Travis AFB, California	1
g. Nogales, Arizona	3

B. Agricultural Research Service

1. Berkeley, California	
a. Brawley, California	1
b. Albany, California	1
c. Fresno, California	1
d. Indio, California	1

C. Forest Service

1. San Francisco, California, Region 5	3
2. Albuquerque, New Mexico, Region 3	1
3. Pacific SW Forest and Range Experiment Station, Berkeley, California	1
4. Intermountain Forest and Range Experiment Station, Ogden, Utah	4
5. Rocky Mountain Forest and Range Experiment Station, Ft. Collins, Colorado	4

II. Dept. of Health, Education & Welfare (HEW)

A. San Francisco, California, Regional Office	4
B. Food and Drug Administration, Region IX	3

III. Dept. of Housing & Urban Development (HUD)

A. Environmental Clearance Office, Los Angeles, CA 4

IV. Dept. of the Interior (USDI)

A. Bureau of Land Management

1. State Office, Sacramento, California
   a. Folsom, California 1
   b. Bakersfield, California 1
   c. Riverside, California 1
   d. Susanville, California 1
   e. Ukiah, California 2

2. State Office, Reno, Nevada 1

B. Bureau of Reclamation

1. Mid-Pacific Region, Sacramento, California
   a. Folsom, California 1
   b. Willows, California 1
   c. Red Bluff, California 1
   d. Redding, California 1
   e. Fresno, California 1
   f. Tracy, California 1

C. Geological Survey

1. Regional Offices, Menlo Park, California 2

D. National Park Service

1. Western Region, San Francisco, California
   a. Parks and sites in Arizona, California and Hawaii 1

V. Dept. of Transportation (DOT)

A. U. S. Coast Guard

1. Twelfth Coast Guard District, San Francisco, CA 1

VI. Dept. of Treasury (DT)

A. Bureau of Alcohol, Tabacco, and Firearms

1. San Francisco, California 4

B. U. S. Customs Service

1. San Francisco, California, Region VIII 1

VII. Environmental Protection Agency (EPA)

A. Region IX, San Francisco, California 1

VIII. Energy Research and Development Administration (ERDA)

A. Nevada Operations Office, Las Vegas, Nevada 1

B. San Francisco Operations Office, Oakland, California 1

IX. General Services Administration (GSA)

A. Regional Offices, So. San Francisco, California 5

X. Postmaster General (PO)

A. Western Region, San Bruno, California 1

XI. Veterans Administration (VA)

A. Regional Office, San Francisco, California 4

Table 1. Types of waste hazardous materials reported, by pound, gallon and number of containers.

		I A2	I B1	I C2	I C3	IV A1	IV A2	IV B	IV C	IV D	V A	VI B	VII A	VIII A	VIII B	X A		TOTALS
	Pounds																	
Type	1. Acid solution													1,750				1,750
	2. Alkaline Solution													22,200				22,200
	3. Pesticides	71				108		6,700		410			270					7,559
	4. Paint Sludge					1,236		3,750										4,986
	5. Solvent		100											7,975				8,075
	6. Lead Sludge																	0
	7. Chemical Toilet Wastes									20								20
	8. Tank Bottom Sediment																	0
	9. Oil							17,600										17,600
	10. Drilling Mud													8,000,000				8,000,000
	11. Contaminated Soil & Sand							276,000			41,500			120,000				437,500
	12. Laboratory Waste	281													2,710			2,991
	13. Drugs																	0
	14. General		200					500		72,000	8			1/	30			72,738 1/
	TOTALS	352	300			1,344		304,500		72,430	41,508		270	8,151,925	2,740			8,575,419
	Gallons																	
Type	1. Acid Solution		20						28	47	763			1,795	5,503			8,156
	2. Alkaline Solution					180			3	5	208				510			906
	3. Pesticides	16	20			261	6,500			62	15		250	100				7,224
	4. Paint Sludge		360			48				150	397			290	4,130			5,375
	5. Solvent		445			232		900	2	1,254	2,471					3,630		8,934
	6. Lead Sludge										1							1
	7. Chemical Toilet Wastes					30,000				73,000								103,000
	8. Tank Bottom Sediment									12,000	50							12,050
	9. Oil		20	250		82		2,000		4,985	6,452	5			2,200	39,250		55,244
	10. Drilling Mud																	0
	11. Contaminated Soil & Sand																	0
	12. Laboratory Waste	107	40			3			25		25	500	40		9			749
	13. Drugs																	0
	14. General							2,000		6,400	3			1/	331			8,734 1/
	TOTALS	123	905	250		30,806	6,500	4,900	58	97,903	10,385	505	290	2,185	12,683	42,880		212,373
Containers		100	28	10		1,520	5,000	1,000		50				310				3,018

Additions to Table 1

1. Footnote 1/ on Table 1 applies to agency VIII A which reports, in addition to quantities shown, the following:

Type 12 -- Trace quantities of 135 chemicals, the use of which does not create reportable waste quantities.

Type 14 --	50-yard rolls Asbestos	20
	50" x 50" x 1/8" sheets Asbestos	66
	Gallons, Spent epoxy, catalyst, resin	110,000
	Gallons, gasoline	2,500,000
	Pounds of lead, as bricks	413,750
	Pounds of lead, as shot	512,500
	Sheets of lead, from 24" x 24" x 1/8" to 36" x 36" x 1/2"	130

2. Agency I C.1. reports use of large quantities of Type 3 materials in small to large lots, but no waste. However, disposal of containers is not reported. Assume some waste gallons and a large quantity of containers.

3. Agency II B reports laboratory use of a large number of chemicals (Type 12), but no waste. Assume a quantity of containers, however.

4. Agency IV C reports laboratory use of various chemicals, but no large waste volumes. However, assume a small number of containers.

Generalized List of Hazardous Materials, by Type

Type 1. ACID SOLUTION

Spent etching solution	Acidic chemical cleaners
Spent acid plating solution	Electrolyte
Pickling liquor	Spent acid
Acid sludge	Sulfonation tar
Battery acid	Copper bathing solvent

Type 2. ALKALINE SOLUTION

Alkaline caustic liquids	Caustic wastewater
Alkaline chemical cleaners	Lime and water
Alkaline battery fluid	Lime sludge, wastewater
Acetylene sludge	Lime soda water
Oakite	Spent caustic
Wyandotte cleaner	Spent cyanide plating solutions

Type 3. PESTICIDES

Unwanted or waste pesticides	Unrinsed pesticide containers
Pesticide-containing wastes from pesticide handling or storage	Wash water from the cleaning of pesticide containers or application equipment

Type 4. PAINT SLUDGE

Paint slops	Paint waste from paint application
Pigment sludges	

Type 5. SOLVENT

Cleaning solvents	Paint remover or stripper
Data processing fluid	Dry cleaning wastes and other spent cleaning fluids
Attrix solvent	

Type 6. LEAD SLUDGE

Wastes from tetraethyl lead compounds	Sediments containing tetraethyl and other organic lead

Type 7. CHEMICAL TOILET WASTES

Type 8. TANK BOTTOM SEDIMENT

Type 9. OIL

Floc	Crude Petroleum
Oil Sludge	Waste Oil
	Toxic grease compounds

Type 10. DRILLING MUD

Type 11. CONTAMINATED SOIL AND SAND

Sand and oil	Lagoon residue mixed with soil
Spent blasting sand	Contaminated soil or sand from spills

Type 12. LABORATORY WASTE

Spent or waste chemicals

Type 13. DRUGS

Hazardous, toxic, or legally controlled drugs and drug mixtures

Type 14. GENERAL

Incinerator ash	Cyanide, phenolic wastes
Lagoon, distillation residues	Spent catalyst, epoxy, resin wastes
Asbestos, Magnesium, Beryllium wastes	Sewage and septic tank sludges determined hazardous

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
345 Middlefield Road
Menlo Park, California 94025

November 6, 1975

Mr. Charles T. Bourns, Chairman
Task Force for Hazardous Materials Management
Western Federal Regional Council
U. S. Environmental Protection Agency
100 California Street
San Francisco, CA 94111

Dear Mr. Chairman:

The Task Force ad hoc subcommittee for the assessment of non-Defense Department federal agencies for quantity and type of waste hazardous materials submits the attached report.

The inventory was made through requesting letters (copies attached) sent to all non-Defense agency units in Region IX thought to maintain operations capable of generating hazardous material wastes. It did not include contractors on federal projects. The responses summarized in the attached table are believed to be reasonably representative of the waste problem within the non-Defense federal agencies. However, quantities estimated probably are considerably less than those actually generated.

The inventoried agencies reported annual waste quantities of more than 4,500 tons and from about 250,000 to 350,000 gallons, with 8,000 to 10,000 container units for disposal. In addition, some agencies reported significant quantities of hazardous materials used in normal operations, but were unable to report either a waste volume or disposal of containers.

Forty-three offices or units of the twenty-six agencies included in the assessment reported their annual hazardous material handling procedures. These units are grouped into four broad categories based on their principal organizational function.

1. Research and Development agencies.
   Includes: Agricultural Research Service (USDA)
   Energy Resource and Development Administration (ERDA)
   U. S. Geological Survey (USDI)

2. Land Management agencies.
   Includes: U. S. Forest Service (USDA)
   Bureau of Land Management (USDI)
   Bureau of Reclamation (USDI)
   National Park Service (USDI)

3. Regulatory and Control agencies.
   Includes: Animal and Plant Health Inspection Services (USDA)
   U. S. Coast Guard (DOT)
   Postmaster General (USPS)
   Environmental Protection Agency (EPA)
   Bureau of Alcohol, Tabacco, and Firearms (DT)
   U. S. Customs Service

4. Human Resource agencies.
   Includes: Department of Health, Education & Welfare (HEW)
   Department of Housing & Urban Development (HUD)
   Veterans Administration (VA)

Table 1 lists the waste quantities by type and category. As is clearly indicated, the majority of wastes are generated in the research and development agencies and the large quantities are of only a few types. However, the individual responses to the assessment also reported the acquisition and use of large quantities of several material types, with no reportable waste. From this, it must be concluded that larger volumes of waste are actually generated, and that the reported container-disposal volume is far too small. This is particularly true of the agencies of category four. Some agency units in this category maintain laboratory facilities and other functions requiring use of hazardous materials. These operations are such, however, that no reportable waste is produced and the containers are apparently disposed of as returnable to the supplier or through domestic solid-waste facilities.

The great majority of all non-Defense Department federal agency hazardous waste is generated in the normal activities of only six of the agencies, and of these one agency produces perhaps 80 percent of the total. From this it is apparent that even though many agency units have need for hazardous waste disposal facilities, the volume involved is not large, and the majority have no real problem of management or disposal through commercial facilities.

Sincerely,

W. L. Burnham
Assessment Subcommittee

Enclosures

Table 1. Types of waste hazardous materials reported by pound, gallon and number of containers

		Category 1	Category 2	Category 3	TOTALS
		Pounds			
Type 1.	Acid solution	1,750			1,750
2.	Alkaline solution	22,200			22,200
3.	Pesticides		7,218	341	7,559
4.	Paint sludge		4,986		4,986
5.	Solvent	8,075			8,075
6.	Lead sludge				0
7.	Chemical toilet wastes		20		20
8.	Tank bottom sediment				0
9.	Oil		17,600		17,600
10.	Drilling mud	8,000,000			8,000,000
11.	Contaminated soil & sand	120,000	276,000	41,500	437,500
12.	Laboratory waste	2,710		281	2,991
13.	Drugs				0
14.	General	230	72,500	8	72,738 1/
	TOTALS	8,154,965 1/	378,324	42,130	8,575,419
		Gallons			
Type 1.	Acid solution	7,346	47	763	8,156
2.	Alkaline solution	513	185	208	906
3.	Pesticides	120	6,823	281	7,224
4.	Paint sludge	4,780	198	397	5,375
5.	Solvent	447	2,386	6,101	8,934
6.	Lead sludge			1	1
7.	Chemical toilet wastes		103,000		103,000
8.	Tank bottom sediment		12,000	50	12,050
9.	Oil	2,220	7,317	45,707	55,244
10.	Drilling mud				0
11.	Contaminated soil & sand				0
12.	Laboratory waste	74	3	672	749
13.	Drugs				0
14.	General	331	8,400	3	8,734 1/
	TOTALS	15,381 1/	140,359	54,183	210,373

Addition to Table 1

1. Footnote 1/ on Table 1 applies to agency category 1 which reports, in addition to quantities shown, the following:

Type 12 -- Trace quanties of 135 chemicals, the use of which does not create reportable waste quantities.

Type 14 -- 66 large sheets and 20 large rolls of asbestos.

110,000 gallons of spent epoxy, catalyst, and resin.

Approximately one million pounds of lead; as shot, sheets, and bricks.

2. Agencies of category 2 report, in addition to that shown, large quantities of Type 3 materials in small and large lots, but no waste. Additional large gallonage of waste and a large quantity of containers must be assumed for disposal.

3. One agency reported 2,500,000 gallons of gasoline as waste. This is considered a one-time disposal and not included as an annual quantity estimate.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
345 Middlefield Road
Menlo Park, California 94025

JUN 12 1975

Agency Heads:
Heads of Offices:
Colleagues:

The Western Federal Regional Council, Region IX, sponsors an Inter-agency Task Force for Hazardous Material Management. One primary objective of the Task Force is to:

> Assess the types and quantities of hazardous materials which may become non-nuclear wastes to be stored in, transported through, destined for, or to be disposed of by the Federal Establishment of Region IX (Arizona, Nevada, California, Hawaii and Pacific Islands).

The purpose of this correspondence is to request your assistance in this assessment by listing on the attached form the annual quantities of hazardous material wastes your agency manages. If you cannot furnish the requested information, will you please forward this request to your Safety Officer or other officer in your agency, unit, or office who is responsible for the management and disposal of hazardous materials.

The assessment is not concerned with agency management or operations procedures. It is concerned with obtaining data, or an estimate of the types and quantities of waste hazardous materials (other than nuclear wastes) for which the Federal Establishment in Region IX requires storage and disposal capability. A separate assessment is being made of Department of Defense agencies. From these sets of information it is hoped that a combined Federal Agency storage and disposal site can be designed, established, and operated so as to relieve the existing serious and costly management problems many agencies are experiencing. Your cooperation and assistance are earnestly requested.

To assist your response there is attached:

1. Definitions of "hazardous waste" and "extremely hazardous waste," taken from State of California Statutes of 1972, Vol. 1, Section 1, Chapter 6.5, Article 2.

2. A listing of hazardous materials in five groups, taken from California Department of Health Hazardous Waste Regulations, Title 22, Division 4, Chapter 2, Article 2.

3. A condensed list of hazardous materials by type, or common descriptive term, that may be used to categorize materials for reporting purposes.

4. A form on which it is requested the types and quantities from lists 2 and 3 be reported. We suggest annual quantities be reported. Where records are unavailable or inadequate, please report an estimate.

Your response is requested as early as possible and should be addressed to:

Task Force Assessment Chairman
c/o W. L. Burnham
U. S. Geological Survey, WRD
345 Middlefield Road (M.S. #66)
Menlo Park, CA 94025

Phone: FTS - 415 323-2337
COMM - 415 323-8111, ext. 2337

If there is nothing to report for your agency or office, please so indicate so that we may close out the assessment.

Please note that the assessment is for planning information with which to estimate the magnitude and severity of the hazardous materials handling and waste management problem. The information is needed for assessment and planning purposes only.

Thank you for assisting in this inter-agency effort toward mutual benefit.

Sincerely,

W. L. Burnham
W. L. Burnham
Assessment Chairman

Enclosures

Attachment 1

"Hazardous Waste" - Means any waste material or mixture of wastes which is toxic, corrosive, flammable, an irritant, a strong sensitizer, which generates pressure through decomposition, heat or other means, if such a waste or mixture of wastes may cause substantial personal injury, serious illness or harm to wildlife, during, or as a proximate result of any disposal of such wastes or mixture of wastes. The terms "toxic," "corrosive," "flammable," "irritant," and "strong sensitizer" shall be given the same meaning as in the California Hazardous Substances Act (Chapter 13 (commencing with Section 28740) of Division 21).

"Extremely Hazardous Waste" - Means any hazardous waste or mixture of hazardous wastes which, if human exposure should occur, may likely result in death, disabling personal injury or illness during, or as a proximate result of, any disposal of such waste or mixture of wastes because of its quantity, concentration, or chemical characteristics.

Attachment 2

PRELIMINARY
From California Department of Health
Hazardous Waste Regulations, Title 22,
Division H, Chapter 2, Article 2.

Listing of Hazardous Materials (in five groups)

(1) Toxic

Acetone cyanohydrin
2-Acetylaminofluorene
Aldrin
Allyl alcohol
Aluminum fluoride
4-Aminodiphenyl
Ammonium arsenate, solid
Ammonium bifluoride
Ammonium fluoride
Ammonium picrate
Aniline oil, liquid
Antimony
Antimony potassium tartrate
Antimony sulfate
Antimony trichloride
Antimony trifluoride
Antimony trioxide
Arsenic acid, liquid or solid
Arsenic bromide, solid
Arsenic chloride, liquid
Arsenic iodide, solid
Arsenic pentaselenide
Arsenic pentoxide, solid
Arsenic, solid
Arsenic sulfide, solid
Arsenic trichloride, liquid
Arsenic trioxide, solid
Arsenical compounds or mixtures
Arsenical dip, liquid
Arsenical dust
Arsenous acid, solid
Arsenous and mercuric iodide solution, liquid
Arsines
Asbestos
Barium carbonate
Barium chloride
Barium cyanide, solid
Barium fluoride
Barium sulfide
Benzene sulfonic acid
Benzene hexachloride
Benzidine
Beryllium compounds
Bidrin
Bomyl
Boranes, Di-, Penta-, Trichloro-
Bordeaux arsenites, liquid or solid
Boron trifluoride
Brucine, solid
Cacodylic acid, solid
Cadmium
Cadmium chloride
Cadmium cyanide
Cadmium fluoride
Cadmium oxide
Cadmium phosphate
Cadmium potassium cyanide
Cadmium sulfate
Calcium arsenate, solid
Calcium arsenite, solid
Calcium fluoride
Carbanolate, Tennik
Carbolic acid, liquid or solid
Carbon tetrachloride
Carbophenothion, Trithion
Chloracetophenone, liquid or solid
Chloral hydrate
Chlordane
Chlorine
Chloroacetaldehyde
Chlordinitrobenzol
Chloroform
bis-Chloromethyl ether
Chloro-o-toluidine hydrochloride
Chlorpicrin and methyl chloride mixture
Chlorpicrin
Chromic fluoride
Cocculus, solid
Compound 4072
Copper acetoarsenite, solid
Copper arsenate
Copper arsenite, solid
Copper cyanide
Cyanide of calcium or mixtures, solid
Cyanides of copper, zinc, lead and silver
Cyanides or cyanide mixtures, dry
Cyanide of potassium, liquid or solid
Cyanide of sodium, liquid or solid
Cyanoacetic acid
Cyanogen bromide
Cycloheximide, Acti-Dione
2,4-D
DDT
DDVP
Demeton, Systox
3,3'-Dichlorobenzidine
Dichloroethyl ether
Dichloromethane
1,3-Dichloropropene
Dieldrin
Diglycidyl ether
4-Dimethylaminoazobenzene
Dimethylsulfate
2,4-Dinitroaniline
Dinitrobenzol, solid or liquid
Dinitrochlorbenzol, solid
Dinitrocresol, Sinox, Egetol 30
Dinitrophenol solutions
Dinitrotoluene
Dioxathion, Delnav
Diphenylamine
Diphenylaminechlorarsine, liquid or solid
Diphenylchlorarsine, solid
Disulfoton, Disyston
Dowicide 7, PCP Pentachloro
Endosulfan, Thiodan
Endrin
Epichlorohydrin
EPN
Ethion, Nialate
Ethyldichlorarsine
Ethylene bromide
Ethylene cyanohydrin
Ferric arsenate, solid
Ferrous arsenate, solid
Fluorine
Fluoroacetic acid, sodium salt, compound 1080
Furadan
GSI
Guthion
Heptachlor
Hexaethyl tetraphosphate mixture
Hydrocyanic acid solutions
Lead
Lead acetate
Lead arsenate, solid
Lead arsenite, solid
Lead carbonate
Lead cyanide
Lead oxide
Lewisite
Lorion purple, solid
Magnesium arsenate solid
Magnesium arsenite
Manganese arsenate
Manganese methylcyclopentadienyl-tricarbonyl
Mercury or Mercurial liquid
Mercuric acetate
Mercuric-ammonium chloride, solid
Mercuric benzoate, solid
Mercuric bromide, solid
Mercuric chloride
Mercuric cyanide, solid
Mercuric iodide, solid or solution
Mercuric oleate, solid
Mercuric oxide (red), solid

1296

C82

Attachment 2 (con't.)

curic oxide (yellow), solid
curic oxycyanide, solid
curic-potassium cyanide, solid
curic-potassium iodide, solid
curic salicylate, solid
curic subsulfate, solid
curic sulfate, solid
curic thiocyanate, solid
curol (mercury nucleate), solid
rcurous bromide, solid
rcurous gluconate, solid
rcurous iodide, solid
rcurous nitrate, solid
rcurous oxide (black), solid
rcurous sulfate, solid
rcury
rcury [illegible], solid
rcury bisulfate, solid
rcury compounds (organic)
rcury cyanide, solid
-Methylaniline
ethyl bromide and chlorpicrin mixture
ethyl bromide and ethylene dibromide mixture
ethyl bromide, liquid
ethyl chloromethyl ether
ethyldichlorarsine
,4'-Methylene bis (2-Chloroaniline), Moca
ethyl parathion, liquid
ethyl parathion mixture, dry or liquid
Mevinphos, Phosdrin
Monochloracetone, stabilized
alpha-Naphthylamine
beta-Naphthylamine
Nickel antimonide
Nickel arsenide
Nickel cyanide, solid
Nickel selenide
Nicotine hydrochloride
Nicotine, liquid
Nicotine salicylate
Nicotine sulfate, liquid or solid
Nicotine tartrate

Nitroaniline
Nitrobenzol, liquid
Nitrochlorbenzene, ortho, liquid
4-Nitrodiphenyl
Nitrogen mustard
4-Nitrophenol
n-Nitrosodimethylamine
Nitroxylol
Oxalic acid
Paranitroaniline, solid
Parathion, liquid
Parathion, mixture, dry or liquid
Paris green, solid
PCB
Pentachlorophenol
Perchloroethylene
Perchloromethyl-mercaptan
Perchloryl fluoride
Phenol
Phenyldichlorarsine, liquid
Phenylhydrazine hydrochloride
Phorate, Thimet
Phosgene
Phosphamidon, Dimecron
Phosphine
Potassium arsenate, solid
Potassium arsenite, solid
Potassium bifluoride
Potassium binoxalate
Potassium fluoride
beta-Propiolactone
Selenious acid, and salts
Selenium
Selenium fluoride
Shradan, OMPA
Sodium arsenate, solid
Sodium arsenite, liquid
Sodium azide
Sodium bifluoride
Sodium cacodylate, solid
Sodium chromate
Sodium dichromate
Sodium fluoride
Sodium thiocyanate
Strontium arsenite, solid
Strychnine and salts, solid

Sulfur, mustard
Sulfuryl fluoride
2,4,5-T
Tetrachloroethane
Tetraethyl dithio pyrophosphate, liquid
Tetraethyl dithio pyrophosphate, mixture, dry or liquid
Tetraethyl lead, liquid
Tetraethyl pyrophosphate, liquid
Tetraethyl pyrophosphate, mixture
Tetramethyl lead
Thallium
Thallium salts, solid
Thallium sulfate, solid
Thiocarbonyl-chloride
Thionazin, Zinophos
Thiophosgene
o-Toluidine
Trichloroethane
Trichloroethylene
VX
Zinc arsenate
Zinc arsenite, solid
Zinc cyanide

(2) Corrosive or Irritant

Acetyl chloride
Acridine
Allyl chlorocarbonate
Allyl chloroformate
Allyl trichlorosilane
Ammonium hydroxide
Ammonium sulfide
Amyl trichlorosilane
Anisoyl chloride
Antimony pentachloride
Antimony pentafluoride
Benzene phosphorous dichloride
Benzoyl chloride
Benzyl bromide
Benzyl chloride
Benzyl chlorformate
Boron chloride
Boron trichloride

Bromic acid
Bromine
Bromine pentafluoride
Bromine trifluoride
Butyl trichlorosilane
Caustic potash, liquid
Caustic soda, liquid
Chloroacetyl chloride
Chlorine trifluoride
Chlorosulfonic acid
Chlorosulfonic acid-sulfur-trioxide mixture
Chromyl chloride
Cupriethylene-diamine solution
Cyclohexenyl trichlorosilane
Cyclohexyl trichlorosilane
o-Dichlorobenzene
p-Dichlorobenzene
Diethyl dichlorosilane
Difluorophosphoric acid, anhydrous
Dimethylsulfate
Diphenyl dichlorosilane
Dodecyltrichlorosilane
Ethyl chloroformate
Ethyl phenyl dichlorosilane
Fluorosulfonic acid
Formic acid
Hexadecyl trichlorosilane
Hexafluorophosphoric acid
Hexamethylene diamine solution
Hexyl trichlorosilane
Hydrazine
Hydriodic acid
Hydrobromic acid
Hydrochloric acid
Hydrofluoric acid
Hydrofluorosilicic acid
Hydrogen peroxide
Hypochlorite solutions containing more than 7% available chlorine
Iodine monochloride
Isopropyl percarbonate stabilized
Methtetrahydrophthalic anhydride
Methyl chloroformate

1297

Attachment 2 (con't.)

Monochloroacetic acid, liquid
Monofluorophosphoric acid, anhydrous
Nitric acid
Nitrohydrochloric acid
Nonyl trichlorosilane
Octadecyltrichlorosilane
Octyl trichlorosilane
Oleum
Perchloric acid
Phenyl trichlorosilane
Phosphoric acid
Phosphorous oxybromide
Phosphorous oxychloride
Phosphorous tribromide
Phosphorous trichloride
Potassium oxalate
Propyl trichlorosilane
Pyrosulfuryl chloride
Silicon chloride
Silicon tetrachloride
Sodium aluminate liquid
Sodium chlorite solution
Sodium oxide
Sodium sulfide
Stannic chloride
Sulfur chloride
Sulfur trioxide, stabilized
Sulfuric acid
Sulfurous acid
Sulfuryl chloride
Thionyl chloride
Thiophosphoryl chloride
Tin tetrachloride, anhydrous
Titanium sulfate solution
Titanium tetrachloride
Tris (1-aziridinyl) phosphine oxide
Vanadium oxytrichloride
Vanadium tetrachloride
Zinc chloride

(3) Flammable

Acetaldehyde
Acetone
Acetonitrile
Acetyl benzoyl peroxide
Acetyl peroxide
Acrolein, inhibited
Acrylonitrile
Alkyl aluminum halides
Allyl bromide
Allyl chloride
Aluminum nitrate
Aluminum phosphide
Ammonium bichromate
Ammonium nitrate
Ammonium nitrate-carbonate mixtures
Ammonium perchlorate
Ammonium persulfate
Ammonium permanganate
Amyl acetate
Amyl chloride
Amyl mercaptan
Amyl nitrite
Antimony pentasulfide
Barium azide, 50% or more water, wet
Barium chlorate, dry or wet
Barium nitrate
Barium perchlorate
Barium permanganate
Barium peroxide
Benzene
Benzine
Benzoyl peroxide
Butyl acetate
Butyl mercaptan
Butyl aldehyde
Calcium chlorate
Calcium chlorite
Calcium hypochlorite, compounds, dry, containing more than 39% available chlorine
Calcium metallic
Calcium nitrate
Calcium permanganate
Calcium peroxide
Calcium phosphide
Calcium resinate
Caprylyl peroxide solution
Carbon bisulfide
Chlorate of potash
Chlorate of soda
Chlorine dioxide
Chlorobenzene
Chlorobenzoyl peroxide
Chromic acid
Chromic anhydride
Cobalt nitrate
Cobalt resinate, precipitated
Collodion
Copper nitrate
Crotonaldehyde
Cumene hydroperoxide
Cyclohexane
Cyclohexanone peroxide
Cyclopentane
Cyclopentane, methyl
Decaborane
Diborane
Dichlorethylene
Dichloroisocyanuric acid, dry, containing more than 39% available chlorine
1,2-Dichloropropane
Dicumyl peroxide
Diethylamine
Diisopropylbenzene hydroperoxide
Dimethylamine, aqueous solution
Dimethyldichlorosilane
Dimethylhexane dihydroperoxide
Dimethylhydrazine
Dimethylsulfide
Dioxane
Ether
Ethyl acetate
Ethyl chloride
Ethyl dichlorosilane
Ethylene dichloride
Ethylenimine, inhibited
Ethylene oxide
Ethyl formate
Ethyl mercaptan
Ethyl methyl ether
Ethyl methyl ketone
Ethyl nitrate
Ethyl nitrite
Ethyl trichlorosilane
Gasoline
Guanidine nitrate
Hafnium metal, dry
Heptane
Hexane
Isooctane
Isooctene
Isopentane
Isoprene
Isopropanol
Isopropyl acetate
Isopropyl ether
Isopropyl mercaptan
Isopropyl percarbonate, unstabil
Lauroyl peroxide
Lead nitrate
Lithium aluminum hydride
Lithium aluminum hydride, ethere
Lithium amide, powdered
Lithium ferro silicon
Lithium hydride
Lithium hypochlorite compounds, d containing more than 39% available chlorine
Lithium metallic
Lithium peroxide
Lithium silicon
Magnesium chlorate
Magnesium nitrate

Attachment 2 (con't.)

Magnesium perchlorate
Magnesium peroxide, solid
Mercuric nitrate
Methyl acetate
Methyl acetone
Methyl aluminum sesquibromide
Methyl aluminum sesquichloride
Methyl chloride
Methyl chloromethyl ether, anhydrous
Methyl dichlorosilane
Methyl ethyl ketone
Methyl formate
Methyl hydrazine
Methyl iso-propenyl ketone, inhibited
Methyl magnesium bromide in ethyl ether in concentrations not over 40%
Methyl mercaptan
Methyl methacrylate monomer
Methyl trichlorosilane
Methyl vinyl ketone, inhibited
Monoethylamine, aqueous solution
Naptha
Nathexane
Nickel carbonyl
Nickel catalyst, finely divided
Nitro carbo nitrate
Paramethane hydroperoxide
Pentaborane
Pentane
Pentane, methyl
Peracetic acid
Permanganate of potash
Permanganate of soda
Petroleum ether
Phosphoric anhydride
Phosphorus, amorphous, red
Phosphorus pentachloride
Phosphorus pentasulfide
Phosphorus sesquisulfide
Phosphorus, white or yellow
Picric acid, wet
Potassium bromate
Potassium dichloroisocyanurate, dry, containing more than 39% available chlorine
Potassium dichromate
Potassium, metallic
Potassium nitrate
Potassium nitrate mixed with sodium nitrate
Potassium nitrite
Potassium perchlorate
Potassium permanganate
Potassium peroxide
Potassium sulfide
Propylene imine, inhibited
Propylmercaptan
Propylene oxide
Pyridine
Pyroxylin plastics
Silver nitrate
Sodium aluminum hydride
Sodium amide
Sodium bromate
Sodium carbonate peroxide
Sodium chlorate
Sodium chlorite
Sodium dichloroisocyanurate, dry containing more than 39% available chlorine
Sodium hydride
Sodium hydrosulfite
Sodium, metallic
Sodium, metallic, dispersion in organic solvent
Sodium methylate, dry
Sodium nitrate
Sodium nitrite
Sodium nitrite mixed with potassium nitrate
Sodium permanganate
Sodium peroxide
Sodium picramate, wet
Sodium potassium alloys
Spirits of nitroglycerin
Strontium chlorate, wet or dry
Strontium nitrate
Strontium peroxide
Succinic acid peroxide
Tertiary butylisopropyl benzene hydroperoxide
Tetrahydrofuran
Tetranitromethane
Thorium metal, powdered
Titanium metal powder, dry
Titanium metal powder, wet
Toluol
Trichloroborane
Trichloroisocyanuric acid, dry, containing more than 39% available chlorine
Trichlorosilane
Trimethylamine, aqueous solution
Trimethylchlorosilane
Trinitrobenzene, wet
Trinitrobenzoic acid, wet
Trinitrotoluene, wet
Uranyl nitrate, solid
Vinyl acetate
Vinylidene chloride, inhibited
Vinyl trichlorosilane
Wet nitrocellulose
Wet nitrostarch-20% water
Wet nitrostarch-30% solvent
Wood alcohol
Zinc ammonium nitrite
Zinc chlorate
Zinc ethyl
Zinc nitrate
Zinc permanganate
Zinc peroxide
Zirconium metal
Zirconium, metallic, solutions
Zirconium picramate, %
Zirconium scrap

Attachment 2 (con't.)

(4) Strong Sensitizer

Epoxy resin systems containing in any concentration, ethylenediamine, diethylenetriamine, and diglycidyl ethers of molecular weight of less than 200.

Formaldehyde and products containing 1 percent or more of formaldehyde.

Glutaraldehyde

Oil of bergamot and products containing 2 percent or more of oil of bergamot.

Paraphenylenediamine and products containing it.

Powdered orris root and products containing it.

Toluene 2,4 - Diisocyanate

Waste epoxy resins

(5) Pressure generating material through decomposition, heat or other means

Ammonium chromate

Antimony trisulfide

1,2,4-Butanetriol trinitrate

Cadmium nitrate

Calcium carbide

Calcium hydride

Chlorine pentafluoride

Copper acetylide

Copper chlorotetrazole

Cyanuric triazide

Diazodinitrophenol

Diethylene glycol dinitrate

Dipentaerythritol hexanitrate

Fulminate of mercury

Glycerolmonolactate trinitrate

Glycol dinitrate

Gold fulminate

Guanyl nitrosamino guanylidene hydrazine

Hydrazine azide

Hydrazoic acid

Lead azide

Lead chlorite

Lead 2,4-Dinitroresorcinate

Lead mononitroresorcinate

Lead styphnate

Mannitol hexanitrate

Nickel nitrate

Nitroglycerin

Nitromannite

Nitrosoguanidine

Pentaerythrite tetranitrate

Polyvinyl nitrate

Potassium dinitrobenzfuroxan

Silver acetylide

Silver azide

Silver styphnate

Silver tetrazene

Sodium perchlorate

Tetrazene

Vinyl chloride

Attachment 3

Generalized List of Hazardous Materials, by Type

Type 1. ACID SOLUTION

Spent etching solution	Acidic chemical cleaners
Spent acid plating solution	Electrolyte
Pickling liquor	Spent acid
Acid sludge	Sulfonation tar
Battery acid	Copper bathing solvent

Type 2. ALKALINE SOLUTION

Alkaline caustic liquids	Caustic wastewater
Alkaline chemical cleaners	Lime and water
Alkaline battery fluid	Lime sludge, wastewater
Acetylene sludge	Lime soda water
Oakite	Spent caustic
Wyandotte cleaner	Spent cyanide plating solutions

Type 3. PESTICIDES

Unwanted or waste pesticides	Unrinsed pesticide containers
Pesticide-containing wastes from pesticide handling or storage	Wash water from the cleaning of pesticide containers or application equipment

Type 4. PAINT SLUDGE

Paint slops	Paint waste from paint application
Pigment sludges	

Type 5. SOLVENT

Cleaning solvents	Paint remover or stripper
Data processing fluid	Dry cleaning wastes and other spent cleaning fluids
Attrix solvent	

Type 6. LEAD SLUDGE

Wastes from tetraethyl lead compounds	Sediments containing tetraethyl and other organic lead

Type 7. CHEMICAL TOILET WASTES

Type 8. TANK BOTTOM SEDIMENT

Type 9. OIL

Floc	Crude Petroleum
Oil Sludge	Waste Oil
	Toxic grease compounds

Attachment 3 (con't.)

Type 10. DRILLING MUD

Type 11. CONTAMINATED SOIL AND SAND

Sand and oil
Spent blasting sand
Lagoon residue mixed with soil
Contaminated soil or sand from spills

Type 12. LABORATORY WASTE

Spent or waste chemicals

Type 13. DRUGS

Hazardous, toxic, or legally controlled drugs and drug mixtures

Type 14. GENERAL

Incinerator ash
Lagoon, distillation residues
Asbestos, Magnesium, Beryllium wastes
Cyanide, phenolic wastes
Spent catalyst, epoxy, resin wastes
Sewage and septic tank sludges determined hazardous

Attachment 4

WASTE HAZARDOUS MATERIAL
(Non-Nuclear)

Agency or Office

Date: _____

Telephone Contact: _____

Please report annual quantities (estimate if necessary) of hazardous material wastes destined for, to be stored in, or to be disposed of by these functions of your agency or office within Region IX (Arizona, Nevada, California, Hawaii and Pacific Islands).

Material, by type and/or spec. ident.	Annual Quantity	Material, by type and/or spec. ident.	Annual Quantity
Example:			
Type 3			
Dieldrin	30 gal.		
Containers	100 bbls		
Type 5	125 gal.		

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
345 Middlefield Road
Menlo Park, California 94025

September 10, 1975

This is a followup to the letter of request for your assistance in assessing the problem of hazardous material wastes within the Federal establishment. Eighty percent of the offices contacted have responded, and I am expecting more in the next few weeks. At this time I want to thank all of you, and your people who put so much of their time and effort into this request, for responding in such an outstanding manner. I, and the members of the Task Force for Hazardous Materials Management express our deepest appreciation for your prompt and detailed assistance. We feel we now have nearly enough information on which to base plans and decisions for a Federal program for disposal of hazardous material wastes.

Largely because the Federal operations are so diverse, and partly because my request was necessarily very general and non-specific for certain kinds of operations, some of you responded with lists of hazardous materials on hand, procured and stored, or used in routine operations rather than the volumes of wastes produced or handled. For some of these, it is possible to estimate the waste volumes, but for others it cannot be done with any sense of reliability. Consequently, there may be a follow-up request of clarification for a few agencies soon. To save time, however, if you reported materials used or on hand rather than wastes, and if you are able to determine or estimate the waste volume, it will be greatly appreciated if you will send that information as soon as possible.

We again thank you all for your courteous and careful responses. It is our goal to report the assessment results to the full Task Force by late October, and the results should be available to any who are interested soon thereafter. May I please hear from those who have not yet responded?

1304

Sincerely,

W. L. Burnham
Assessment Chairman

REGION
COMM. CEN
DEC 15 12 09
1975

DATABANK SYSTEM FOR RECYCLING, RECOVERY AND DISPOSAL

1. SCOPE

Hazardous materials may well be a very real part of our national resources. Even though a material, hazardous or otherwise, may not be in apparent demand at a particular time by its possessor, at another time or another place it may be of some economic value. This portion of the study is particularly concerned with a databank system for recycling, recovery, and disposal. Lest we investigate the potentials out of context, let us examine the total problem to provide a setting, a foundation on which to build.

a. Excess Hazardous materials may result from any of several actions or sources, including:

(1) Acquisition of more product than was required due to over-estimating; minimum quantity available for purchase greater than requirements; or subsequent development or change of plans resulting in lesser requirement.

(2) A by-product of some activity.

(3) Excessive time "on-shelf".

(4) Materials necessarily held for some contingency, for which the validity has expired.

b. It is rather obvious that some of these sources may be managed to reduce quantities of excess hazardous materials, but others are directly related to mission and work which must be performed. Accordingly, first attention should be directed to minimizing excesses of hazardous materials wherever feasible.

c. When excess of hazardous materials cannot be avoided, some series of actions must be determined and followed for "disposal". Disposal in this sense includes all aspects of use and reuse, recycling, alternative uses, detoxification, destruction, and long term storage. The economics of disposal must consider the potential of the material as a valuable asset, perhaps in relatively limited supply, as well as costs for detoxification or destruction or storage following determination that it is hazardous waste without identifiable value.

d. Acceptable priorities for disposal method can follow a logical sequence, either by the owner or someone else.

(1) Reutilization of material, as is.

(2) Modification or alteration of material such that all or part can be used. (Including use as a fuel to produce energy.)

(3) Store for future use.

(4) Permanent storage, or abandonment.

(5) Destruction.

2. DATABANK POTENTIAL

Desireability of identifying a local use, either direct or of modified hazardous material, appears elementary. However, failing to establish a local use, some attempt to determine "another time, another place" for reutilization seems logical and worthwhile. Such procedures have been adopted and practiced for many years for non-hazardous materials predetermined as having a ready market. So we must conclude that if excess materials which can be readily marketed with minimal effort is feasible, the re-entry into the economy of other materials, including many of those which may be classified as hazardous, should warrant at least an attempt. This is particularly emphasized when the high cost of destruction or storage is considered.

a. Prior to the summer of 1974, the Department of Defense established a Defense Property Disposal Service (DPDS) headquartered in Battle Creek, Michigan, with a Defense Property Disposal Officer (DPDO) at many major military activities. Included in their mission is the responsibility for disposal of all DOD generated excess, surplus, exchange/sale and other personal property authorized for turn-in which is salable.

(1) To carry out this assignment, DPDS established a procedure for military activities to report such salable materials to a local DPDO. If local sale exceeds his authority, or a buyer can not be located, the material is referred ultimately to the computer databank in Battle Creek for screening by predetermined priority to locate a user. Priorities generally include defense activities and other government agencies, donation to specified organizations, public sale, and abandon.

(2) Materials are identified by numerical designation, and minimum quantities/values are prescribed. Material condition is coded, and location identified.

b. DPDS mission was modified on August 5, 1974, to include nonsalable properties (other than refuse and trash). Property found to have no utilization or sales value will be disposed of by the DPDO in landfills, by incineration, as sewage, or other authorized means. Accountability will be accepted by the DPDO and recorded on disposal accounts. Physical transfer or acceptance in place of the property will be predicated on local circumstances and the types of property involved. The ability of the DPDO to physically accept certain property possessing unique characteristics or requiring special handling will be based on his existing resources, i.e., security, storage, material handling and other equipment, reclamation and demilitarization capabilities. Where the DPDO lacks adequate/suitable resources, or the technical expertise, to properly process property turned in for disposal, he will arrange for such support with the local host installation or the generating activity on a case-by-case basis.

(1) As this new DPDS function is implemented, the computer screening process is integrated with the salable items.

(2) DPDS has legal and contract authority to hire consultants to recommend potential users, including alterations and modifications which may make the material more usable and salable.

(3) One difficulty encountered relates to inconsistencies in reporting condition of the material, in contrast to the condition of its container. Funding responsibilities for this screening is not fully and clearly defined. When a DPDO accepts "accountability" for screening a hazardous material, he normally does not have a capability for physical custody, so particular care must be taken to assure the material receives appropriate storage maintenance and does not "get lost in the system."

3. LIMITATIONS

A workable system for complete screening to exhaust every potential for recycling and recovery of excess hazardous materials is currently available for Department of Defense activities. As experience is gained by use of the system, effectiveness can be expected to improve and problems of the databank resolved.

a. This system is not available outside the Department of Defense. Disposal of salable materials for other than DOD activities is the responsibility of the General Services Administration (GSA).

4. RECOMMENDATIONS

a. Defense activities should continue striving to improve development of the DPDS screening process to determine every potential for recycling excess hazardous materials. Only when a complete "search" is unfruitful should consideration be given to abandonment by permanent storage or landfill, or to destruction (such as by incineration), and only then can it be appropriately labeled as "hazardous waste".

b. A central, single, databank for determination of potential recycling for all Federal agencies has the obvious advantage of avoiding duplication.

c. A joint effort by DPDS and GSA seems appropriate, for singleness of purpose. Within their respective charters, mutual agreement is needed for responsibility, including funding. If a statutory change is necessary the problems of disposal of hazardous materials provides adequate justification for a request to the Congress.

Appendix X

SAMPLE FORMAT

HAZARDOUS MATERIAL DISPOSAL CAPABILITIES, REGION IX

FACILITY NAME: McClellan AFB, CA

INDIVIDUAL TO CONTACT/OFFICE SYMBOL: Nelson Chardoul/DEO

TELEPHONE (COMMERCIAL)(916)643-5004 (AUTOVON) 633-5004

MATERIAL	DISPOSAL CAPABILITY AND RESTRICTIONS
Metallic Mercury	Contaminated liquid mercury is reclaimed through chemical reprocessing in the Mercury Reclamation Unit, Bldg 368.
Acids	Miscellaneous acids can be used for pH adjustment in the Industrial Waste Treatment Plant (IWTP), Bldg 714. Containers must be in good condition to allow for outside storage.
Cyanide Wastes	A maximum of _____#/day can be treated in the IWTP, Bldg 714. Treatment costs of approximately $_____/gal must be reimbursed.
Chrome Wastes	A maximum of _____#/day can be treated in the IWTP, Bldg 714. Treatment costs of approximately $_____/gal must be reimbursed.

NOTE: This listing to be developed is intended to inform persons charged with hazardous waste disposal within Region IX of locations where present capabilities exist for proper disposal of specific materials through treatment, neutralization, reclamation, etc. Each task force member is requested to submit a brief listing of those materials for which adequate disposal capability exists , showing any restrictions which would be necessary in accepting materials from other facilities. Information submitted for this listing will be of great practical value in developing a mutual cooperative effort for hazardous waste disposal in Region IX, while recovery and disposal capabilities are further developed in the future.

Submit inputs in the format shown above as early as possible but to arrive not later than 27 Feb 1976. Send to:

Maj Wyatt L. McGhee
Chief, Bioenvironmental Engineering Svcs
USAF Clinic, McClellan/SGB
McClellan AFB, CA 95652

Copies of the completed listing will be mailed to each task force member. Individuals must then make their own appropriate inquiries to determine whether disposal at the listed facility can be arranged. Arrangements would include: transportation and handling, use of proper containers, limits on quantities acceptable, reimbursement for treatment costs, etc. In all cases, the product to be disposed must be fully and accurately described to the satisfaction of the facility contact listed, to assure that proper treatment capability exists.

(NOTE: REPORT WILL NOT BE COMPLETE UNTIL MARCH 15, 1976)

THE CHAIRMAN: Thank you, Major McGhee.

Do we have questions?

Mr. Kovalick.

MR. KOVALICK: We have been following with interest, of course, the work of the task force.

There are several puzzling questions that we have been giving consideration to. Perhaps you can share with us some of the task force's thoughts on this.

In our other public meetings across the country we have heard rather strong testimonials from the private hazardous waste treatment industry as distinguished from the land site only industry -- those who actually engage in some kind of treatment -- as to the lack of motivation for industry to use their facilities because they generally cost more than land disposal.

And I was wondering if you have given some thought to the implications of opening facilities presumably only at the beginning to other Federal agencies for the treatment or disposal of hazardous wastes in this part of the country and its potential impact on, if you will, the competition?

Has that point been discussed?

MAJOR McGHEE: I know our Air Force regulations quite strongly state that it is Air Force policy that we will attempt to join regional plans for, for example, sewage treatment. We do not like to build sewage treatment plants. We like to get it

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

into a regional system so that the Air Force bases do not have to do this type of thing.

I would think that the military services particularly would be most happy to try to follow this type of material into acceptable private sector treatment facilities, disposal sites.

MR. KOVALICK: I guess the add-on to that is the opposite could occur if you all are particularly effective and you find several of your brother and sister agencies also have facilities similar to the one you described at your Air Force base, that perhaps the private industry would argue that they ought to have access to that particular facility and therefore you find yourself perhaps not in the defense business but in the waste management business.

Have you given some thought to that possibility?

MAJOR McGHEE: Right. We have had quite a few problems in accepting waste from other Air Force bases trying to handle the problems that they could not handle at their bases, because we do happen to have an industrial waste treatment plant at our base. But we do run into problems with the waste not being properly identified so that we cannot treat it properly. They have simply passed their problem on to us, and now we have the problem.

This whole effort started more or less as a grass-roots approach from our environmental engineers, our people at the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

various facilities that did have a problem, that recognize that we do not have the solutions to it. And this is how it has grown.

THE CHAIRMAN: All right, Mr. Mausshardt.

MR. MAUSSHARDT: Major McGhee, I have a question from the floor.

Where can one obtain a copy of a directory of agencies who assist in the management of waste disposal?

I believe this is the document you referred to in your presentation.

MAJOR McGHEE: I believe Mr. Carl Neiling is here at the conference and he was the one that was instrumental in putting this thing together.

Would he raise his hand.

Right here (indicating). You might want to speak with him individually. He would be able to get you a copy of it, perhaps.

THE CHAIRMAN: All right. Mr. Bourns.

MR. BOURNS: I have a question from the floor.

I might mention, though, to take Carl off the hook here a little bit,that this directory is published by the Navy, and until they get clearance from on high, they cannot distribute that outside the Federal establishment.

I have a question from the floor.

You mentioned that at McClellan you dispose of waste

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

and pesticides and chrome. Do you run a Class One site? And do you follow state regulations for the facility?

MAJOR McGHEE: No, we do not run a Class One site. We do treat industrial waste products in a multi-million dollar industrial waste treatment plant which does destroy cyanides, it does properly treat and reduce hexavalent chromium to a trivalent chromium whereby the sludge is more or less in an acceptable form for disposal in a regular sanitary landfill.

We do follow our extremely hazardous wastes and hazardous wastes into existing Class One disposal sites. And this is done on a contract basis.

MR. BOURNS: You mean the commercial sites?

MAJOR McGHEE: Right. The Air Force does not operate such a site.

THE CHAIRMAN: Mr. Lazar.

MR. LAZAR: Major McGhee, do you do any monitoring at that sanitary landfill where you put in some of the chromium sludges? Is any monitoring being done there?

MAJOR McGHEE: Let me put it this way, we are attempti to build some drawing beds to properly de-water the sludge so that it can be acceptable by Sacramento County for their centra landfill site that they have.

There are some problems in trying to handle it as a wet sludge. Right now the county has agreed to take all of the material sludges so long as it can be properly dried. We have

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

run tests on the sludge water mixture in trying to decide whether it would be a problem in a sanitary landfill.

We have given all the data over to the county, and they have agreed to take the sludge if we can de-water it. It is simply a matter of them not being set up to handle wet sludge to this degree. It is not a matter of the toxicity of the sludge.

THE CHAIRMAN: Mr. Lindsey, do you have a question from the audience?

MR. LINDSEY: I have one from the audience. I am not sure whether it is directed to you, Major McGhee, or to us or just in general, but I will throw it out and you can comment on it if you can.

Would it be possible to have industry or government, those people in the business of creating hazardous wastes, file a disposal plan at the beginning of the cycle so that the determination can be made if the wastes can be decontaminated or safely disposed of?

Do you have any comment on that?

MAJOR McGHEE: I am not sure I understand the question. Would you read it again, and I will see if I can cover it.

MR. LINDSEY: Okay. Would it be possible to have industry or government and the people that are in the business of creating hazardous wastes, file a disposal plan at the beginning of the cycle so that the determination can be made if

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

the wastes can be decontaminated or safely disposed of?

I do not know who they would file this with, but I imagine it is talking about creating a plan ahead of time with each waste disposal problem.

MAJOR McGHEE: Well, I can think of several things that we do that may have a bearing on this.

For example, the National Pollution Discharge Eliminatic System, which covers all discharges, we do file that plan. We also have to identify as a separate line item all pollution type projects that we require to be able to meet all Federal,state and local regulations as far as all environmental concerns, not just hazardous wastes.

There are a number of these types of things.

I do not think that that is really an acceptable answer to the question, however, bioenvironmental engineers at each of these sites are charged with the responsibility for making sure that Air Force bases do comply with all Federal, state and local requirements.

As far as filing a separate plan to identify the types of wastes, I do not really have an answer for that.

THE CHAIRMAN: Mr. Bourns.

MR. BOURNS: I have a question here from the floor.

What happened to the Freedom of Information Act?

MAJOR McGHEE: The Freedom of Information Act is giving the services quite a problem as far as the magnitude -- and I

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

think the entire Federal government has problems with the magnitude of the types of notifications that are having to be given as far as just releasing routine information.

If I want to go on leave, I have to get permission for my Social Security number to be released. It has really given us a problem. But the Federal services are really going overboard trying to comply with this right down to the letter.

THE CHAIRMAN: I think that is all the questions.

Thank you very much, Major McGhee.

Ladies and gentlemen, at this time I would like to recess the meeting for lunch. I would like to reconvene the meeting at 1:30 p.m. sharp. We have a number of speakers yet to come.

(Luncheon recess.)

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

THURSDAY, DECEMBER 11, 1975 1:30 O'CLOCK P.M.

---oOo---

THE CHAIRMAN: Ladies and gentlemen, I would like to reconvene the meeting at this time.

There has been a slight reordering of the speakers for this afternoon.

I would like at this time to call Mr. Alvin Simon of Advanced Chemical Technology, City of Industry, California.

Is Mr. Simon here, please?

MR. ALVIN SIMON: Mr. Chairman, I would like to preface my statement to this panel by emphasizing that the opinions and recommendations that will be expressed are those of our company -- Advanced Chemical Technology -- and are not intended to reflect opinions or recommendations of any industrial group or trade association.

One of the major areas of concern to those involved in the managmenet of hazardous wastes is the problem of the disposal of the container that was used to package and transport the hazardous substance. It is to this aspect of the problem, container disposal, that we offer our views, experience and recommendations.

Advanced Chemical Technology is a major supplier of containers utilized in the packaging of hazardous materials. Our wholly-owned subsidiary, Ted Levine Cooperage, reconditions steel drums for the petrochemical and allied

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

industries.

Our POLY-DRUM division introduced to America, in 1972, was the first reusable, self-standing high molecular weight polyethylene 55-gallon container. Also in 1972, our POLY-DRUM passed the necessary physical tests to receive approval from the Department of Transportation for use in the packaging and shipment of certain hazardous materials.

Since that time we, and our customers, have encountered and solved a variety of problems that relate to the packaging of these hazardous substances. As a result of these experiences we believe that a key part of any program relating to hazardous waste management should be that "the container in which the hazardous substance is packaged shall not, itself, become a hazardous waste." That container must be reused and/or the materials of construction recovered.

The uncontrolled disposal of used containers which previously contained hazardous materials is thoroughly documented as a public health and environmental hazard. Perhaps even the word "disposal" is misused in this sense. What we are seeking is "elimination." The practice of disposal by land emplacement does not "eliminate." You cannot plant poison and expect to harvest flowers. Land emplacement offers no finality, it is a lethal legacy for future generations. In addition to the threat to the future there are the dangers and disasters that will, necessarily, be part of any land emplacement program. A

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

prime example is the death of a bulldozer operator in 1974 at a New Jersey landfill when drums containing chemical wastes exploded. In April of this year, at a Coalinga, California disposal site an explosion and fire resulted from the disposal of undeclared chemicals in a 55-gallon steel drum. It took over four hours to extinguish the fire; resulted in extensive equipment damage and more important, the firemen and other county personnel at the site all had to be hospitalized to be screened for possible pesticide poisoning.

A recent study by the Oregon Department of Environmental Quality included the results of a survey of 101 of Oregon's 220 commercial pesticide application firms to determine their container disposal practices. Based upon questionnaire response -- 54 of the 101 firms responded -- 87 percent of all containers are disposed of by land filling or on-site burial. Additionally, the study revealed that of the state's estimated 2.2 million containers used annually for pesticide use and formulation, less than three percent were reused or the materials of construction recovered.

Many pesticide containers are stored in open fields and their labels are destroyed by exposure. Lack of proper identification on containers further contributes to the problem of proper disposal management and demonstrates an immediate need for a positive identification system. Towards this desired goal, Advanced Chemical Technology, in June of this year

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

introduced an "embossed" POLY-DRUM which clearly shows in English and Spanish that this container has been filled with a hazardous substance. Anyone coming in contact with this container is adequately warned of the eminent danger. Any subsequent reuse of this container is therefore restricted by the presence of the embossment -- it cannot be erased, painted over or removed.

The continued practice of packaging in one-way containers generates problems other than hazardous waste management. The one-way container represents a drain on our national resources, a waste of vital energy and contributes to our dependency on importation of virgin raw materials.

From our point of view there is only one solution that is economically and environmentally efficient. As we stated earlier,the container must be reused and, eventually, the materials of contstruction recovered. We recognize that a program of this depth would develop many problems that would have to be solved before it becomes the "law of the land."

For example, "How many times can we reasonably expect to reuse a container?" "What method can be developed to recover the basic materials once the container is no longer usable?" And finally, "What can these recovered materials be used for?"

To seek out the answers to these and other questions we recommend that you establish a joint industry-government task force to review current container specifications and

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

disposal practices. The primary objective would be arriving at recommendations that could result in the reduction of those single-trip containers that become part of the hazardous waste.

Advanced Chemical Technology, for one, and we are sure many of our customers, would be more than willing to participate in such an effort.

Thank you.

THE CHAIRMAN: Thank you, Mr. Simon.

Will you answer questions, sir?

MR. SIMON: Yes.

THE CHAIRMAN: Any questions?

Mr. Lindsey.

MR. LINDSEY: Could you comment for us a little bit on the differences in the economics between what you call the "single-trip container" and its disposal as compared to the "multi-trip container" and the reconditioning of those?

MR. SIMON: Are you relating to the steel drum?

MR. LINDSEY: Yes.

MR. SIMON: I think perhaps the next speaker would be a little better qualified to answer on the steel drums.

On the plastic drum I could comment that now that the price of plastics has moved up high enough in the larger containers, it is now more economically feasible to salvage the material after it has been reused.

We have found with our plastic drums, because of their

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

construction, because of the high molecular polyethylene can be reused a number of times if filled with the same commodity.

Another part of the study would be: Can you use it for different commodities?

If filled with the same commodity it can be recycled at least a minimum of ten times.

MR. LINDSEY: Well, then, as a result of that, that being the cheaper way to go, would you expect that as a natural course that recycled containers would tend to replace the single-trip containers --

MR. SIMON: I would think so, yes.

MR. LINDSEY: -- under present conditions?

MR. SIMON: I would think, yes. Especially in the plastic area.

THE CHAIRMAN: Mr. Kovalick?

MR. KOVALICK: Could you comment on the use of your container for other than pesticides?

MR. SIMON: Oh, yes. We have used it for other hazardous materials, for other chemicals, for food products. It has been used for almost anything other than for hydrocarbons. The only material that the polyethylene is subject to high permeation from is in the hydrocarbon field. So in the chemicals like acids, other than the highly concentrated nitric acids, in most of the acid solutions, in the caustics, in the pesticides, in water-based products, in everything, the container has been

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

used successfully.

MR. KOVALICK: Also, you may realize that the EPA has guidelines for pesticide containers relating to triple rinsing and the fact that that does reduce the amount of material left in the drum.

Have you had any rinsing experience in terms of data with your plastic drum?

MR. SIMON: Yes. I think -- and you must remember, we have just received approval for pesticides I think earlier this year or late last year -- but those people that have been using it have been rinsing it. And the plastic drum is a seamless container. There are no chimes. There are no pitfalls once it is rinsed. Our own particular design, incidentally, is a completely emptying design. If you will think of a round container or a steel drum, when you tip it, at the thumbhole you have that flat portion which you never, even with a triple rinse, fully empty.

With many of the plastic drums on the market, especially ours, you can completely empty it upon rinsing. But as to whether the people are doing it, I do not know.

THE CHAIRMAN: We have a note here from the audience. Perhaps you might want to respond to it.

It is, evidently, a clarification on one of your statements.

It says: Would like to correct Mr. Simon as to the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

hospitalization of personnel at the Coalinga site. They were taken to the hospital as a precaution and were released immediately.

Do you have any comment on that?

MR. SIMON: No, I have no comment. I am glad they got out.

THE CHAIRMAN: Mr. Mausshardt.

MR. MAUSSHARDT: I have a question from the floor.

Is it the trust of the restricted articles law as administered by the Department of Transportation for the single use for one-way containers?

MR. SIMON: Is it the trust . . .

MR. MAUSSHARDT: Isn't it the thrust of the restricted articles law as administered by the Department of Transportation toward the use of single-use or one-way containers -- what is, I guess, your relationship to the Department of Transportation in that position of one-way containers?

MR. SIMON: I do not think I can respond to that, because I am not familiar with the law they are talking about.

THE CHAIRMAN: All right. Thank you very much, Mr. Simon.

I would next like to call Mary Lee of Bay Area Sewage Services.

Mary Lee, Bay Area Sewage Services. Is she in the audience?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

FROM THE FLOOR: She will be here shortly.

THE CHAIRMAN: All right. We will return to her later.

We have one speaker who has a time problem, so at this point I would like to call Ms. Nancy Buder, representing the National Sierra Club.

MS. BUDER: I am Nancy Buder, a member of the National Staff of the Sierra Club representing 150,000 members.

Today I would like to discuss with you the far-reaching effects of hazardous wastes and toxic substances as opposed to some of the technical presentations which have been analyzed so far today.

Publication this last summer of the National Cancer Institute's cancer maps of the United States, provided one of the more graphic examples of the probable effects of environmental pollution and toxic substances on human health.

The maps reflect adjusted death rates from cancer on a county-by-county basis for 35 anatomical sites -- liver, lungs, et cetera -- of cancer.

The original data were obtained for 20 years, 1950 to 1969, from death certificates.

The maps reproduced show that cancer mortality is not uniform, but is clustered in certain geographic areas. The darkest areas indicate that a county's death rate from cancer falls in the top ten percent of all counties in the nation. There is a five percent possibility that this variation from the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

normal cancer death rate could be attributed merely to chance.

Knowing that 60 to 90 percent of human cancer is environmentally caused, environmentalists have been quick to note that particular conditions in certain counties appear to play a role in the higher death rates for those counties.

The maps and back-up data demonstrate several relationships that epidemiologists have already noted or predicted. For example, cancer mortality rates are generally higher in urban than in rural areas; non-white males have the highest death rates from cancer, followed by white males and then females regardless of race.

The map also reveals some previously unknown clusters of cancer that correspond with some of our most polluting industrial complexes. For instance, counties in the rural West that have a relatively high number of workers employed in smelters also tend to show higher cancer mortality rates. Similarly, bladder cancer is highest among chemical workers who are exposed to compounds experimentally proved to cause cancer in animals. Thus, almost every county in New Jersey is shaded black, as are Detroit, Chicago, and their environs. These areas are the traditional homes of the chemical industry.

A final example: Some of the most notorious government-testing and chemical-worker facilities are located in the areas of high lung cancer mortality. These include the Nevada Proving Grounds; Pine Bluff, Arkansas; Dugway Proving Grounds in

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Utah; and China Lake, California.

At this point I would like to describe the events of one particular city which has caused it to become a black area on these cancer maps.

Not long after moving to Maryland's Little Elk Valley in 1967, Dr. Petro U. Capurro and his family began to fall ill with increasing frequency, exhibiting strange symptoms that Dr. Capurro, a pathologist and toxicologist, suspected were connected with the activities of a local chemical plant. So he set out to discover just how widespread these symptoms were among the people in the valley. He learned that 12 of the 43 residents were hospitalized from 1967 to 1970, showing signs of damage to the pancreas, liver, or kidneys. Seven of the eight residents he examined personally also showed malfunctions of the liver and pancreas.

The Galaxy Chemical Company, the only industry in the valley, has been the center of controversy among local residents since 1969, when it began to reprocess solvents in its local plant. The company uses a distillation process to purify more than 20 different solvents, most of which are deadly in high concentrations. One of these -- benzene -- is known to inhibit the production of red blood cells and to cause leukemia. Others can damage the liver, kidneys, pancreas, and central nervous system. In the course of his investigation, Dr. Capurro identified more than 25 of these solvents in the air and water

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

of the valley. He reported in "Medical World News" that he had found nine of these solvents in blood samples from various valley residents. The nine solvents were benzene, carbon tetrachloride, methyl chloride, methylene chloride, methyl ethyl ketone, methyl isobutyl ketone, tetrachloroethane, and toluene.

Most of the solvents processed by Galaxy contain an unknown number of impurities that are discarded as wastes. No one -- not even company officials -- knows what all the impurities are. The State of Maryland has taken samples of the wastes, but has been unable to determine their precise contents. These wastes are illegally dumped in a nearby sand-and-gravel quarry because Galaxy does not have the dumping license required by the state. Residents of the community have continually complained to the county health authorities about odors emanating from the quarry.

In April, 1973, it caught fire, and fumes from the burning chemicals were dispersed throughout the valley. After the fire, the residents' complaints and health problems greatly increased.

Previously, the State of Maryland had ordered the plant shut down because of air- and water-pollution violations. During investigations in 1970, the state had discovered abnormally high amounts of methylene chloride, benzene, methyl ethyl ketone, and other solvents in the valley air, thus

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

confirming Dr. Capurro's findings. The state forced Galaxy to eliminate its open evaporating ponds, but residents of Little Elk Valley still suffer from the pollution. They must rely on wells for water that the EPA has determined are contaminated. The valley's air is so polluted that some parents will not allow their children to play outside because the fumes make them act "dopey."

As one mother recently explained to a reporter from the "Baltimore Sun," "We'd have to house ourselves up like bears and hibernate." Looking outside, she went on to say that she could "see a blue fog settling through here laying right close to the ground -- or yellow, it would get real yellow looking."

The workers in the Galaxy plant, of course, receive even stronger doses. One employee explained that while working closely with the chemicals, he did not notice any odor, but that as soon as he would go outside, he would faint. This man lost 20 pounds while working at the plant. He told the "Baltimore Sun": "I didn't eat much -- when you work around it, you just don't eat."

One woman explained that she and her 20-year-old daughter had been diagnosed by Dr. Eloise Kailin, an allergenist and specialist in environmental medicine serving as a consultant to the state, as having contracted epilepsy from exposure to chemical fumes. Dr. Kailin also found that the woman's husband and son were suffering from pancreatitis. Upon

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

examining the valley residents, Dr. Kailin found a total of 11 cases of pancreatitis, an incidence of 45 per thousand, as compared to the rate of two per thousand in the rest of the surrounding area. "When I put together all of the information made available to me," Dr. Kailin told the "Baltimore Sun," "it adds up to proof beyond any reasonable doubt that fumes from the Galaxy plant have caused and are continuing to cause an epidemic in Little Elk Valley."

Even more alarming, though more difficult to substantiate, it is the unusually high incidence of cancer in the valley. Dr. Capurro determined that from 1967 to 1973, there were 15 deaths among the 120 people who, by his estimate, had lived in the valley for at least two years -- a death rate 2.2 times higher than that of Cecil County as a whole. Of those deaths, eight were attributed to cancer -- a rate seven times greater than that for the county. But as persuasive as these figures seem to be, the case is difficult to substantiate because by the end of 1973, more than 60 percent of the people living in the area between 1968 and 1970 had either moved away or died.

John Madison worked at the plant several years ago, but had to quit because he could not tolerate the fumes. He explained to the "Baltimore Sun": "I got headaches from it. I had them all the time." Madison's father had been a supervisor at the Galaxy plant for 11 years prior to his death from cancer last August. He died of throat cancer. His widow described the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

odors on her husband's clothes as being so strong that he had to change his working clothes before coming into their home. John Madison's family suffers from chronic sore throats. Along with many residents of the valley, the Madisons can take no more pollution. They are planning to move.

Little Elk Valley provides an extreme case of the threat to human health and environmental quality posed by the careless or mindless disposal of hazardous substances. But we must mot mislead ourselves into thinking such instances are unique. We are all, in some degree, in the position of the valley residents, for the entire country -- if not to say the world itself -- has been repeatedly exposed in the past century to a staggering variety of toxic substances. Industrial society has routinely trafficked in poison, and we are beginning to pay the price. The common wastes of home and industry have become a greater threat to human safety and environmental quality than anyone could have foreseen. Even our best attempts to contain many of these toxic substances have proven futile, not to mention the appalling number of occasions when few if any precautions were taken. Not only is the production of hazardous wastes continuing, now increasing by some five to ten percent annually, but the wastes of past generations -- wastes assumed to be long buried -- are returning to plague us.

The practice of burying toxic substances in the ground on the assumption they would eventually decompose into

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

natural elements and remain permanently as benign constituents of the soil has proven disastrously wrong in many communities.

For example, a large municipal landfill in the State of Delaware, where both domestic and industrial wastes had been buried for many years, was closed in 1968, and its contents forgotten. Four years later, it was discovered that chemical and biological pollutants had percolated into the local groundwater. The Environmental Protection Agency esimates that some $26 million will be required to correct this dangerous situation and to stop further deterioration of an underground aquifer that provides drinking water to over 40,000 people.

The kindred practice of confining certain wastes to holding ponds has proven just as unreliable. In too many cases, the pond has held little beyond our hopes. For example, since the 1940's, a New York electroplating firm has been discharging its waste water into what it considered to be safe settling ponds. Even though the ponds were well constructed, they lacked protective linings. As a result, seepage of toxic cadmium and chromium has contaminated the local groundwater. This case also points up the distressing fact that even the expenditure of huge amounts of money may not eliminate the hazards posed by latent toxic substances. Since 1958, considerable sums have been spent on the chemical treatment of this waste water -- all in vain.

Nor is groundwater the only final receptacle of our

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

wastes. In Tennessee, for example, a chemical company had buried a hundred 55-gallon drums of chlorinated hydrocarbons each week in shallow, unlined trenches. These poisons regularly escaped from their containers to contaminate not only the local groundwater supply, but a nearby creek as well. Our air may also become the unfortunate destination of migrating wastes, as is demonstrated by the hexachlorobenzene mystery of Geismar, Louisiana. Hexachlorobenzene, along with other benzene derivatives, is noted for is carcinogenic properties. So when the U.S. Department of Agriculture discovered that unusually high levels of the substance had accumulated in the fatty tissue of local cattle, it placed the entire herd, numbering some 20,000 under quarantine.

Otherwise, the chemical could well have been passed on to the unsuspecting consumer. It turned out that one of the many chemical plants in the area, following a practice common to all, had dumped its hexachlorobenzene wastes on adjacent land, assuming they would remain intact until they could be properly treated. But weather conditions caused the hexachlorobenzene to evaporate into the atmosphere, from whence it proceeded to settle with the morning dew on nearby pastures, where it was ingested by the grazing cattle.

Substances such as hexachlorobenzene and the host of solvents emanating from the Galaxy Chemical Company are relatively new arrivals in the world. They were created in the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

retorts of modern science in an age when "progress through chemistry" seemed not only promising, but inevitable. We may regret our foolishness in so cavalierly handling these exotic substances, in blithely assuming that the miracle of modern chemistry was entirely benign, but at the same time we can understand, perhaps, how it was that we failed to recognize the deadly aspect of these new substances. It is far more difficult to understand our similar casualness with such naturally occurring poisons as arsenic, surely one of the most notorious poisons in history. This ubiquitous element is present in low concentrations in sea water and in somewhat higher concentrations in carbonate springs and highly saline water. Arsenic is also naturally present in the soil, although the concentration increases greatly with the use of pesticides. It is generally claimed that arsenic will tend to remain in the topsoil, predominantly in an oxidized pentavelent state that presents virtually no danger to well water or plant growth.

Because it is a naturally occurring element in our soil and water, we long believed that if buried in the ground, even arsenic would eventually be rendered harmless. Today, we know differently, we know that this element will remain indefinitely and reappear to infest later generations.

For example, in the late 1903's, a pesticide, containing arsenic was buried in western Minnesota. Thirty years later, a building contractor expanded his facilities by building

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

a warehouse and office outside the city of Perham. A well was drilled for his water supply. Almost immediately, workers developed symptoms of arsenic poisoning. According to a study conducted by Dr. Edward J. Feinglass, 11 of the 13 employees suffered from symptoms of chronic (subacute) arsenic intoxication. More acute reactions were confined to those who had ingested especially large quantities of the water. The distinction between chronic and acute poisoning is significant. An actue case will draw immediate attention, whereas chronic poisoning may only produce an irritation that is tolerable for many years. It is now believed that chronic arsenic poisoning may lead to cancer.

The exact source of contamination in Perham was difficult to determine. When an investigation began, several possibilities for groundwater degradation were found. In interviews with local residents, for example, it was discovered that in the late 1930's, when grasshoppers threatened farmers' crops, bait composed of arsenic, bran, and sawdust -- a mixture not unlike old-fashioned garden snail bait -- was stored in pile on the bare ground until needed. The excess bait was supposedly buried. Perhaps it was the grasshopper bait that contaminated the groundwater, perhaps it was the buried arsenic pesticide, or perhaps it was something else altogether. But in any case, here we find a clear instance where our carelessness cannot merely be explained away by ignorance.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

We would be fortunate indeed if all we had to do in order to solve the problem of hazardous wastes was to, say, shut down a chemical company, or restrict the uses of certain substances, or regulate how such substances are handled and disposed.

Such steps are necessary, and we should do whatever possible to assure that they are taken at once, but unfortunately, the problem is far too complex to be so easily solved. The example of Perham, Minnesota, suggests that no simple solution to this situation exists.

The circumstances I have described are not unique, but merely representative.

The Sierra Club supports the passage and enforcement of legislation to strictly regulate the production of, the prevalence and the disposal of existing hazardous wastes.

The Sierra Club would also enthusiastically support the pre-testing of hundreds of chemicals and substances which enter the environment annually so as to remove Elk Valley and other dark areas from future cancer maps.

THE CHAIRMAN: Thank you.

Will you accept questions?

MS. BUDER: Certainly.

THE CHAIRMAN: Any questions?

Evidently not. Thank you very much.

MS. BUDER: Thank you very much.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

THE CHAIRMAN: At this time I would like to call upon Mr. David Baker of the California State Solid Waste Management Board.

Mr. Baker, please.

MR. DAVID BAKER: Mr. Chairman, gentlemen, earlier this year the State of California through the Solid Waste Management Board began to recognize the importance of hazardous liquid waste, hazardous chemical waste and what is known commonly as non-sewerable industrial waste. This came about because of problems that existed at various locations of the state that came to our attention about disposals, illicit disposals, changes of laws, regulations and so forth that created a problem that eventually came to the State of California Solid Waste Management Board. The chairman of that board, Mr. Dies, appointed a committee to investigate and gain as much factual data as possible throughout the State of California either to confirm or to deny or to recognize the extent of the problem and come forth with some recommendations as to some kind of a solution.

So we began holding hearings throughout the state. We asked industry, both the manufacturers of chemicals and other types of representatives from the landfill operations, the transporters, the chemical companies, local government representatives, both elected and appointive, to offer testimony. And our findings were varied.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

In various parts of the state the problem was compounded more by urbanization and in the difficulties of weather , disposing of materials, transportation, economics, political-social environment, reactions and what is being done about it.

And our findings showed that there was considerably more non-sewerable liquid wastes produced than there was the legal capability of the landfill sites to accept.

And what happened to that was, of course, bootlegging -- what we call moonlight disposition. Much of it was disposed of in treatment plants by dumping in manholes at the various locations, some of it pumped into a neighboring jurisdiction in a flood-control channel, or some of it was hauled into illegitimate, acceptable landfill operation sites.

Our findings from San Diego, the industrial development of San Diego, the problems that exist in that area to the non-manufacturing areas of Northern California --

The problem is greatest, of course, in the urban area. The problem of transporting it is greater in the urban areas. The cost is great.

We have heard many comments today, and all over the country wherever we go we have heard statements, questions, what happens, we have heard illustrations of what has taken place. We have heard there is a definite need. But no one has really come up with a positive, 100 percent solution to the problem.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

So long as we have economic growth, so long as we have industrial growth, so long as we have people, so long as people produce, we are going to have residues. And we have to make some kind of prepration to accept this. We have to realize that there must be, in order to maintain an economic balance in the State of California and elsewhere, a capability of disposing of those wastes. Who does it?

It has been said, and opinions have been offered by various legal counsels that it is the responsibility of the manufacturer to dispose of his waste. No one would quarrel with that. Perhaps that is true. But then how does he dispose of it and where does he take it?

That, gentlemen, is the unanswered question.

Now, industry by itself cannot do that. Government by itself cannot do that. The social-economic pressures, the political pressures, in a particular community cannot accept the landfill site, because any politician who is half as smart as his mother thinks he is is not going to go against something that his constituents do not want.

So then he is willing to put a landfill site or some disposal station over into someone else's jurisdiction. And that happens all over the State of California. It happens wherever you propose one.

There is the environmental reaction of the people who justifiably do not want it there. But those same people are the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

employees of the corporations or the company who produces that and whose very jobs depend on the continuation of that company or corporation to produce.

A recent study in Riverside County last year indicated that one out of every four paychecks generated in that county other than government was from an industry that produced a non-sewerable waste.

Now, they have to have a place to put it. Their alternatives, of course, are to close down and relocate. And where do they relocate?

We have had testimony in Los Angeles where industry was denied permits to construct in an economically deprived area because they had no facilities for disposing of their waste. What happens if one county tells another county that they cannot dispose of their chemical wastes or their hazardous wastes or any kind of wastes in their county? And I think they have the right to make that determination. So then we are confronted with a problem.

I am not a chemist, but we have chemists in our state agency. Dr. Collins you heard this morning. A member of our committee, Mr. Bonnerson, from the Water Resources Control Board was part of our committee. They are the experts.

So I have to rely on them in our findings and make a report back to the board.

It has been said that a mark of a good executive is a

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

man who goes around with a worried look on the face of his assistant. And so I have attempted to utilize the talents that exist within our committee and within our staff and within the state agency to find a reasonable solution. And at this point in time our findings are that there is not yet the state of the art that is readily capable of handling 100 percent recovery. No matter how much you recover, there is still going to be residue. There is still a definite need for landfill sites wherever they are in the State of California.

It is also a definite fact that you cannot put landfil operations or recovery systems or solar evaporation units in a highly urbanized area. It is also a fact of life that you cann put them in an area that has heavy rainfalls or that has a high humidity factor. Therefore, it must go into an arid area with a lot of sunshine, remote from urbanization. And there is much in Southern California and Nevada and Arizona that could lend itself to that. So how do we find where those lands are and where those sites are?

Studies were made earlier by the state to make determinations on what might be usable sites, but because of environmental pressures these have been shelved and nothing has been developed from them.

We are currently looking at a master plan, which is part of our recommendation, that the state develop a master plan of Class One landfill sites throughout the State of

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

California.

This committee currently operating is asking the legislature to appropriate funds to the State Division of Mines and Geology to make borings and testings of those areas that might lend themselves to the use of solar evaporation or land-fill sites. This is in the process presently. It is one of the recommendations that we are making.

Now, I served some 12 years as an elected official in Orange County as a member of the Board of Supervisors, so I know what home rule is. I also know that it is extremely difficult in any urban area to do anything that is not consistent with the wishes of the constituency. I also recognize the importance of having another agency big enough to meet the challenge operate, enforce, and supervise any kind of an operation that goes beyond the local jurisdiction. Such an agency would be the State of California or perhaps the Federal government.

We are recommending that the state acquire through whatever funding process -- eminent domain, negotiations -- by whatever means -- any landfill sites that meet the criteria within that enclosed basin that has no inflow or outflow of under-water that is sufficiently removed from urbanization to permit solar evaporation and recovery systems. This may be called secondary mining or however you wish to describe it.

The problem is greater than most of us realize. It has

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

taken us some ten to twelve years to bring the problem of solid waste disposal to that which is now a common household word. Resource recovery, reuse, salvage or whatever.

It was not many years ago when people would just toss everything over the back fence into a gulley or they would burn it in a backyard incinerator, and no one really paid much attention to what happened to it until urbanization forced government into the landfill operation or private enterprise into landfill operations, recovery systems.

But looming ominously in the background like a cloud over a lawn party is the problem of hazardous liquid waste and what do we do with it.

And this is probably -- at least in my opinion -- one of the greatest problems that faces our country today. What do we do with it? Not only from an industrial point of view, but from a governmental point of view and a military point of view, but from an economic point of view. We cannot ignore the problem. We are trying to do something about it in the State of California. We are developing this master plan as rapidly as we possibly can through all the resources that are available to us at this time.

You gentlemen as an agency of the Federal government oftentimes have funds available to assist in projects of this kind. It might well be as one of your recommendations or your findings that you should participate in the acquisition and

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

warehousing for such lands for future landfill operations of this type.

Some of the finest farmlands in California or Southern California, at least, and certainly most of the finest mineral sand and gravel deposits are now under subdivision.

There are many areas in the south where the landfill operations have been operating for some time and I suspect that that has happened up here. Ten years ago it happened way out in the open spaces. Today, right next door, are subdivisions and the housing. And the people down at the City Council are protesting the landfill operations. So, consequently, they will go the way of the dairies and the chicken farms that were very prominent in Southern California a few years ago.

But that does not get rid of the problem. It is still there. The solution is within our reach, I think, if we look to the combined operation of government and private enterprise.

I do not believe that private enterprise can buy land and warehouses and pay the taxes on them and store it until it is needed, but government can. In 10 or 20 or 30 years or maybe 100 years we may have an entirely different system of life, but today in the immediate foreseeable future we are an industrial nation, and as such, we are a productive nation, and as a productive nation we produce residues. And we have to dispose of them one way or another.

Recycling, of course, is the most desirable thing.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Resource recovery and reuse of all these chemicals and by-prod is a desirable thing. But when it gets beyond the economic capability of industry to do it, then it becomes a problem. A so long as there is no profit motive, industry cannot continue or cannot afford to do it. Therefore, it becomes necessary fo either government subsidy or partnership to produce.

If they are forced to do it, they will add that on to the price of the product, and the consumer pays. The consumer that is, you and I, the taxpaper, whomever. So it is a debata question on whether it should be a subsidized program or wheth there should be some incentive to industry -- or however the answer may be, we recommend that there be a melding, a partner ship program between government and industry to join hands to reach a common goal, a solution that both can live with. We i government, as representatives of the people, and industry as the employers of industry.

In the absence of that, we continue to go from moonlight moonlight deposit, dumping into the sewer in some remote area where there is a manhole that we can lift up. We even find where they pulled the tanker trucks alongside the construction project and pretended to be a water truck, emptied their mater and left.

Well, in order to avoid that, one of our big recommendations is that we charge a fee to all operators regardless of what it is -- not a selective few -- to all

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

operators for enforcement procedures.

We found that some industries and some operators were legitimate, were following precisely the rules, paying their fees and doing what was asked of them to do, only to be handicapped and discriminated against by an indiscriminate industry who failed to do so by choice and economic reasons.

Orange County Sanitation District recently adopted an ordinance that will go into effect very shortly, if it hasn't already, that is source control over the chemicals that go into the sanitation treatment plants. When they stop dumping there, industry will have to locate another source or another place to dispose of their waste.

If Los Angeles should say, for example, that they do not want it there, what are they going to do with it? It is going to be very costly to them, to dispose of this some way or another. Transporation is not a real problem. San Diego hauls to Nevada in some cases. That is probably in excess of 500 miles. If they can transport that far and find a reasonable site at some distance, that may be partially the solution to urbanization such as the lack of solar evaporation capability here in the Bay Area.

You have a high water table here. It is difficult to dispose of chemicals through that process.

Closed basin areas do exist. They are reasonable. They can be controlled. They can be supervised in the long term

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

through a levy of a charge for future administration and protection, possibly the responsibility of the State Solid Waste Management Board.

Mr. Chairman, that concludes my comments.

DECEMBER 11, 1975

Testimony for EPA Hazardous Waste Management

Public Meeting

San Francisco, California

MY NAME IS DAVID BAKER, MEMBER OF THE CALIFORNIA STATE SOLID WASTE MANAGEMENT BOARD, AND CHAIRMAN OF THE BOARD'S INDUSTRIAL LIQUID WASTES COMMITTEE. THANK YOU FOR THE OPPORTUNITY TO TESTIFY HERE TODAY.

ALTHOUGH THE BOARD HAS NO REGULATORY AUTHORITY REGARDING HAZARDOUS WASTES MANAGEMENT, CERTAIN OF ITS MANDATED PROGRAMS ARE RELATED TO THE DEVELOPMENT OF EFFECTIVE HAZARDOUS WASTE PRACTICES THROUGHOUT THE STATE. UNDER THE MANDATE OF SB 5 (1972), CALIFORNIA'S 58 COUNTIES ARE PREPARING COMPREHENSIVE PLANS FOR SOLID WASTE MANAGEMENT FOR SUBMITTAL TO THE BOARD BY JANUARY 1, 1976. PLANNING GUIDELINES ADOPTED BY THE BOARD REQUIRE THE COUNTY PLANS TO ADDRESS THE MANAGEMENT OF HAZARDOUS WASTES GENERATED WITHIN THE COUNTY. IN ADDITION TO PROGRAMS BEING DEVELOPED BY THE STATE DEPARTMENT OF HEALTH, DATA COMPILED FROM THESE COUNTY PLANS SHOULD PROVIDE VALUABLE INSIGHT TO THE SCOPE OF THE PROBLEM IN THIS STATE.

DURING JUNE AND JULY OF THIS YEAR, THE INDUSTRIAL LIQUID WASTES COMMITTEE OF THE STATE SOLID WASTE MANAGEMENT BOARD CONDUCTED EIGHT DAYS OF PUBLIC HEARINGS ON THE HANDLING AND DISPOSAL OF NONSEWERABLE LIQUID INDUSTRIAL WASTES. I HAVE COPIES OF THE COMMITTEE REPORT, WHICH I WILL LEAVE WITH YOU.

THE FINDINGS IN THIS REPORT ARE BASED ON THE VIEWS OF THE PRODUCERS, HAULERS, DISPOSAL SITE OPERATORS AND OTHERS PRESENTING BOTH ORAL AND WRITTEN TESTIMONY RELATING TO (1) THE PROBLEMS ASSOCIATED WITH THE ADEQUACY OF EXISTING SITES AND THE ESTABLISHMENT OF NEW SITES, (2) THE PROBLEMS OF ENFORCING CURRENT LAWS AND REGULATIONS REGARDING THE PROPER DISPOSAL OF INDUSTRIAL LIQUID WASTES, AND (3) OTHER SUGGESTIONS WHICH MIGHT FACILITATE THE SATISFACTORY HANDLING OF THESE WASTES.

BRIEFLY, THE FINDINGS OF THE INDUSTRIAL LIQUID WASTES COMMITTEE MAY BE SUMMARIZED AS FOLLOWS:

1) THERE IS CURRENTLY A SHORTAGE AND MALDISTRIBUTION OF SITES AVAILABLE FOR DISPOSAL OF HAZARDOUS WASTES, KNOWN AS CLASS I SITES;

2) THE LACK OF ADEQUATE DISPOSAL SITES IS RESULTING IN A NEGATIVE IMPACT ON EMPLOYMENT IN SMALLER INDUSTRIES PRODUCING LIQUID WASTES;

3) IN ADDITION TO PROBLEMS ASSOCIATED WITH LOCATING SITES PHYSICAL CAPABLE OF MEETING CLASS I CRITERIA, ECONOMIC, POLITICAL AND SOCIAL CLIMATES ARE SEVERELY LIMITING THE ESTABLISHMENT OF NEW CLASS I FACILITIES;

4) CURRENT MONITORING AND ENFORCEMENT PROGRAMS NEED STRENGHTENING BOTH IN AREAS OF TRANSPORTATION AND DISPOSAL;

5) LONG DISTANCE HAULS TO SUITABLE DISPOSAL SITES COUPLED WITH LIMITED HOURS FOR DISPOSAL ENCOURAGE ILLEGAL DISPOSAL; AND

5) A DISPOSAL FEE LEVIED ON ALL NONSEWERABLE LIQUID WASTES, AS OPPOSED TO THE CURRENT FEE STRUCTURE FOR HAZARDOUS WASTES, WOULD BE LESS BURDENSOME, MORE FAIRLY DISTRIBUTE THE COST AND REDUCE THE INCENTIVE FOR UNAUTHORIZED DISPOSAL.

)N THE BASIS OF TESTIMONY RECEIVED DURING THESE PUBLIC HEARINGS, ,ND IN AN EFFORT TO COORDINATE THE ACTIVITIES OF THE VARIOUS STATE ,GENCIES INVOLVED IN REGULATING THE STORAGE, COLLECTION AND ·ISPOSAL OF INDUSTRIAL LIQUID WASTES, THE COMMITTEE'S PRIMARY :ECOMMENDATIONS WERE THAT THE STATE SOLID WASTE MANAGEMENT BOARD :NDERTAKE THE FOLLOWING.

.) DEVELOP A STATEWIDE MASTER PLAN FOR CLASS I DISPOSAL SITES WHICH WOULD DETERMINE REGIONAL NEEDS, LOCATE SITES, AND RECOMMEND METHODS OF IMPLEMENTING THE ESTABLISHMENT OF NEW SITES.

) PURSUE, IN COOPERATION WITH OTHER STATE AGENCIES, STRONGER MONITORING PROGRAMS AND ENFORCEMENT PROCEDURES, INCLUDING THE DELEGATION OF ENFORCEMENT TO LOCAL AGENCIES WHERE SITES ARE PRIVATELY OWNED; POOLING OF THE SEPARATE INSPECTION ACTIVITIES OF VARIOUS STATE AGENCIES TO MAXIMIZE THE EFFECTIVENESS OF STATE SURVEILLANCE RESPONSIBILITIES; AND EXPANSION OF EXISTING STATE LICENSING REQUIREMENTS FOR LIQUID WASTE HAULERS TO INCLUDE SOLID WASTE HAULERS, SEPTIC

TANK PUMPERS AND ALL DISPOSAL SITE OPERATORS.

3) MODIFY THE CURRENT HAZARDOUS WASTE FEE STRUCTURE TO INCLUDE NOT ONLY HAZARDOUS, BUT ALL NONSEWERABLE WASTES.

4) CONSOLIDATE ALL WASTES CONSIDERED DETRIMENTAL TO WATER QUALITY OR HAZARDOUS TO PUBLIC HEALTH INTO A SINGLE LIST AND REVIEW ITS APPLICABILITY IN RELATION TO THE PHYSICAL CHARACTERISTICS OF EACH NEW AND EXISTING CLASS I SITE.

STAFF OF THE SOLID WASTE MANAGEMENT BOARD AND OTHER STATE AGENCIES INCLUDING THE STATE DEPARTMENT OF HEALTH, STATE WATER RESOURCES CONTROL BOARD AND AIR RESOURCES BOARD ARE CURRENTLY INVESTIGATING METHODS TO FACILITATE THE IMPLEMENTATION OF THESE RECOMMENDATIONS.

IN SEPTEMBER 1975, THE CALIFORNIA STATE LEGISLATURE ADOPTED ASSEMBLY CONCURRENT RESOLUTION NO. 79, RELATIVE TO A STUDY OF WASTE DISPOSAL SITES FOR ENVIRONMENTALLY DANGEROUS SUBSTANCES. ACR 79 REQUESTS THE SOLID WASTE MANAGEMENT BOARD, IN CONJUNCTION WITH OTHER APPROPRIATE STATE AGENCIES, TO CONDUCT AN INVESTIGATION WHICH INCLUDES AT LEAST THE FOLLOWING ELEMENTS:

A) DETERMINATION OF THE QUANTITY, TYPE AND LOCATION OF GROUP 1 WASTES NOW PRODUCED WITHIN CALIFORNIA, INCLUDING A PROJECTION OF THOSE WASTES THAT WILL BE PRODUCED IN THE FUTURE DUE TO NEW STRINGENT AIR AND WASTEWATER CONTROL REQUIREMENTS.

B) EVALUATION OF THE ROLE OF THE STATE IN ESTABLISHING NEW CLASS I SITES. SUCH EVALUATION SHALL INCLUDE: (1) WHETHER

THE STATE SHOULD ASSIST IN THE LOCATION AND EVALUATION OF POTENTIAL SITES, (2) IF THESE SITES SHOULD BE PURCHASED AND OWNED BY THE STATE, AND (3) THE MANNER BY WHICH THE STATE SHOULD CONTROL OR REGULATE THE OPERATION OF THE WASTE DISPOSAL PROCEDURES.

c) ANALYSIS OF METHODS AVAILABLE TO MONITOR THE AMOUNTS OF WASTES BEING GENERATED AND CORRELATE THOSE AMOUNTS WITH THE RECORDS OF WASTE BEING DISPOSED OF AT CLASS I SITES.

D) EVALUATION OF THE STATE'S ROLE IN ASSURING THAT LONG-TERM MAINTENANCE WILL EXIST FOR THE CLASS I DISPOSAL SITES BOTH DURING SITE OPERATION AND AFTER SITE CLOSURE.

E) ANALYSIS OF THE SOURCES AND LEVELS OF REVENUES NECESSARY TO FINANCE THE REQUIRED PROGRAMS.

A REPORT OF THE FINDINGS AND RECOMMENDATIONS OF THIS INVESTIGATION ARE DUE TO THE LEGISLATURE BY JULY 1, 1976.

THE STATE'S ROLE IN IMPLEMENTING SOLUTIONS TO ENVIRONMENTAL PROBLEMS IS BEING REINFORCED THROUGH THE DEVELOPMENT OF A STRONG HAZARDOUS WASTE MANAGEMENT PROGRAM, WHICH, HOPEFULLY, WILL BE OF ASSISTANCE TO OTHER STATES INITIATING SUCH PROGRAMS. WE BELIEVE THAT THE DEVELOPMENT OF STRONG FEDERAL AND STATE LEADERSHIP IN HAZARDOUS WASTE MANAGEMENT IS A NECESSARY REQUIREMENT IN SOLVING THE OBVIOUS LOCAL AND REGIONAL PROBLEMS ASSOCIATED WITH THE DISPOSITION OF ENVIRONMENTALLY DANGEROUS WASTES.

A SOLUTION TO THESE PROBLEMS IS ESSENTIAL TO THE CONTINUED ECONOMIC STABILITY OF THE STATE, AND MOST IMPORTANTLY, TO THE PROTECTION OF THE PUBLIC HEALTH AND SAFETY.

APPENDIX

THE PROBLEMS OF DISPOSING OF NONSEWERABLE INDUSTRIAL LIQUID WASTES

Summary of presentations made to and
correspondence received by the

INDUSTRIAL LIQUID WASTES COMMITTEE
OF THE STATE SOLID WASTE MANAGEMENT BOARD

during June and July 1975

TABLE OF CONTENTS

		Pages
I.	SAN DIEGO - July 22, 1975.....	1-3
II.	LONG BEACH - June 23-24, 1975.....	4-10
III.	DOWNEY - June 25, 1975.....	11-15
IV.	MARTINEZ - June 30, 1975.....	16-17
V.	OAKLAND - July 1, 1975.....	18-21
VI.	REDDING - July 14, 1975.....	22-23
VII.	EUREKA - July 15, 1975.....	24-26

.. L. McConville, Orange County Road Department, Santa Ana (Other)

- The entire basin area (Orange, Riverside, San Bernardino and Los Angeles Counties) has entered into a study that anticipates to have a preliminary final report late this fall. They will determine which areas in the basin will be logical for location of a Class 1 site.

- In the Liquid and Hazardous Wastes Study for Orange County final report, they inventoried the types of generators, quantities of hazardous materials and where these materials were going at the present time.

- Largest amounts of hazardous wastes were the toxic inorganic materials, basically the heavy metals. These materials, being not too difficult to trace, are being generated in the metal processing industries. Of the total amount of toxic materials that are generated, over half of the total amount of waste at the present time are going directly into the ocean.

- They found that some of the wastes that they had always worried about (oils, detergents, etc.) have been overly stated. Many of these materials are being processed at the source. Smaller quantities are finding their way into the sewage systems.

- They favor materials being economically recovered at source, especially the metals. If firms were given the chance and a little encouragement, he feels that they would install facilities at their plants to recover these meterials and not just to waste them. His department is going to contact the producers to encourage them to consider some resource recovery.

- There is bootlegging going on for sure. The actual numbers and percentages of this are shown in the report.

- When the Resource Recovery Program was started in Orange County they established an Advisory Committee with representatives from both the Sanitary District and the Water District in the County. The two staffs worked very closely together.

- He thinks that local government should pursue their responsibility and locate sites. The role of the State should be to help local government to encourage communities to study what their real problems are. The State should study processing facilities and maybe establish a plant for an area or region that could economically work.

2. Roy Stevens, Singer Company, Kearfott Division, San Marcos (Producer)

- Increased liquid hazardous wastes production due to local industrialization and water pollution control programs is forcing increasing amounts of hazardous liquid wastes to be disposed of in the landfill sites. There is a shortage of proper disposal sites.

- He briefly had looked into the recovery of the metals. Currently this is not provitable to his firm.

3. Ming-Shyong Yang, San Diego Regional Water Quality Control Board (Other)

   - Increased liquid hazardous waste production due to local industrializatio and water pollution control programs is forcing increasing amounts of hazardous liquid wastes to be disposed of in landfill sites. There is a shortage of proper disposal sites.

   - Because of the shortage of disposal sites and long haul distance to the approved disposal sites, some wastes may be illegally disposed of in Class 2 sites and other locations.

   - The serious impact from the lack of adequate disposal facilities for industrial hazardous liquid wastes is easily conceivable. The industry may limit its capacity or move away and new industry may not move in. People may lose their jobs and government may lose its revenue.

   - There is not sufficient enforcement on the liquid waste hauling. Some haulers, after their license has expired, do not even bother to renew it.

4. Bob Racine, Victor Equipment Company, San Diego (Producer)

   - Since Calcium Carbide comes from energy related industries we have had a large increase in the total cost of Acetylene gas. This increase combined with the cost to discharge our lime slurry of over $12,000.00 for the year and a possible cost of $25,000.00 for the coming year may make the manufacturing of Acetylene gas an uneconomical fuel gas.

5. Ray Edwards, Orange County Environment Management Agency, Santa Ana (Other)

   - He will supply a draft statement in final within the next week.

   - The completed Orange County study shows the emphasis in toxic waste handling in the near future must be forcefully shifted to management as opposed to disposal.

   - If ocean discharge limitations are to be met and if sanitation ordinance and State and federal pollution laws are to be effectively enforced, the volumes of hazardous and liquid wastes to be dealt with by means other than sewering will increase at a dramatic rate to levels more than one hundred times those presently hauled to Class 1 sites outside of Orange County.

   - Approximately one tenth of one percent of all metal wastes are currently going into Class 1 sites. In the early 1980's, the volume of such waste in Orange County alone is expected to exceed a million gallons per day.

   - He believes in control at or near the source. Control in this content may have any one of several meanings. In the case of toxic, environmentally hazardous organic materials of little or no economic value, control must consist of rendering the materials inert or harmless by economical chemical treatment including, where necessary, controlled

combustion or pyrolysis. In the case of solvents and petroleum derivatives, the recovery and reuse as process feed materials or fuels should be accomplished with economic fringe benefits to the processor. Inorganic chemicals including the long list of so-called heavy metals are not subject to chemical destruction, but many of them have intrisic economic value and all of them represent nonrenewable resources of strategic value.

- Basic chemical processes needed to achieve this control at the source are already available. What remains to be developed is only the technology of applying these processes in the most cost effective manner to the operations.

- He hopes efforts of governments will be concentrated on solutions to waste management problems rather than the searching for alternative sites for the irretrievable disposal of valuable resources.

- He feels Orange County needs a Class 1 site and believes that the people of Orange County would be delighted to see the State take the responsibility for selection and operation of the site.

- One thing that he feels is needed in Orange County is a uniform industrial waste code. Most of the cities make no attempt to enforce any industrial waste ordinances. County has no restriction within the 19 cities that did not adopt the county industrial wastes ordinance.

6. William M. Davis, City-County Solid Waste Management Task Force, S. Diego (Other

- In comparing totals, site for site, he found that there has been a decline of about 20 percent at the Otay site and 44 percent at the Omar site. Two possible reasons can be given for this decrease: current recessive economic business conditions affecting both sites, or a shift to other disposal sites by a major generator affecting only the Omar site. While they have no hard evidence at this time of any "midnight" dumping practices they strongly suspect that there is a certain amount going on in the area.

- The County of San Diego in its operation has established a permit system that is reponsive to the basic requirements of AB 598 as regards to disposal site controls. While the city and county monitor respective sewerage systems, they see a definite need for an inventory of source generation and the establishment of a source inspection program in the effort to eliminate the possibility of illicit disposal.

- The State should continue, however, to bear the responsibility for regulating Class 1 disposal sites in order to avoid any possible difficulties due to overriding local interests of local selfpolicing.

- In an effort to "close the circle" on the generation and disposal of industrial liquid wastes and hazardous chemical wastes, they recommend to the Committee that a hazardous waste management program for the area be delegated to a local regional agency as allowed under AB 598, including responsibility for regulation and surveillance of local hazardous waste processing, source control and disposal.

- He feels that the local entity should coordinate out-of-county as well as shipments coming into their site.

LONG BEACH - June 23-24, 1975

1. Frank Ellison, THUMS, Long Beach (Producer)

   Mr. Ellison read from a written statement, and accepted no questions.

   - Any curtailment of their ability to dispose of wastes accumulated while drilling and working on their wells would mean a reduction of their activities. This means they would no longer be able to drill or work over oil wells and would eventually cause a significant decline in their existing production.

   - The energy, jobs and money lost as a result of involuntary curtailment of their operations would obviously have an adverse effect on the state and local economy.

2. Harry Winston, Lockheed (Producer)

   - Curtailment of their ability to dispose of chemicals such as acids, chromates, and the like, would be a serious curtailment of their ability to produce the aircraft, missiles and other products they are manufacturing in the State of California.

   - He feels that the State has a role to play in making sure that the industry has the necessary places where they can in turn dispose of the chemicals.

   - State role should be supervisory or regulatory only to the extent that it would not infringe upon free enterprise of the businesses that have the job of disposing and taking care of the wastes now.

   - Shirvanian stated that private industry has problems between the department's different lists of hazardous wastes.

   - The Environmental Protection Group at Lockheed are made aware of every chemical that comes into the plant, the amount of it, who is going to use it and what it is being used for. They have very complete control over the use, storage and disposal of any chemical and maintain accurate records of what is disposed of and exactly where it went.

   - If Class 1 sites are taken away, then Lockheed will have a serious problem that would effect thousands upon thousands of employees and cost millions of dollars.

   - He feels that there is a need for certification of when something leaves a plant or a factory that it does in fact get deposited in a place where the State or county says is a legal place to put it.

   - Tighter restrictions requiring them to make the water cleaner all the time, means that there will be more left inside the plant that will have to be disposed of, either through water treatment plants which condense wastes down to solid sludge or other means.

Donald Martin, Los Angeles Air Pollution Control District (Other)

- He believes that limiting hours of use of landfills by liquid wastes haulers will cause problems from the District's point of view, especially if the liquid waste is odorous. If wastes are dumped only a few hours each week, and dumped all at one time and in large volumes, the air passing over the dump site cannot reduce the ordorous material by dilution and creates a local nuisance problem.

- He thinks that trucks that dump liquid wastes should always be under the direct supervision of the dump operator, and that dumping of hazardous wastes should be limited to the daylight hours. He also pointed out that dumping on weekends, when people are in their homes or out in their yards, should be stopped or limited.

- Not limiting dumping hours may reduce the chances of combinations of nonhazardous wastes, chemicals, etc., from interacting and becoming dangerous.

Bernard Love, American Chemical Society (Other)

- He is concerned about the liability of the liquid waste producer. Believes that liability and responsibility should be specifically and definitively stated so that there is no confusion.

Carl Sjoberg, County of L. A. Engineering Dept. & Pollution Control Div. (Other)

- People who operate businesses in the Antelope Valley, who are trying to honestly get ride of their wastes, don't have a means of disposal. There are no approved Class 1 or 2 liquid waste disposal sites conveniently available to them in the Antelope Valley area. Of the two suitable Class 2 sites that could be used, one was turned down for liquid wastes and the other one has declined to apply, because it was not financially beneficial to get the site approved and a nuisance to go through all the paperwork and procedures.

- Small waste producers (service stations and the like) have difficulty disposing of possible hazardous wastes. Out of frustration or ignorance they usually end up disposing of it illegally.

- A transfer site might be feasible for the area, but the regulation would be difficult.

- Industries which produce hazardous material have been discouraged from locating in the area, simply because of the fact that the sewage system in the area is a closed system and cannot handle hazardous material.

- There is a real need for control of the producers of the wastes to begin with, once it is at the disposal facility it is very difficult to have any recourse.

- Recommends having a standardized method at the disposal sites for checking trucks as they come in. Checking only occurs after a problem happens.

- Believes the solution should involve control at the source, rather than at the landfill.

6. Ruth Kirby, Jurupa Mountains Cultural Center (Other)

   - She is against increasing the number of Class 1 sites, and strongly favors resource recovery.

   - She believes that there should be an educational program on resource recovery in the schools.

   - She also feels that all disposal sites need a chemist at the entranc

7. Donald Brain, Fix and Brain Vacuum Truck Service (Hauler)

   - He would like to see the landfills stay open for longer hours, rathe than just from 8 am to 4 pm. The vacuum trucks are a 24 hour a day service.

   - He does not get involved in hauling industrial hazardous material because he feels when involved in something like that he should have a registered, qualified chemist on his staff. With the amount of revenue he has, he cannot afford that type of individual.

8. Roy D. Owen, Routh Transportation (Hauler)

   - He has had no real problem in disposing of material, except during the rainy days during the winter months.

   - His main problem is the hours that the disposal sites stay open. The don't take care of industry on a 24 hour a day, seven day a week per He feels that this factor is what might be encouraging "bootlegging" They had to install portable tanks in the yard so that they could temporary store liquid wastes until a dump was open where they coulc haul it to. This is what hurts the very small operator.

9. John Lambie, Ventura Regional County Sanitation District (Disposer)

   - After three years and two campaigns, one for the City of Ventura anc the other for the District, what did we learn? There doesn't seem to be an easy, effective local method to overcome opposition to new Class 1 sites. The "pick-it-up, carry-it-around, but don't put it down" philosophy is still here and it seemingly can't be countered on a local level. Support from the State is needed to enable operat to find, evaluate, and open new Class 1 sites.

   - They are literally being drowned by large volumes of liquids (over a million gallons per month at peak times) and with the intensive effo to clean up the water and air, the only sink left is the land.

- Their procedure will be to continue efforts to identify and plan for a new site, but this takes time and money. About 18 months for all the hearings and permits, and at least $60,000 for the studies, reports, site selection and EIR's that are needed just to reach the permit stage. Locally, they will do their best to meet the challenge, but they need support from Sacramento, both politically and monetarily.

- Industry is dependent on agencies such as theirs to provide long-term sites for disposal of hazardous wastes. Without such repositories the mandate is clear - close down.

After reading from his written statement, Mr. Lambie answered questions from the Committee.

- There are only 11 locations in the State and that is completely inadequate. Its asking industry an awful lot to travel a long distance to reach an approved disposal location. He thinks that the government must do a better job by trying to find an additional facility for a Class 1 site.

- They are fighting a budget problem too. They cannot afford the luxury of having someone there 24 hours a day. It runs their cost out of sight since a Class 1 site is a break even business.

- Without sufficient facilities he personally believes that they are going to have this problem of indiscriminate dumping.

- The first key is to get a network of sites where they are convenient. He firmly believes that the situation as it is being handled now, with the Department of Health administering the recent laws, the hauler has a license, and the generator of the waste is responsible, is a beautiful setup. He doesn't believe that it will work until there are adequate sites to get to. The temptation is still there to haul waste without a license.

- He recommends that if the licensed hauler does not get the wastes to an approved location then his permit should be cancelled.

- He thinks that if the State actually owned the site and then issued a license to operate said site to either the County Department of Public Works or some other local entity or private enterprise is a good approach. But if the county did not perform, then lift the license from the county as well as you would if it were a private enterprise.

- The county should be given a chance to get the sites approved, but if they fail to act, then there is a need for a law to give the State the authority to step in and establish sites.

- State agencies need to look at the criteria developed by the State Water Resources Control Board which do not allow for a man-made or unnatural barrier in a true Class 1 site.

- He has received testimony that in the North only one barrel out of ten was reaching disposal facilities.

- If they are going to get good enforcement, then they are going to have to have more sites. Class 1 sites are getting a broad brush. He thinks that they should be narrowed down, oil field wastes and brines etc. should be pulled out and handled in specific areas. To say that you take any wastes that might come along takes a tremendous amount of proof that your geology is right and satisfactory so that there will be no pollution.

- They are doing a research project attempting to recycle a good many of these materials, to treat them, to condense them, to reduce the volumes and neutralize them to cut down on transfer.

- It takes four years to get a site. You have to start now just to get the various permits, EIR's and various things you have to go through.

- There is a need for an educational program. The public needs to be informed that if done right, hazardous wastes will not bother the environment.

10. Russ Bryan, Crosby and Overton Transportation (Hauler)

- He would like to see the dump sites open for approximately 18 hours instead of the hours that they are open now.

11. Larry Hettick, Long Beach Oil Development Company (Producer)

- A closer Class 1 site would benefit them. It is an 82 mile round trip to the nearest site for dumping and it costs $1.57 per barrel to dispose of this material.

12. E. T. Winter, B. K. K. Company (Disposer and Hauler)

Mr. Winter will file a formal report to the Committee on July 2.

- His listing covering the period of August 1974 to May 1975 of liquid wastes received and disposed of at the West Covina site shows a dramatic decrease from 1125 loads per month to approximately 780 load

- The problem with staying open longer hours to receive liquid wastes is that they need solid wastes to mix them in with. They only receiv solid wastes over a 10-hour period. They must provide daily cover of the solids and cannot leave them open at the end of the work day. They could accept acids which they place into their injection wells and that do not require mixture.

- The B. K. K. site has a twenty year life according to their engineers, and the capacity to accept 3.8 billion gallons of industrial liquids which amount to over 15 million tons. There seems to be a discrepanc with the records in Sacramento. They seem to be working at only half of their capacity today to accept industrial liquids. They do not

see a saturation of their current capacity for the near future, and believe if increased capacity to absorb per day they could find techniques to increase the solid waste input as well as to maintain the two for one balance.

- Eighty-one percent of the $100,000 monthly fee which could be expected is not appearing, and therefore, perhaps 81% of our hazardous wastes are being improperly disposed of, or the taxes are not being paid if they are being disposed of, or the statewide estimate of the waste quantities in this State is grossly overstated.

  They have problems with material classifications which are found in the separate listings of the state agencies (State Department of Health and the State Water Resources Control Board). The terminology of hazardous, extremely hazardous, Group 1 wastes - certain wastes the Water Resources Control Board does not consider harmful, but the State Department of Health does - results in confusion.

  He suggested that the Committee consider a system which instead of having multiple, conflicting, and confusing lists issued and used separately by different state agencies, that the State of California adopt a single list with simple straight-forward categories. For example: Class A materials - those which may be disposed of only at Class 1 sites, Class B - includes materials which may be disposed of in Class 1 and/or Class 1 sites and so on. Maybe the last category being sewerable liquid wastes. It is important to operators, haulers, disposers to have a single list to operate by and, therefore, adhere to.

- It is the B. K. K. Company's position that the present tax system, which imposes a 60¢/ton fee on hazardous wastes disposed of is both unfair and represents a real disincentive which financially penalizes those producers, haulers and disposers who comply with the state law and provides a beneficial incentive to those who violate the law.

  Recommends that the Committee give consideration to recommending a revision of AB 598, Dunlap, a law which requires only the institution of a fee system and does not provide for a penalty system. They believe that some modification thereto should be considered by the Legislature. Alternatives to fee system: (1) impose an equal tax per ton, per barrel, or per gallon on all nonsewerable industrial liquid waste, whether they be hazardous, nonhazardous, extremely hazardous or harmful by any standard. This would represent a fee of one mil per gallon on all industrial liquids or 2¢ per ton on all industrial liquids and raise the same amount of money for the State support as the 60¢ per ton fees, or (2) institute a penalty system which imposes severe penalties in the order of $100 per ton on violators whether they be producers, haulers, or disposers.

  They believe that a stiff penalty in the order of $100 per ton or $2,000 per truckload would stop the infractions.

- The State Board might consider, in order to find out the quantity and the quality of everything that is in the market place, a total monitoring program at all sites for a period of time.

- They feel that it might be hard to find a talent (chemist) able to do the monitoring at the sites because the field is so specialized.

- They are now actively pursuing the neutralization of liquid waste and resource recovery of valuable minerals prior to disposal.

Ben Taylor, Douglas Aircraft (Producer)

- They have had no difficulty in getting rid of the liquid wastes produced by their agency.

- They have had some people in the last few years that have been interested in trying to reclaim and remove chemicals, to get the metals out of the chemicals - this doesn't seem to be the answer.

Dr. Collins requested him to make available to the Committee the statistics of the total unsewerable liquid wastes produced by Douglas, the types of wastes, and where they are being deposited in the Los Angeles Basin.

Mr. Robert Goodbaudy, Robert Goodbaudy Company (Resource Recovery)

Mr. Goodbaudy operates a company that reclaims plating wastes (cadmium, chrome, copper, zinc). He recovers zinc from this material and returns it back to them at less cost than it would be for them to go out and buy the zinc on the market.

He takes a cadmium plating solution, which is a sianide solution that has cadmium in it, removes the cadmium completely, and destroys the sianide solution by an "ultra-sonic" process. Basically, what he has left is water, after filtering, that is sewerable.

Dr. Collins requested an invitation from Goodbaudy to the Committee or the state staff to visit his facility and become better acquainted with what he is doing.

- He feels that recovery is the only way for people to handle the waste problem, to eliminate the wastes that are created, to reuse them. He feels that a person can recycle just about all the hard acid wastes, plus all the metal wastes.

- He finds it difficult to find people who will buy the recycled material back. If he cannot find a direct source to resell to, he won't take the material.

Mrs. Gary Farris, San Bernardino/Riverside Liquid Wastes Haulers (Hauler)

- There are no Class 1 dumps in San Bernardino and Riverside Counties.

- Another major problem is the education of the general public. The concerned citizens refuse sites even in the desert. They do not understand that these materials would be taken care of properly.

- The forms that you have to fill out poses a problem to the small producer of liquid wastes. They are reluctant to make out the form - its such a large form for a very small amount.

- She admitted knowledge of illegal dumping.

- She believes that having to haul hazardous wastes so far, and properly dispose of them at a large cost, is one of the major factors causing illegal dumping.

4. Kenneth O'Morrow, Oil & Solvent Process Company (Resource Recovery)

OSCO regularly takes the dirty solvent from many customers, reclaims it by distillation and returns the clean solvent to the customer. They also purchase large quantities of dirty solvent from companies who wish to dispose of it and for various reasons do not want clean solvent returned to them. They take wastes, which become their raw material, and after distilling and perhaps further processing they utilize the clean solvents to sell as a reclaimed solvent or perhaps use in blends of reclaimed and new solvents formulated for specific uses. They sell large amounts of blends so they are always looking for dirty solvents they can utilize in these.

Their process obtains yields of about 65 percent. Their operation prevents the waste of about 3 million gallons of reusable solvent each year.

- They need Class 1 landfills now. We cannot allow industry to be driven out of the State and people forced into unemployment because residential communities are built next door to landfills which were already in operation. Where this situation develops there should be no doubt that the landfill prevails. Every effort should be made to enlist the support required to make sure every Class 1 site now in operation is utilized to the fullest extent possible. Not one day nor one ton should be excluded from its useful life.

- OSCO processes about 4 million gallons of predominantly flammable solvents. They know how important this is because when the solvents are rejected for disposal at the landfills they usually end up in their plant. They try very hard to take all these products because they know that if they don't they may end up being dumped illegally.

- Needs legal means to allow them to take flammable material the dump won't take, mix it with other waste material (which is much less flammable), and then return it to the disposal site. This is much less dangerous that the material they turned down originally because it would be mixed with water, sludge, and other nonflammable materials. Then to set aside a portion of the dump, or somehow treat this in such a way as to prevent a grader or cat from rolling over it and starting a fire. Perhaps digging a hole and leaving it isolated for a day or two, until that very small percentage of acitone evaporates into the air to the point where they could cover it up and it would be safe.

5. Ivan Tennant, Riverside County Road and Survey Department (Disposer)

- There are no Class 1 disposal sites in Riverside County since the closing of the Stringfellow Quarry. One other proposal for a project

west of the City of Covina as a Class 1 site, but that was turned down by the Regional Water Quality Control Board. In both cases there was strong oposition by local citizens.

- If the State were to step in, this would generate some heat at the local level, but it may be the only alternative.

- He thinks that changes to the state regulations are needed so that artificial barriers could be created that can be monitored for seepage or leakage.

- The Mine and Geology did a study on the possibility of disposal in the dry lakes in the desert. This is still an alternative that is open. These would be very controversial. There is concern about what happens in the desert areas. The site would have to be very remote.

'. Hank Yacoub, Los Angeles Regional Water Quality Control Board (Other)

- They are fully aware of the fact that there aren't enough Class 1 sites to accommodate the increasing rate of nonsewerable industrial liquid wastes in California. There is a shortage of capacity in the existing Class 1 sites. This shortage is compounded by recent federal and state water and air pollution abatement programs which are creating increasing volumes of liquid wastes that must find their way to Class 1 landfills for ultimate disposal.

- The criteria for Class 1 disposal sites are so stringent that there are very few such potential sites in this region. Compounding this problem is the extremely large, relatively densely-packed population in the Los Angeles Region, which means that any new site would have to be located more or less close to residential areas and would undoubtedly be resisted by the people living in those areas. This points out the very urgent need for regional planning. Otherwise, as legal sites are used up, more and more illegal dumping is bound to occur. Short and long range solutions are urgently needed.

'. Gary Decker, San Diego County Dept. of Sanitation and Flood Control (Disposer)

- With the new EPA requirements with the point source discharge control the problem is increasing.

- He feels that there does need to be a local regional control of hazardous wastes. This type of authority not only would control the disposal at sites, but control the activities within its jurisdiction area. They have only control at the site itself as materials are coming in.

- In the total overall wastes, there has been some reductions. They can't figure out what it is, maybe the economy or less production, things like that. He would be afraid to guess what the percentage of decrease would be.

3. David Anzures, Metal Finishing Association of Southern California (Producer)

- They have been severly affected by the EPA guidelines on effluent discharge liquids.

- He feels that the State should preempt city authority mainly for reasons that the decisions should not be based on politics, it should be based on technical competence.

- As an industry, they have probably begun to decrease a little because they have gone into "good housekeeping techniques" to reduce the amoun of effluent discharge.

9. Dr. Kenneth Kehimian, VTN - Engineers, Architects, Planners (Other)

   - When trying to identify how much waste was being exported to various landfill sites in terms of Class 1 materials, they found that these records were not available. He suggests in the area of proper record keeping that:

     1. Copies of all waste discharge permits should be sent to each waste disposal engineer of each county or the appropriate person responsible for the waste.

     2. Waste disposal site operators who receive the waste should be required to identify and report the waste discharged by county of origin.

   - Septic tank wastes should go into sewage treatment plants where applicable and possible. There should be a listing of chemical toilet agents that are nontoxic. The State should support the development of these types of agents to reduce the amount of wastes that would have to go into a site.

10. Ottis E. Pittman, Ott's Vacuum Truck Service (Hauler)

    - Mr. Pittman complained that he had recently had five flats backing over garbage to dispose of wastes at a landfill.

Extracts from correspondence:

1. G. A. Collins, Jr., Manager Los Angeles Plant, Texaco Petroleum (Producer)

   - During the first half of the year 1971 they disposed of approximately 31,700 barrels of such liquid wastes. For comparison in the first half of the year 1974 they disposed of approximately 62,260 barrels. These data indicate that the liquid waste from their facility has increased 96 percent due to stringent environmental requirements implemented during the 1971-74 era.

   - They heartily agree that misguided regulations and the possible future inability of the State to provide adequate disposal facilities could represent a grave potential loss of industry and jobs. Therefore, every possible effort should be made to provide adequate and environmentally sound future disposal sites for industry as well as the general public.

2. Ivan F. Tennant, Asst. Road Commissioner, County of Riverside (Disposer)

- Since the closing of the Stringfellow Quarry, the bulk of Group 1 wastes have been disposed of outside of Riverside County. Some amount (estimated at 10 percent) of Group 1 wastes are disposed of in Riverside County by various means. A portion is generated in households and mixed with residential refuse, some is disposed of through sanitary sewers, and a portion is illegally dumped.

- Group 1 wastes are closely associated with the problems of water and air quality and, therefore, the mechanics for handling this extend beyond the local political boundaries. He is not advocating another state agency, but some means of controlling these wastes on a regional basis.

MARTINEZ - June 30, 1975

1. Ottis Hunt, Aeroject Solid Propulsion Company, Folsom (Producer)

   - He does not feel that the liquid wastes produced at Aerojet will increase significantly in the next five years. To date he has not had any difficulty in disposing of the wastes.

2. Victor Johnson, Industrial Tank, Inc., Martinez (Hauler and disposer)

   - Operates two Class 1 sites in the Bay Area and part of a transfer station in Santa Clara County named Industrial Environmental Services. The disposal sites are open 24 hours a day, 365 days a year. After waste is treated at the Martinez site it is disposed of through solar evaporation. He employees six engineers and six chemists on his staff who operate the two sites and the transfer station. He has an approved laboratory for analysis.

   - He believes in advance treatment at a site to prolong the site's life. Both of his sites have a minimum of 25 years.

   - Solar evaporation, as it relates to the options they have for disposing of liquids, is the method that has the least number of inherent drawbacks. There is the potential for odor or air pollution relating to this process. This is why they pretreat the material that goes into these ponds and also into the extensive analytical work ahead of time.

   - Since the new regulations, he has noticed an increase in small pickups in the Bay Area. The transfer station in San Jose was basically built to service the small customer.

   - His sites are not manned for 24 hours, but a technical man and a management man are on on-call programs. Winter is probably a larger generation time, primarily because many of the customers use the same approach that they use, treatment followed by solar evaporation. During the winter, if weather is severe, customer's evaporation ponds fill up and they utilize his service.

   - He shows a slight upward trend in amounts disposed of rather than a decreasing one.

   - He agrees that different state agencies' regulations and terminology discrepancies do exist and are sometimes a problem, but has not been a major hindrance to the operation of his firm.

   - He supports a performance bond that operators and truckers would post so that failure to comply with the laws and regulations would have direct economic consequence to substandard truckers or substandard operators.

- He believes resource recovery will come in selected classes of wastes. Some of the wastes are much easier to recover than others. His transfer station in San Jose is now contracting with solvent recoverers. Solvents will be one of the first materials to see resource recovery. Other materials have less value on the market, so will be slower to come under resource recovery programs.

- In general, thinks that government can perform a very valuable service by clearly explaining what is involved in the disposal of Class 1 wastes. Supports ACR 79 which develops information that will help the public understand the problem.

- Even though he recently a Class 1 proposal in Contra Costa Co., he still feels that it would be, in his opinion, not the best solution to the problem to have some super agency designate the places for sites. With inovative programs between existing state agencies, industry and local government, and when the public has the understanding of the need, we can develop sites under the existing legislative and administrative procedures.

3. Charles Gibbs and Daniel F. Murphy, BASSA, Berkeley (Other)

- The Bay Area Sewage Services Agency concurs with your concern for the serious existing and potential problems associated with nonsewerable industrial liquid wastes and hazardous chemical wastes, such as the increased rate of production due to more stringent regulatory agency control actions and the limited availability of adequate disposal sites.

- They feel that a quantitative study of the toxic and hazardous wastes generated in the Bay Area should be developed. Need to know where they are originating so they can follow them through from their origin to their ultimate disposal. Monitoring picks it up at some midpoint.

4. Jean B. Siri, West Contra Costa Conservation League, Richmond (Other)

- When considering Class 1 dump sites and the State managing or buying or condemning land for Class 1 dump sites, you are going to have to figure in residential buffers. Depending on the wind direction, these buffers have to be a fairly decent size.

- She was asked by the West Contra Costa Conservation League to urge for a change in policy direction in the way of resource recovery and recycling. There is going to have to be some incentive policy to inspire industry or force industry into resource recovery.

OAKLAND - July 1, 1975

1. James Wiseman, Stauffer Chemical Company, San Francisco (Producer)

   - Operates 12 plants and three research facilities in California. Products include sulfuric acid and other industrial chemicals, PVC, agricultural chemicals, cleaning compounds and food ingredients.

   - Because of increased production capacity and the removal of some materials from municipal treatment plants, we expect to see an increase in the use of Class 1 and Class 2 sites in 1975 and 1976.

   - Sees a great amount of expectation in recycling and resource recovery as a solution to disposal problems. Within his company a considerable amount of business is recycling or resource recovery. There are practices in use today that his company cannot except. Numerous companies buy damaged, outdated, off-spec., contaminated material. Sometimes these are reprocessed and sometimes they are sold to the public and not uncommonly under the original label. This is one reason why his company insists on proper disposal, and not recycling in some instances. They have found reclaimed insecticide pails for sale in hardware stores where the new paint did not completely cover the original painting. They have no idea if the decontamination was complete. Confidence in recycling or recovery of this type of material has been reduced.

2. George Laakso, Engineering Department, San Mateo County (Disposer)

   - As a result of the deliberations of the Solid Waste Management Committee of the County Engineers Association of California (CEAS) and the Environmental Management Committee of the County Supervisors Association of California (CSAC), both have adopted a policy on Group 1 wastes as follows:

     Of all types of solid waste, the disposal of hazardous wastes presents the greatest difficulty at local governmental levels and requires state assistance in resolving the problems. In cooperation with the local agency involved as to land uses and service areas, the State should assure the availability and funding of Class 1 disposal facilities within reasonable haul distance as needed to adequately protect the environment and the general public interest. This type of facility warrants strict regulation and monitoring.

   - The basic thought behind the policy statement, which is concurred in by most counties, is that the State should assume the responsibility of guaranteeing that Class 1 disposal facilities are available for all users and that individual counties cannot resolve the problems for these type wastes produced within each county area.

3. H. M. Schneider, Romic Chemical Corporation, E. Palo Alto (Recovery, Producer and Hauler)

   - Reclaims 80% of the solvents, chemicals, aircraft hydraulic fluids and turbine oils generated in the Bay Area. Organic materials only, anything that can be distilled or fractionated.

   - Any questions they have, before they go to a Class 1 site, are referred to the State Department of Health.

   - Their use of the Class 1 site will be restricted somewhat in the near future by the laws stating that you cannot put any photo-reactive chemical in the atmosphere, and they cannot be ponded.

   - He believes that if a good operator of a Class 1 site can be found, the sites should be run by private industry but under the auspicious of the Department of Health. They should also have strict regulations. He does not believe the State should supply the Class 1 site, but only to expedite procedures and "red tape".

   - Overlaping authority is a problem to him and operators of Class 1 sites. Believes the sites should be privately owned, but the State should have control over them.

   - People are concerned about liability when signing the forms. Also, the PPM's make it difficult to analyze waste that have 20 components. It takes pretty sophisticated equipment to do this. Now that the guidelines are out he finds practically no resistance about filling out the forms. If people won't tell him what is is, then he doesn't want to haul it.

4. Phillip Moe, FMC Corporations, San Jose (Producer)

   - They expect a 15 percent increase in the future.

   - There is a need for a Class 1 site in the South Bay Area.

   - If the Class 1 site in Richmond were to close down they would have a definite problem. His wastes are not reclaimable. They have had several people come in which they have given 8 to 9,000 gallons to play around with and they have never seen them again.

5. Betty Croly, Alameda County Planning Department, Hayward (Other)

   - Who should own the Class 1 disposal sites, the public or private operators? After the determination of hazardous waste disposal needs, the problem of site ownership should be addressed and policies developed at the State level concerning ownership of sites and facilities by the State, local government, or by private business.

   - Who should own reclamation facilities and what is the potential for resource recovery from hazardous or dangerous wastes? The recovery potential from hazardous wastes should be identified in any study that is conducted along with the costs associated with recovery.

- Policy formulation should include consideration of centralization or decentralization of disposal facilities.

- Should the State become more involved in the designation of areas acceptable for Class 1 disposal sites? Develop criteria specific to the location of Class 1 sites and policies for the involvement of the State in location problems.

- There is some confusion at the county level about the separate lists of hazardous wastes put out by different state agencies. Another problem is not knowing where the waste generators are.

6. Dr. Paul Palmer, Zero Waste Systems, Oakland (Resource Recovery)

- They have established that over half of the hazardous wastes being dumped today could be recycled. Estimates that twenty or fifty years from now 80 percent of the wastes that would have been dumped in 1975 will be providing raw materials for manufacturing. In the absence of hidden subsidies for virgin materials and dumping, the economics favor recycling.

- Recycling cannot yet compete with depletion allowances which artificially lower the prices of virgin materials. Recycling cannot pay higher freight rates than the rates for identical loads of virgin materials.

- Class 1 dumpsites represent a waste of resources. If we can recover these resources then why should we even consider putting them into the ground.

- Recovery of material resources has already proved itself economical, in many cases, it already has surpassed the cost of virgin materials on an equal basis, but they are not on an equal basis. Virgin materials are subsidized, in many ways, and recycling has a difficult uphill battle in every paticular case. Just recently involved in a case that had 50 tons of very noxious material that they were hired to find a way to recycle it. They did find a way to successfully recycle this and it would have saved the dumper money and yet the individual company, who had the option to dump anyway, decided to dump the material. It was more a question of attitudes than of the economics, because the economics were favorable. This situation happens time and time again.

- Recycling is not considered as an option today, because people have the philosophy of the word "garbage". There is a feeling that recycling is just an alternative to dumping. A recycling project has to start directly at the beginning - in the design of the system. The speaker before stated that he gave several thousand gallons of wastes to various people for recycling and found that nothing came of it. He is not surprised, because it is too late at that point.

- He would favor a new law structured in such a way that a person would be required to recycle if it was economically advantageous to him. Then he would not have the option to refuse to recycle if it could be shown that he would be saving money.

7. Roy Miller, Miller and Gibson Industrial Pumping, Cupertino (Hauler)

   - There is a must for a Class 1 disposal site around the Santa Clara Valley area. Some of the smaller companies cannot afford the costs of conveying the waste materials a great distance and therefore they are getting rid of it anyway they can.

   - The new manifest has been an asset to the haulers because now they know what they are hauling, where before they never knew.

   - He believes that the septic tank haulers, the pumpers, should be licensed by the State Water Resources Control Board.

8. Jim Lemieux, Department of Fish and Game, Yountville (Other)

   - Mr. Lemieux was concerned about radioactive materials being disposed. Dr. Collins said that he would send Mr. Lemieux a copy of the regulations adopted by the State Health Department regarding disposal of radioactive materials.

9. Dave Eubanks, Solano Health Department, Vallejo (Other)

   - He thinks that it would make regulation much easier if there were one basic guideline either by the State or by all the counties in general regarding the control of this problem. It is impossible to regulate dumping; even the licensed haulers on occasion dump illegally. The problems are worse with trucks from out of the county.

Summary of correspondence:

1. William C. Hern, Executive Director, Peninsula Manufacturers Association, Palo Alto (Producers)

   - Unless concerted planning is promptly undertaken, public and industrial users will soon be confronted by cost burdens of major proportions.

   - In the absence of any developing competition fees charged for use of these sites have increased significantly and will continue to do so. An attendant threat is posed at the privately owned sites where trucks may be turned away without explanation.

   - Government should be encouraged to cooperate more actively to assist the scavenger companies in their efforts to develop replacement sites.

   - The tactics of pressure groups must be counteracted by the dissemination of information which describes the scavenger's growing difficulty in providing satisfactory disposal of wastes within reasonable environmental and economic limits.

REDDING - July 14, 1975

1. Quintin Narum, Simpson Lee Paper Company, Anderson (Producer and Disposer)

   - They operate a Class 2 landfill in Shasta County on leased property and also a liquid waste treatment plant. In his 11 years of operation he has not had a serious problem with hazardous liquid wastes. They store approximately 10 barrels of materials that they could not put into the liquid waste treatment plant on the millsite in an earthen confinment. If a centralized facility were available to handle these wastes, they would use that opportunity.

   - He would favor the State developing a Class 1 landfill site plan and participating in acquisition of sites, then releasing them to private operators; especially in an area like Northern California because of the sparsity of population and industry.

   - Due to the very small amounts of wastes in Shasta County and in Northern California generally - a transfer station would be quite appropriate.

2. Mike Stevenson, Regional Water Quality Control Board (Other)

   - If there is a significant number of Group 1 wastes in the area, then they would like to have a Class 1 site, but at this time they do not know of the quantity or types of Group 1 wastes in the area.

3. Bruce Wade, County Agricultural Commissioner (Other)

   - Without a Class 1 site they are severly limited in the means of disposal of pesticide containers. Feels that they don't have sufficient volume of these materials, containers or anything else, to justify a Class 1 dump site locally, but feels that there is a need. Because of this lac of facilities, he is sure that there is moonlight dumping of these waste which is impossible to enforce.

4. Richard Curry, Director of Public Works, Shasta County (Other)

   - He feels that there has to be a need for sites. To take inventory of the need is the first thing that must be done, because he feels that the need is very minimal in his county.

   - Thinks that there would possibly be opposition to a Class 1 site from the public.

5. Carl Arness, Public Works Director, City of Redding (Other)

   - They had an environmental impact report on an expanded land use program a few weeks ago and there were petitions submitted opposing the expansic

   - The public felt that the EIR was inadequate in answering questions about all the alternative sites, control of leachate gas, dust, noise, odor, and blowing paper.

   - He agrees that there should be an inventory of need.

6. Bill Hiler, City of Redding (Other)

   - Mr. Hiler was concerned about chemical toilet refuse.

7. C. R. Conroy, Chico Plating, Chico (Producer)

   - Mr. Conroy did not feel that Northern California really has a disposal problem.

EUREKA - July 15, 1975

1. Don Burres, Oil Terminal Company, Eureka (Producer)

   - Feels that an approved disposal site is needed. He has to store wastes in tanks, which might last for another two to three years. At periodic times he has to clean his tanks, but now he has nowhere to put the wastes.

2. Pat Garrett, Humbolt Bay Oil Spill Co-op, Eureka (Other)

   - Intent is to prevent oil spills on Humbolt Bay. Trains personnel on the correct procedures of transfer of petroleum products. The second function of the Oil Spill Co-op is to stop, contain, clean up, and dispose of any spillage that should occur on Humboldt Bay. Even though they have adequate equipment and personnel to handle oil spills, efforts will be severaly curtailed by the fact that in Humboldt County there is no place to dispose of any hazardous materials. Spillage would have to be trucked to San Francisco. They are 100 percent in favor of Class 1 disposal site located in Humboldt County.

   - They have attempted to stimulate interest in this matter and have not been able to make any headway. Any help the State could give them would be appreciated. They would favor anything that would give them a Class 1 disposal site.

   - Jack Pickett added that it was his understanding that the Coast Guard can commandeer a Class 1 dump in the case of an emergency.

   - He also operated oil storage facility and cannot dispose of his tank bottom wastes, just holding onto it. Haulers quit hauling in October 1974.

3. David Carlson, Union Oil Company, Eureka (Producer)

   - Local haulers have no disposal site for solid waste and cannot compete with contractors from the San Francisco Bay Area. This takes work away from local people and contributes to unemployment in Humboldt County.

4. Jack H. Pickett, Standard Oil Company of California, Eureka (Producer)

   - The site of a Class 1 dump in this area would seem to be important to the community as a local problem with a local solution.

   - He questions whether the tank bottom wastes would be combustible mainly because there is considerable amounts of water content in the bottoms. That is where it accumulates. It could be incinerated with outside heat or drying. A local disposal site would facilitate the clean up of the entire area more readily than transporting it to the Bay Area.

   - Feels that the community in Eureka will support a Class 1 site selected by the State and possibly run by private or local agencies.

- He doesn't feel that the bottoms waste material can be recycled, but they are considering reclaimed oils.

5. Joe Creisler, Humboldt-Del Norte County Health Department, Crescent City (Other)

   - In order to protect the public health and safety and to prevent a possible secondary spill in transportation they have set up an emergency disposal site for the handling of oil and hazardous waste materials from a spill on county property. While this is not an approved Class 1 disposal site as set forth by rules and regulations of the State Water Resources Control Board, they felt they had no other alternative but to set up an emergency site in order to expedite the proper removal of this type of material which could be a possible public health and safety hazard.

   - It is his hope that the Committee will look into the matter of the problem of cleanup and disposal of petroleum and hazardous materials from spill incidents which occur in rural areas some distance away from authorized Class 1 disposal sites.

   - He felt that one of the problem is that the program is so fractionized that hazardous materials are handled in one way, oil spills another, sewage a third, and pesticides a forth. There is no unity in the approaches or contingency plans by federal and state agencies.

   - They have attempted to have all hazardous wastes (oil, pesticide, etc.) under county control. Problem of bootlegging occurs when the county or state agency does not know where this stuff is going.

   - He feels that there is no chance of finding a suitable area for a Class 1 site. There is no potential with existing criteria, but perhaps with membranes and changed criteria it may be possible.

6. Tom Dunbar, Regional Water Quality Control Board, Santa Rosa (Other)

   - Nothing is being done about finding a Class 1 site in Northern California. He doesn't think that anybody has had a significant amount of wastes or problems with wastes yet to the point where they have to go out and look for a site. The County, in their Solid Waste Management Plan, has recommended that the State look into, develop, and operate a Group 1 disposal site.

   - Transfer stations appear to be a feasible alternative.

   - They also have a problem with municipal incinerator residue in the statewide criteria as a Group 1 waste.

7. Richard Smith, Director of Environmental Health, Humboldt-Del Norte County (Other)

   - Septic tank pumpings need, because of the hydrological conditions that exist on the north coast, a Class 1 disposal facility for disposal.

- Due to terrain, rainfall, rivers and the bay they are in very poor position in order to effect a site that will please everybody. In order for an individual to obtain a land disposal site for septic tank pumping he needs the approval of the Health Department, Regional Water Quality Control Board, Coastal Zone Conservation Commission, and also the County Planning Department.

- The State should take into consideration the various regional or unique features of an area that create this hardship in adopting and applying regulations with respect to the removal and disposal of these materials.

- The State should help in site selection, expenses in appropriating sites and share or help provide for the means of removing these materials to an acceptable site outside of the area.

- In his opinion, it would be almost impossible to find a site in the area.

8. David Long, Mendocino County Health Department, Ukiah (Other)

- He feels that every county should have or have access to a Class 1 dump. They do have pesticide container problems. He would like someone from the agency to come and look at some sites that they have in mind for a central collection depot or transfer station. Doubts that the driteria set up now could be met.

THE CHAIRMAN: Thank you, Mr. Baker.

I believe we have some questions.

Mr. Kovalick.

MR. KOVALICK: Mr. Baker, I am interested in your comments, and I gather it is the conclusion of the State of California that it intends to play the role of possibly acquiring facilities in the longer run -- that is, the warehousing facilities for future use.

If that is indeed the case, could you share with us some of your thinking regarding the long-term care of those facilities -- that is, presuming, for example, they were properly closed out -- that is, filled and closed.

Is it the Board's position then that the taxpayers of the State of California in the long term will pay for whatever monitoring or observation of that site after its proper and adequate closure?

MR. BAKER: It was the feeling of the committee that after the site be obtained that it be let to private enterprise to operate the landfill site. A user fee would be charged, a percentage of which would be returned to the state for the administration, both currently and after the operation was

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

closed. The constant monitoring, the constant surveillance of that -- you know, we do not really know how long that material will stay in the ground. It may be there ten or 10,000 years.

Yes, that is the recommendation of our committee.

THE CHAIRMAN: Yes, Mr. Kovalick. Do you have another question?

MR. KOVALICK: Yes. Related to that, much of your discussion seemed to relate to the placement and planning for the Class One type disposal site.

Does your state plan address the location or the future what I would call "treatment facility" -- that is, not use land disposal, but use chemical treatment or physical treatment. Is that part of that planning process?

MR. BAKER: That at this point in time is not part of the process. That is the treatment facility's. If you are referring to such things as the sanitation district board or information centers as to where materials might be or who might be able to use part of that material -- no. That at this point is not recommended. It is not closed, either.

MR. KOVALICK: So the treatment industry is still part of the long-term plan of California; it just is not a part of this particular plan?

MR. BAKER: It is not at this time. And it is definitely a part of the long-term plan.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: Yes. I have a question from the audience here.

You mentioned that San Diego has some unique disposal problems. Could you please elaborate on that.

MR. BAKER: They have two Class One sites in San Diego County that take certain types of chemicals, liquid wastes. Others, which are very odorous, which are not acceptable, they will not accept. And so they must be disposed of in an area that will take them.

They are currently hauling through a contractor from that area to a site in Nevada.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: Yes. I have a question from the audience.

We have the State Solid Waste Management Board doing a really fine job. Why do we need another layer of government, in effect, duplicating much of the state's efforts?

MR. BAKER: I am not sure I know what is meant by another layer of government.

If they are referring to a city or a county, that, by California Constitution,exists. But those things which go beyond the jurisdictional capability of that county then must be by a state agency in my opinion.

If they are referring to you, gentlemen -- this is not

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

necessarily a California problem. This is a national problem. And there are areas of the nation that have an even greater problem, perhaps than we have, and perhaps they have a greater capability of solving it than we have. If what we can do here is helpful to them, then wonderful. If it is not, then we will not have at least lessened our efforts in California.

I think that much of the problem that we have is because much of the imports come from other states -- that is, the raw materials. And perhaps much of ours is exported to other states. So it becomes a national or interstate problem. I do not see how it can be confined to any one state.

If we are looking for, for example, an arid area for solar evaporation and secondary mining, then it would be necessary if there are no closed basins within a reasonable area here, to transport that material to another state. So I look at this as an interstate problem, not just a California problem.

THE CHAIRMAN: Mr. Bourns.

MR. BOURNS: Mr. Baker, I have a question from the audience.

It says: What agency will determine regulations of hazardous wastes in California? Is that the State Health Department or the California Solid Waste Management Board?

MR. BAKER: There are certain regulations already established by the State Health Department. We will accept those.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673 7747

We also accept what your agency has outlined as a hazardous waste description.

As I say, I am not a chemist. And all I know about chemistry is that one part scotch and two parts soda is equal to one big headache.

(Laughter.)

THE CHAIRMAN: Mr. Mausshardt.

MR. MAUSSHARDT: I have a question from the floor.

Provided that the state legislation does not allow the right of eminent domain so that the state can acquire land to lease to private enterprise for disposal site locations, do you have any other thoughts on how to overcome the uninformed public opposition to disposal site location?

MR. BAKER: I think through the educational process, seminars such as you are conducting here, primarily in the university areas or highly urbanized areas, where the employment of the people who are dependent on industrial firms who have a non-sewerable waste problem is probably the alternative. It takes time.

We have addressed that question. What happens if it doesn't? Then we would look to you for assistance -- that is, your agency for assistance. Or some branch of the Federal government. Whether it be in California or another state, that, of course, must come to pass sooner or later.

I am of the opinion currently that there is sympathy for

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

the most part in the legislature for our program. Whether there will be funding at this point in time, that only remains to be seen.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: Another question from the audience.

Is the state considering construction of a regional incinerator for both liquid and solid wastes?

MR. BAKER: The state has no plans to my knowledge at this time -- at least not of the Solid Waste Management Board to construct any incinerating plant.

There are funds proposed in the budget to assist in recovery systems or development of systems that would assist in the reduction, either in source reduction or recovery programs. We are currently involved in a study to determine which is the best method to go. We have hired a company. A $400,000 grant to make surveys of the various sites available and determine the best way to go into resource recovery.

Incineration is unlikely in California, at least in the Los Angeles air pollution basin. There are many problems there. And at least to my knowledge at this point in time there is no method that totally meets the Los Angeles air pollution standards.

THE CHAIRMAN: Mr. Baker, can I just ask if you might clarify the study on resource recovery that you mentioned, does that include both domestic waste and industrial waste?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

MR. BAKER: Solid waste, chemical waste, liquids, sewerage, where it goes and what might be used, what might be recovered or what by-products could be produced from it.

That is the important part of why government and private enterprise should join hands.

Government cannot send salesmen in to the field to sell the products that they recover. Industry can. Government cannot hire staffs to do research and development. They can appropriate funds and go into contract for doing that, but they cannot do it. Private industry can.

And so with the two agencies working together -- that is, private and governmental agencies, I am convinced that with this kind of cooperation it can be resolved.

THE CHAIRMAN: Mr. Bourns.

MR. BOURNS: Mr. Baker, I would like to ask you to do a little prophesying as to what the situation might be in Southern California as to their hazardous waste disposal. We hear rumors that the big disposal sites down there are in danger of being closed for reasons other than physical capability.

Would you like to clarify that?

MR. BAKER: Yes, there is definitely that problem. It is urbanization. Very definitely.

There are two major sites that are threatened. That is the political implication, the effect of communities being

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

developed and encroaching on existing landfills, people complaining to the city council, the city council responding to their constituency and keeping tight regulations on them.

This is primarily more towards private enterprise than it is towards governmental operations. Sanitation districts sanitary districts and large combinations thereof are difficult to approach, and yet an enforcement agency can focus in on a single operator. This does pose a bit of a problem. It could very well be that political pressures are being brought that could cancel use variance of an operation. That would seriously impact that area economically.

As for a place to put them, it would have a serious effect on Southern California's industrial economy.

THE CHAIRMAN: Mr. Baker, I have a question. Do I read correctly from what you said that you would support future landfill sites, and for that matter, processing and treatment facilities, and that there be a buffer zone around these so that you could prevent this type of encroachment in the future?

Would that be a reasonable solution?

MR. BAKER: That would be a large part of the solution to the problem of both future and present operating sites. There are several ways that that could perhaps be accomplished. Acquisition of the buffer zone or obtaining air rights over that zone or obtaining the "over rights" much in the same manner as the airports regulate the land underneath them by

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

what they call navigational easements. This is one possibility. Open space zoning, which is difficult to accomplish because there is still that basic fundamental property right of a land owner to use his land. Agricultural zoning adjacent to it possibly is a solution.

Yes, I do wholly support the buffer zone concept. And I think that that is the consensus of the Board, the Solid Waste Board.

THE CHAIRMAN: I believe we have one more question.

Mr. Bourns, do you have a question?

MR. BOURNS: You mentioned you were supervisor in Orange County, and you mentioned the hazardous waste problem in Orange County.

Do you have any Class One sites in Orange County?

MR. BAKER: No.

MR. BOURNS: What do you do with your waste?

MR. BAKER: Testimony at one of our hearings indicated that they kind of turned their heads when the trucks came in with known hazardous wastes, with known chemical wastes; allowed them to dump them in those sites.

This is not only there, but many areas of the state. That was offered in testimony both in confidence and in public testimony.

Currently much of the industry will dump it into the sewer system. It ends up at the sanitation treatment plants.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

However, much of it is also being transported over into an adjacent landfill in Los Angeles County.

THE CHAIRMAN: Yes, Mr. Lindsey.

MR. LINDSEY: Yes. I have this one from the audience.

How do you view the dilution factor of hazardous wastes being handled through ocean outfalls, specifically at San Aleto?

MR. BAKER: Well, I do not think that pollution by dilution is the solution.

(Laughter.)

MR. BAKER: I do not think that the oceans should be the depository or anything of this kind. I am reminded of what happened to Lake Erie a hundred years ago and what happened today and what happened to many of our waterways in the central United States. And while it may not be a problem in the immediate foreseeable future -- by that I mean the next ten years -- how do we know what is going to happen in 50 or 100 years?

So I am firmly convinced that the ocean should not be the depository of anything but pure water.

THE CHAIRMAN: Thank you very much, Mr. Baker. We appreciate your testimony.

I would like to call upon Mary Lee, the Bay Area Sewage Services.

Will you answer questions, ma'am?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MS. MARY LEE: Yes.

I am Mary Lee, Chief Administrative Officer of the Bay Area Sewage Services Agency. We are a regional governmental agency representing the nine Bay Area counties.

Our board is composed of 21 locally elected representatives from sanitary districts and cities that operate sewage treatment facilities. The agency supports and calls for the establishment of a regional hazardous waste study, through the Section 208 planning process of Public Law 92-500. This study should determine the present and future quantities of hazardous wastes, and advance specific collection, treatment, disposal and recovery systems for toxic and hazardous industrial wastes on a regional basis. Such systems could take a variety of forms such as regional or subregional treatment and recovery facilities which are properly planned, designed and operated. Solutions could be developed utilizing both existing private systems and public facilities.

The agency is concerned that at the present time there has not been adequate planning in regard to hazardous wastes produced or expected to be produced in the region. Several recent county solid waste management reports contain comments that no estimates of the wastes are available or that solutions must be addressed on a state or regional level. The existing situation has been marked by environmental uncertainties, inadequate proposals for additional Class One sites and a lack

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

of application of advanced technological solutions for this complex problem.

There is no reliable determination of the quantity of hazardous wastes which are produced and no reliable estimate of future production in the San Francisco Bay Region. Although the State Department of Health is maintaining a record-keeping system of the quantity of wastes delivered to Class One disposal sites, this estimate does not account for wastes which are illegally disposed of through unauthorized collection and dumping either through manholes or disposed of through the sewage system.

In addition, many communities in the Bay Area have adopted or will soon adopt strong source control ordinances, many of them using the Model Wastewater Discharge Ordinance which was developed by the California Water Pollution Control Association and my agency over the last two years.

The additional quantities of hazardous wastes which will be removed from the sewers and conveyed to Class One sites has not been adequately addressed. A related problem is the form in which the hazardous wastes exist. A substantial portion of the hazardous wastes now being produced are discharged to sewers in liquid form. Due to more stringent source control regulations,pretreatment of these wastes will be required which will result in compounds of a different nature, depending upon the pretreatment systems used.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

The data base in the Bay Area is poor. No adequate solution can be planned until a good determination of these quantities can be made.

We feel the logical mechanism for addressing hazardous wastes in the Bay Area, including that of proposing solutions, would be through the Section 208 planning process which is now in its formative stages in the San Francisco Bay Region under the direction of the Association of Bay Area Governments. This program has the necessary prerequisites for success. Through the policy and technical committees, all responsibile agencies and organizations, public as well as private, can be represented. Data collection and proposed alternatives can be developed within the time span of the 208 study, which is approximately two years. And most importantly, the mechanisms for solutions involving the legal, financial and managerial aspects necessary for success can be developed.

The adoption of local source control ordinances will not, in themselves, solve the problems. Specific treatment, disposal and reclamation facilities which are adequately planned on a regional level, properly financed, managed and operated must be developed in order to provide hazardous waste producers with a location for the wastes.

In addition, proper incentives must be developed in order to insure that these facilities are used. These incentives can be developed through the Section 208 planning process. It

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

should be noted that for the 208 planning process in our area, implementation of solutions has been and will continue to be stressed.

Although a statewide study of Class One disposal sites is underway, such a study will not provide the solutions needed. Consideration of alternative solutions must include more than just the need for additional disposal sites, although these are sorely needed. The feasibility of hazardous waste treatment must be considered along with the potential for resource recovery and alternatives for construction, operation and financing. Solutions need to be developed with the cooperation of regional interests and organizations. This mechanism is available in the 208 planning process.

Benefits from an adequate regional hazardous waste facility and management program are numerous. I will enumerate just a few.

Additional reliability for public treatment works by elimination or reduction of toxic wastes which would cause upsets.

Greater potential for reclamation and reuse programs for water and sludge by public agencies through increased reliability and lower degree of risk due to lesser amounts of toxic and hazardous wastes in the system.

Enhanced reliability and safety through proper handling, disposal, treatment and reclamation of hazardous wastes with

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673 7747

reduction in the quantity of toxic wastes entering the air, ground and water environments.

Increased potential for reclamation and reuse of hazardous and toxic wastes through economies of scale.

Possible monetary savings to industrial and commercial establishments through economies of scale by providing alternatives to remote Class One sites.

I would also like to acquaint you a little more with the work of the California Water Pollution Control Association Uniform Industrial Waste Ordinance Subcommittee. The Subcommittee has broad representation of governmental and regulatory organizations, public wastewater dischargers and industries. The overall purpose of the Model Ordinance, developed over the last two years, was to provide a standard source document which could be used by a variety of public agencies to assist in the control of discharge of hazardous and toxic wastes to sewage treatment works. Specific purposes of the Model Ordinance included:

Establishment of uniform practices for enforcement and facilitation of disposal of waste pollutants.

Promotion of greater efficiency among regulatory and municipal agencies in carrying out industrial source control programs.

Provision of a basis of equity to industry and private wastewater dischargers who must comply with regulations which

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

can vary from community to community.

Elimination of undesirable relocations of industries from one waste treatment jurisdiction to another.

The Subcommittee has been encouraged by the degree of interest and success expressed with the Model Ordinance. As a next step to assist in the practical implementation of source control measures, the Bay Area Sewage Services Agency and the Uniform Ordinance Subcommittee are developing a proposal for Industrial Waste Source Control Administration, Education and Training. This program is directed toward personnel in public agencies and industries including public agency administrators, industrial wastewater inspectors, plant managers and employees to provide the necessary tools and knowledge to advance the purposes of source control.

In conclusion, BASSA believes that the problem of hazardous wastes is an important one in the entire region. The time and situation are opportune for developing a regional approach for implementable solutions in the Bay Area through the Section208 planning process of Public Law 92-500.

Thank you.

THE CHAIRMAN: Thank you, Ms. Lee.

I had a question. We have heard previous speakers indicate that in their opinion the hazardous waste management problem was best addressed at a state level. And as I understand your feeling, it would be addressed at the regional level.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Could you comment on that.

MS. LEE: Yes. We suggest the regional level, first of all, because we are regional government.

Secondly, the 208 planning process in the San Francisco Bay Area is already funded. It is approved. The work plan began its development two weeks ago using two of my top staff people, one from J.B. Gilbert Consultants who is a top consultant in our area, and two of Association of Bay Area Government's top level people.

Once the program is developed it is due to be submitted to EPA on March 31st. Then the implementation and the detailed work will begin.

Now, source control is already included in the work plan that was approved by EPA for four million dollars of funding for the 208 plan.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: I was wondering if you could describe the relationship as you see it between the product of the planning process that you are engaging in and the solid waste management plan that Mr. Baker just described.

It seems to me that at least some of the elements of what you are interested in they will be addressing presumably in your area.

And as a part of that question, I am interested in whether you will be addressing residuals in your plan that are

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL. (415) 673 7747

not waterborne -- processes from the normal manufacturing process that have never gone into the water, but that are still a waste management problem, if you get what I mean.

MS. LEE: Yes, I understand what you mean. I am not sure I can give you an adequate answer, as to whether the residuals that are not waterborne will be addressed.

The 208 planning process does look at more than just water pollution. It is land use, air pollution and all of the environmental factors.

So I would imagine that as the work plan is developed that all residuals will be addressed in some manner.

As to our interface with the State Solid Waste Management Board, the Director of Regional Services of my agency has been working very closely with the State Solid Waste Management. He is on the Technical Advisory Committee. We are quite aware of their studies. We are trying not to duplicate, but to assist in every way we can.

THE CHAIRMAN: I had another question.

You mentioned the importance you place on source control.

MS. LEE: Yes.

THE CHAIRMAN: And by that I presume you mean what we would call "pretreatment" prior to discharge to the sewers.

MS. LEE: That is a portion of it.

THE CHAIRMAN: A portion of it?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MS. LEE: We are also talking about the illegal disposals, the simply opening of a manhole cover and dumping it down.

I know when I was working in Berkeley we had a terrible problem with industry simply putting their hazardous chemicals into the storm drainage system because they did not know any better.

THE CHAIRMAN: Well, my follow-up question is you talked in terms of plant upset, the obvious implication being that the material being illegally or surreptitiously discharged was toxic to the microorganisms in the sewage treatment plant.

Is that the extent of your concern? There must be a number of toxic materials which pass directly through the sewage treatment plant into the sludge and have no effect --

MS. LEE: Yes.

THE CHAIRMAN: -- on the microorganisms.

MS. LEE: Yes. We have several studies running through our agency on all kinds of residuals.

We have a residuals management study for some two million dollars. The lead agency for that is East Bay Municipal Utility District along with the City and County of San Francisco, San Jose, BASSA, and the Sanitary District in Contra Costa County.

And we are looking into the sludge management problem in that study.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

And all of our efforts interface and interrelate not only within our own agency and the 208 program, but with all the state programs in the county solid waste management plans.

THE CHAIRMAN: Mr. Lazar.

MR. LAZAR: Ms. Lee, based on your current estimates, what percentage of the sewerage effluents comes from industrial versus domestic sources?

MS. LEE: I have no idea.

Mr. Chu, do you have any information on that?

FROM THE FLOOR: I think this question is kind of difficult to answer because everybody has different estimates. But we do have some kind of figures if you are interested.

MR. LAZAR: Are you aware of any sewage situations which have exclusively domestic waste and no industrial waste? Is this common at all?

MS. LEE: Not as far as I know.

THE CHAIRMAN: Would you perhaps provide for the record the figures that Mr. Chu referred to.

MS. LEE: Yes, I will be happy to.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: We have had some discussions in the other meetings of the problems of the private hazardous waste treatment industry and of course the sewage treatment, the municipal sewage treatment, often in most places in the country, has been the role of the municipalities -- at least in

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

large measure.

Would you expect that the end result of your planning process -- that is, what it is you intend to implement -- will forecast a larger or smaller role for privately owned waste treatment and disposing firms versus the public ones?

MS. LEE: Well, it is very difficult to judge since the studies are just now underway. We do have private industry represented on all of our technical advisory committees. Their input is very vital to all of our programs. I would say it would probably depend on the extent of pretreatment. Municipal sewage treatment plants are now being upgraded to secondardy and tertiary treatment and a lot of consolidation of treatment plants in the Bay Area has been required.

I am not certain that those facilities would be able to handle much more pretreatment of toxic wastes. It may be that a private treatment works would be needed.

MR. KOVALICK: Well, given that some kind of additional facilities are required, regardless of the reason for that, what would be the decision rule for deciding whether it should be publicly or privately owned -- I guess that is what I am getting at -- given that some are required.

MS. LEE: I am sure it would be economics.

MR. KOVALICK: You mean whether or not someone could make a profit at it. Is that what you mean by "economics"?

MS. LEE: That would be involved. It would also entail

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

whether or not Federal funds would be available for construction of additional facilities. The municipal and special districts, I am sure, would not have the additional funding necessary to build extra pretreatment works at this point in time.

THE CHAIRMAN: I think that is all the questions we have.

Thank you very much, Ms. Lee.

Next I would like to call Mr. Walter Umstead of the Western Oil and Gas Association.

Is Mr. Umstead here?

FROM THE FLOOR: I am Mr. Knowlton for Mr. Umstead.

THE CHAIRMAN: All right. Will you please identify yourself for the record.

Will you answer questions, sir?

MR. HAROLD D. KNOWLTON: Yes.

THE CHAIRMAN: Thank you.

MR. KNOWLTON: My name is Harold D. Knowlton and I am employed by Chevron Research Company, Richmond, California, where my professional responsibilities involve refinery environmental control activities. I am also a member of the Committee on Solid Waste Management of the American Petroleum Institute. I am submitting these comments on behalf of the Western Oil and Gas Association and the American Petroleum Institute.

I would like to express appreciation for this opportunity to comment concerning development of guidance on the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

environmentally safe management of hazardous wastes. My comments will be limited specifically to Discussion Topics 1 through 4 and Topics 6 and 16.

Discussion Topic 1.

It is difficult to define a hazardous waste. The definition must be sufficiently comprehensive to satisfy the complex conditions and circumstances applicable to sound hazardous waste management. Recognizing this problem, we are currently sponsoring several studies which we hope will assist in defining hazardous waste.

The results of these studies will of course be made available to EPA. We understand that EPA is conducting similar studies. We would urge that the final regulatory definition of hazardous waste await the outcome of these various studies. Until such time as a specific, satisfactory definition is developed, the following general working definition of hazardous waste seems to us to be reasonable and appropriate:

> "Any waste or combination of wastes which, because of its quantity, concentration, or characteristics, presents a real and measurable or potential hazard to human or animal health or causes permanent damage to the environment by its disposal."

Criteria used to distinguish hazardous from non-hazardous wastes should cover the following questions:

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

One. Hazardous to what?

Two. Hazardous for what reasons?

Three. Hazardous to what degree?

Four. Hazardous under what conditions and circumstances?

The principal criterion should be effect on the environment. For example, merely because a waste contains a toxic chemical, it does not necessarily follow that the waste is hazardous to the environment. Material properties should not be the sole basis for defining hazardous wastes. In implementing solid waste legislation, regulatory agencies must consider that wastes of the same general type do sometimes vary in actual composition, and therefore should not necessarily be considered hazardous simply because they fall into a categorized list of hazardous wastes.

We take serious issue, for example, with a regulation prohibiting the disposal of any industrial waste containing any concentration of any materials in a list of "toxic substances." Such a regulation could cause havoc in this industry and other industries as well as in the government agency administering the regulation since, given the capability of modern chemical analysis, almost any waste generated could contain some minimal concentration of one of these substances.

As we noted before, the criteria for establishing a hazardous waste should be based on the total quantity of harmfu

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

materials, the concentration of the materials, their characteristics, and resultant effects on health or the environment.

With respect to the last two questions of Discussion Topic 1 concerning collection of waste samples and analytical methods, the American Petroleum Institute is sending you a copy of the sampling methods and analytical techniques which API has prescribed for its current survey of petroleum refining solid wastes. These methods and techniques represent the best technology developed by experts in our industry.

Discussion Topic 2.

As to who should bear the responsibility, liability, and costs of hazardous waste disposal, we believe that

One, The generator should be obligated to collect and safely contain all hazardous wastes. Further, the generator should be responsible for accurately characterizing and representing the wastes, contracting with a properly licensed hauler, treater, or disposer and for maintaining records. The generator should be responsible for issuing a contract which requires compliance with all applicable regulations. The contract should document the method of hauling the material, the method of treatment, and the method and location of ultimate disposal. The hauler, treater, or disposer should furnish a copy of his operating license to the generator.

Two. The transporter should be responsible for obtaining a hauling license and for maintaining records of origin,

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

destination, and characteristics of material hauled.

Three. The treater of hazardous waste should be responsibile for adequate processing facilities for safe handling and treatment, for storing treated wastes properly, and for maintaining records of the waste process, the generator, and the hauler. The treater should also be responsible for complying with applicable emission regulations.

Four. The disposer should be responsible for maintaining records of wastes received and disposal techniques employed, for obtaining an operator's license, and for complying with applicable emission regulations.

Five. If any of the conditions of the contract are violated by the hauler, treater, or disposer, these violators should be liable, not the generator. The generator should not be liable for poor operating practices by the hauler, treater, or disposer that violate license requirements.

Six. The costs of proper waste disposal should be borne first by the generator. However, the consumer ultimately pays the bill. For that reason we must insure that the cost of solid waste regulation is not disproportionate to its benefits.

Discussion Topic 3.

No specific requirements or prohibitions should be set governing the recovery, reuse, or disposal of industry wastes. Wastes are generated under different circumstances, and the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

feasible disposal method can vary significantly among generators because of location conditions and other factors. Obviously, all wastes should be disposed of in an environmentally acceptable manner. Recovery and reuse where practical has been and continues to be pursued in the petroleum industry. This practice is particularly applicable to oily wastes, where oil can be separated and recovered. However, because of their individual properties some oil wastes cannot be de-oiled economically. Energy required to de-oil certain wastes exceeds the energy recovered, making such a process uneconomical and wasteful. In such a case an environmentally sound, alternate disposal method such as land spreading -- which utilizes the natural decomposition process and a minimum of energy -- is employed.

Disposal methods (b) through (f) under Discussion Topic e should be options of the generator who should process and dispose of the wastes in an environmentally acceptable manner. For example, incineration is used by some refineries. However, it is one of the most expensive methods in terms of capital, operating costs, and energy consumption, and an ash residue disposal problem remains. Similarly, land emplacement is used by many refiners; however, this technique may be impractical where land is scarce.

Discussion Topic 4.

We are limiting our comments here to leaded gasoline storage tank sludge, a common toxic waste. It has been a

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

widespread practice for many years in the petroleum industry to detoxify leaded gasoline storage tank sludge by a weathering technique. Leaded gasoline storage tank sludge has also been buried in designated areas. Of the two methods, weathering is preferred because of its inherent ecological advantages. Field experience indicates no air, water, or soil contaminat: problems. It is a safe, effective, and economical technique.

In brief, the weathering technique consists of spreadi the sludge to a depth of three inches in the tank farm area or in an area remote from habitation. After four weeks of weather· ing, sludge can be treated as any other nontoxic industrial waste, provided that lead-in-sludge tests indicate less than 20 ppm organic lead. A pertinent reference -- API Publication 2015A, "A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning" -- is being sent to you by the American Petroleum Institute.

Discussion Topic 6.

There are abundant government and industry publication outlining recommended safety and security procedures for the treatment, storage and disposal of hazardous materials. Existing procedures for the handling of hazardous materials before they become incorporated in wastes are adequate and additional regulations are not required.

Government regulations developed for hazardous waste management should be consistent with existing Federal regulatio

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

such as:

a. Department of Transportation, CFR Title 49, Parts 100-199, 1973.

b. Occupation Safety and Health Administration (OSHA) regulations Section 1910, Hazardous Materials.

In addition, a National Fire Protection Association pamphlet, No. 49, 1975 edition, is an excellent reference used by many segments of our industry.

We feel that the generator, the treater, and the disposer should each be responsible for all facets of employee training to insure compliance with hazardous waste management regulations.

Discussion Topic 16.

All industry is dynamic. The demand for products and the technology avilable for their manufacture are continually changing.

The production of by-products and wastes likewise changes continually, both as to characteristics and quantities. The industry providing waste treatment and disposal services must be just as dynamic as the generators it serves.

The private and competitive business community can provide necessary services at lowest possible cost, keep pace with the varying needs of generators, and provide facilities which will satisfy environmental restrictions. It is likely

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

that government involvement in hazardous waste disposal would lead to requirements that generators guarantee specified feed streams to certain disposal facilities over long-term contract periods. This could be environmentally counter-productive.

The proper and effective government role, we feel, is to set minimum standards and monitor activities as necessary to protect health and welfare. The reality that the operation of hazardous waste disposal facilities can impact on the environment indicates that emissions should be regulated (as the emissions of other sources are), but this is not an argument for either government operation or government establishment of a regulated monopoly.

Generators should be free to increase or decrease waste production rates, terminate waste production, treat their own waste, and negotiate treatment or disposal service contracts in a free and competitive market.

We thank the EPA for this opportunity to present our views.

Thank you.

nerican Petroleum Institute
)1 L Street Northwest
ashington, D.C. 20037
2-457-7000

. W. Umstead
202) 457-7084

December 17, 1975

r. John P. Lehman
irector, Hazardous Waste Management Division
ffice of Solid Waste Management Programs (AW565)
nvironmental Protection Agency
ashington, D.C. 20460

ear Mr. Lehman,

The enclosed documents, referred to in the statement presented efore the Environmental Protection Agency at the San Francisco public eeting of December 11, 1975 on hazardous waste management by r. H. E. Knowlton on behalf of the Western Oil and Gas Association nd the American Petroleum Institute are forwarded for your infor- ation.

Sincerely,

WU:lab

c: H. E. Knowlton

ncl. (1) American Petroleum Institute Refinery Solid Waste Survey 1976, sampling methods and analytical techniques. (Referred to under Discussion Topic 1, p.3)

ncl. (2) A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning, API Publication 2015A (Referred to under Discussion Topic 4, p.6)

equal opportunity employer

AMERICAN PETROLEUM INSTITUTE

REFINERY SOLID WASTE SURVEY

1976

Instructions

and

Appendixes

Department of Environmental Affairs
American Petroleum Institute
2101 L Street, N. W.
Washington, D. C. 20037

1412

INTRODUCTION

This survey develops data on the life cycle of solid wastes generated by petroleum refineries. The results of the survey will enable the industry to respond to solid waste management legislation expected to be enacted by the Congress and implemented by EPA in 1976.

The survey questionnaire is designed to collect data on refinery characteristics, types, quantities, generation rates, and composition of refinery solid wastes, as well as methodology currently used by the refineries in the treatment and disposal of these wastes.

QUESTIONNAIRE

The survey questionnaire is comprised of individual information sheets on each of the subject areas enumerated below:

REFINERY:

1. Intake Waters
2. Crude Oils
3. Background Soil

SOLID WASTES:

1. Once-Through Cooling Water Sludges
2. Cooling Tower Sludges
3. HF Alkylation Sludge
4. Waste FCC Catalyst
5. Treating Clays
6. Tank Bottoms
7. Storm Water Silt
8. API Separator Bottoms
9. Air Flotation Float
10. Waste Biological Solids

TREATMENT AND DISPOSAL METHODS:

1. Sludge Dewatering
2. Sludge Farming
3. Incineration

These information sheets are to be filled in as completely as possible. They may be completed in pencil or ink or typed so long as they can be adequately reproduced on a zerox machine. Where actual data are not available, estimates should be provided. It is not necessary to revalidate data already in hand from previous relevant work. Existing data are acceptable as long as they are representative of actual conditions.

Included in the information sheets of the questionnaire are requests to take and analyze samples relating to refinery characteristics, solid wastes, and treatment and disposal methods. An Analytical Data Sheet is to be used to report the analytical data pertaining to each sample. A blank Analytical Data Sheet is included with the questionnaire and at page 10 of these instructions. Additional copies as necessary should be duplicated by the refinery. Every

effort should be made to take and analyze samples as requested in the questionnaire. If samples are not obtainable or existing data are insufficient to prepare the Analytical Data Sheet, it is nevertheless requested that the applicable information sheet be completed.

In completing the Analytical Data Sheets care should be taken to insure that the notation used to describe the samples in the individual information sheets of the questionnaire is also used in the corresponding Analytical Data Sheets. Likewise the Laboratory Number entered in the Analytical Data Sheet should be repeated in the corresponding information sheet. Laboratory numbers may be assigned from the regular numbering system or from a series assigned especially for this survey.

The data being requested in this survey relate to solid wastes normally encountered in a refinery. In the event that a refinery generates solid wastes of a different type, data on such wastes should be furnished on supplementary sheets. Note, however, that information is not being requested for sludges resulting from clarifying, softening, or otherwise the intake water, since these sludges would not be different from those generated by public utilities or other manufacturing plants.

A period of about five months is being provided to the companies for completion of the survey questionnaire. This should allow ample time for the sampling of tank bottoms. Completed questionnaires including applicable Analytical Data Sheets and schematic diagrams as requested below should be returned to the following address not later than May 1, 1976.

Mr. Walter W. Umstead
Department of Environmental Affairs
American Petroleum Institute
2101 L Street, N.W.
Washington, D.C. 20037
(202) 457-7084

Upon receipt of the questionnaire, API will assign it an API Code Number remove the cover sheet on which the company name appears and forward the questionnaire identified only by the API Code Number to Engineering-Science, Inc. Engineering-Science will tabulate and correlate the survey results and prepare the survey report.

When Engineering-Science has finished its work and the final report is approved, the completed questionnaires will be returned to the companies.

SCHEMATIC DIAGRAMS

It is requested that schematic diagrams be submitted as follows:

(1) Provide a general schematic diagram of the sewer system including impoundment facilities, to assist in understanding the sources of the sludges accumulated in the API separator(s), and the storm and/or the process waste wate impoundment facilities.

(2) Provide a solids flow schematic diagram, to assist in understanding the solids handling system within the refinery. All of the sludges described in the questionnaire should be included in this diagram. Each of the solids flow lines, as applicable, should be labeled in accordance with the information sheets. All sources are to be included along with all solids handling, dewatering, and disposal facilities.

SAMPLE COLLECTION

The following are guidelines for the collection of representative samples:

1. Many of the samples required for this survey have three distinct phases (hydrocarbon, aqueous, and solid) As this is not usually the case in refinery sampling, care should be taken to preserve the ratio of the three phases in the sample taken.

2. A sample should be collected in sufficient volume to minimize sampling errors and to provide enough sample for analytical aliquots to be taken. Four-fifths of a gallon in a 1-gallon can is suggested for a majority of the samples. Samples from tank or vacuum trucks should be no less than 4 gallons in a 5-gallon crimped-top pail to be representative.

3. Plastic sample containers should not be used for field samples.

4. As a minimum, samples should be labeled to include the following information:

   a. Date
   b. Source
   c. Person sampling
   d. Identifying number
   e. Any special sampling conditions (i.e., rainy, windy, etc.)

5. The discharge from sludge removal or conveyance pumps, such as the pumps on the bottoms of an API separator or on the float from an air flotation unit, can be sampled as for any refinery flowing stream.

6. Sludge removed by vacuum and tank trucks should be sampled at the place where it is discharged. Samples should be representative of the bottom, middle, and top of the truck contents.

7. The background soil sample should be taken at a point close enough to assure that the data are representative of the background soil conditions at the refinery. This sample should be collected at a minimum depth of one foot below the ground surface. This background soil sample will indicate the virgin soil conditions within the refinery; and it, therefore, should be taken from a relatively undisturbed area.

8. Field samples should be separated on the day collected into equivalent analytical aliquots. The field sample should be made as homogeneous as possible by the use of a paint shaker, if available, or by vigorous stirring. Ten analytical aliquots should be taken, each in 100-110 ml volumes. Aliquots should be stored in glass.

9. If the aqueous extraction procedure as defined in the Analytical Measurements sections is postponed, the aliquots should be refrigerated at 33°F to 35°F until the extraction is made.

ANALYTICAL MEASUREMENTS

The various solid wastes and the phases to be analyzed are listed in Table I. The individual analytical constituents are listed on the survey's comprehensive analytical data sheet.[1] Existing analytical data on any of the waste sources can be used; however, these data should be representative of the true waste composition and the information supplied on the survey information sheets.

Figure 1 has been prepared as a working scheme for sample separation and analysis. A narrative explanation is presented below to provide more details.

The field samples collected in accordance with the suggestions in the preceding section are brought to the lab for characterization. Each fluid or semifluid sample is homogenized with a paint shaker or by vigorous stirring and broken into ten equivalent analytical aliquots with a volume of approximately 110 ml. These aliquots are to be stored in a refrigerator until the analyses are complete. Extra samples should be kept until you see the final survey report.

Analytical Aliquot No. 1 is used for Part 1 of the analytical sequence. Every refinery involved in the survey is expected to complete Part 1. Part 1 involves the determination of the bulk density and phase partition of the sample into percent benzene extractables, percent water, and percent solids by weight. The well-shaken aliquot is poured into a tared 100-ml graduated clylinder and weighed to get the bulk density. The cylinder contents are then transferred with benzene into a 500-ml capacity ASTM D 95 flask. The percent by weight of water is determined by a modification of the ASTM D 95 procedure using benzene and reported on the respective analytical data sheet for the sample. Benzene is chosen because it is the best solvent for defining the hydrocarbon phase we want to separate out of the sample, can be more easily separated from the oil than a higher boiling solvent, and will ensure getting all the benzo-a-pyrene and asphaltenes. Its use in the water-by-distillation step will result in a long elapsed time in carrying out this part of the analysis.

The residue in the D 95 flask is further extracted with benzene in a Soxhlet extractor. The dried residue is reported as percent solids. The benzene extractables are reduced in volume by removal of the benzene solvent and weighed. The benzene is removed by distillation with reflux to minimize hydrocarbon loss. It is suggested that the Kuderna-Danish evaporative concentrator and a tube heater (Kontes catalogue) be used in finishing off this separation. This extract is representative of the quantity of hydrocarbon or oil phase.

1. An Analytical data sheet form is inserted at page 10.

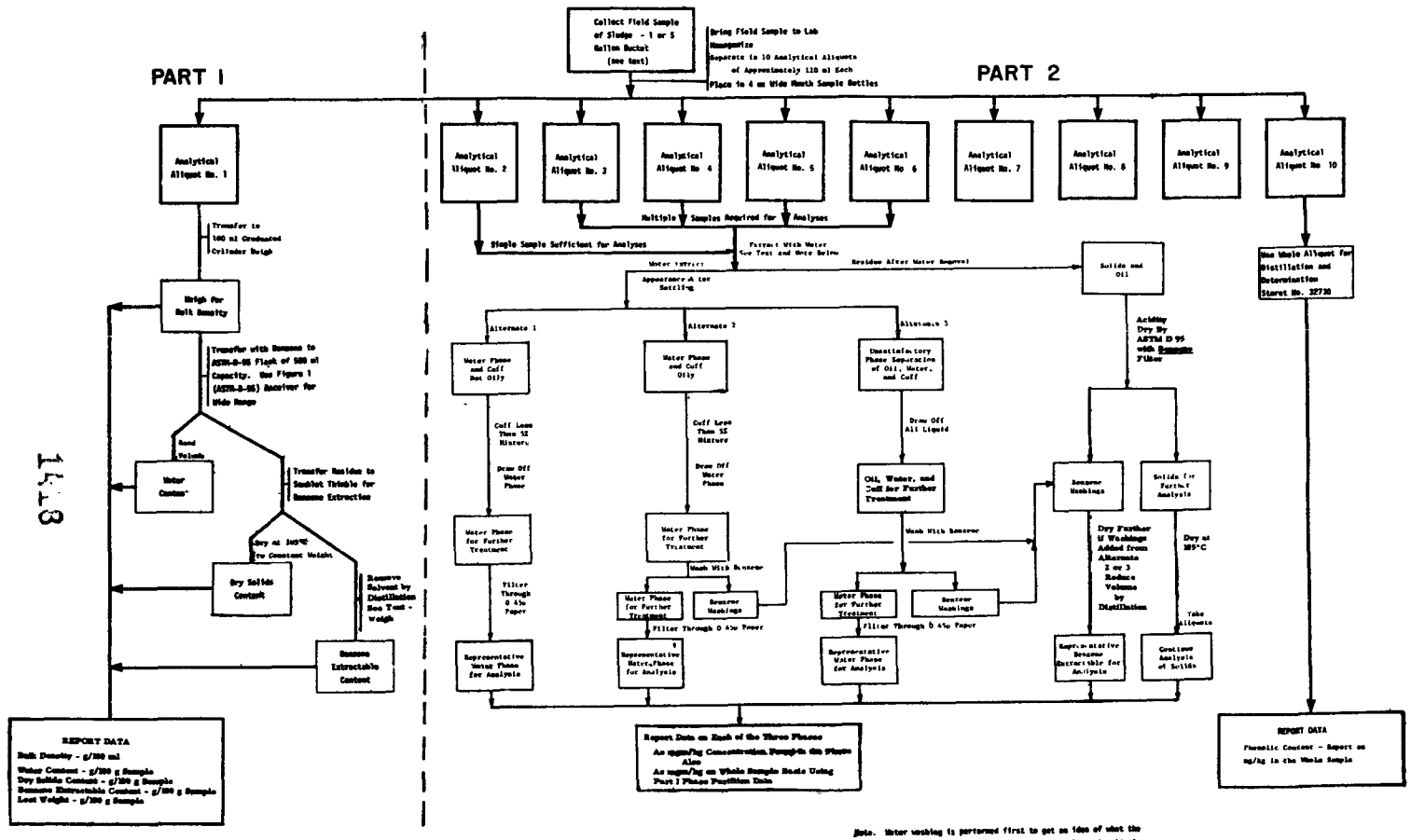
TABLE 1

SAMPLE PHASES TO BE ANALYZED

	Phases to be Analyzed		
	Hydrocarbon	Aqueous	Solid
·finery Data			
Intake Waters		X	X
Background Soil			X
Crude Oil	X		X
›lid Wastes			
Once Through Cooling Water Sludge			X
Cooling Tower Sludges			X
Alkylation Sludge		X	X
Waste FCC Catalyst			X
Treating Clays	X		X
Tank Bottoms	X	X	X
Storm Water Silt			X
API Separator Bottoms	X	X	X
Air Flotation Float	X	X	X
Waste Biological Solids	X	X	X
·eating Methods			
Sludge Dewatering	X		X
Sludge Farming	X	X	X
Incineration	X	X	X

FIGURE I

ANALYTICAL SEQUENCE DIAGRAM



Note. Water washing is performed first to get an idea of what the first rates may wash out. No other chemicals or treatment should be used before the representative water is removed.

'hese Part I data provide a very important set of characterization numbers, since all of the Part 2 detailed analytical information must be reported by relating the Part 2 data to the phase percentages by weight from Part 1. These analyses will then be the bases of the industry projection which the survey contractor will make. Any loss in material in this separation will be thought of as due to a light hydrocarbon or light water-soluble organic phase. 'his loss number is included with the analytical data for completeness but is not a suitable measurement for any industry projection.

'art 2 of the analytical sequence diagram starts with water washing so as to provide an idea of what the first rain may wash out of the oily sludge. It is, therefore, important that no other chemicals or treatment be used before the representative water is removed.
'art 2 of the scheme does not require the quantitation that Part 1 did. However, as one goes through the scheme, the phase separations should be as clean as practicable. Nine analytical aliquots are available for Part 2 use. It is preferable to do Part 2 work on a single sample because of the volumes of solvent involved. However, if a single aliquot is insufficient for one of the phases based on Part 1 data, several samples are combined to provide the necessary volume. One separate aliquot is used for the phenolic content determination using STORET Method 32730.

'he water extraction method using a single aliquot is carried out as follows.

.. Mix the analytical aliquot with deionized, distilled water shown to have negligible metals content in a volumetric 1:4 ratio of sludge material:water at room temperature. This can be one by the method of volumetric displacement, which is as follows:

a. 100 ml of water is placed into a 1-liter graduated cylinder or other calibrated container that can be handled on an automatic shaker.

b. Sample material is added until the mixture reaches a volume of 200 ml.

c. The vessel is filled to 500 ml with purified water.

. Cap tightly and shake vigorously on a mechanical shaker.

. After shaking, the suspension is allowed to settle overnight.

. After settling, the aqueous phase is carefully removed with a syringe (or by decanting or siphoning), leaving behind the emulsion cuff.

In making this separation, one should strive for an emulsion cuf as small as practicable. Centrifugation may help provide a clea phase partition. Three alternate schemes for getting the representative water, depending on the oiliness of the sample and the size of the cuff, are shown in Figure 1 and further described be

a. If the volume of the emulsion cuff is less than 5% by volume of the total sample volume (e.g., 25 ml) and the sample does not appear to have an oily phase, then a suitable volume of the drawn-off water is filtered through a 0.45-μ membrane filter This separated water is the representative aqueous phase for the Part 2 analysis. Oil content for such a sample is ignored unles oil specifically shows up when the solids are dried by distillat extraction.

b. If the volume of the emulsion cuff is less than 5% by volume but the aqueous phase is oily, then the water removed is washed with benzene. The benzene washes are added to the benzer extractable phase. The benzene-washed water is then filtered and analyzed.

c. If the volume of the emulsion cuff is greater than 5% b volume, then all liquid (oil, water, and cuff) is drawn off sol Suitable volumes of benzene are added to the liquid, and benzene and aqueous phases in the absence of the solid will hopefully separate. The aqueous phase is filtered and analyzed as require The benzene washings are added back to the solids phase for fur separation.

The solids and oil phases remaining after the aqueous phase extraction are acidified with 1:1 sulfuric acid to spring the organic acids bound to the solids. The sample is dried with benzene by the modified ASTM D 95 method. The solids are separated by filtering and further washing with benzene. The benzene-soluble phase after reduction in volume is now ready for analysis. There is no need to remove the last traces of benzene. An aliquot is related to the whole by the Part 1 analysis. The solids are dried at 105°C to const weight. If the solids are to be analyzed by several different methods for the different elements, now is the time to homogeni the solids and take aliquots.

Suggestions for analysis of the various phases follow. The generally requested level of detection is 0.1 ppm. Where analytical sensitivity is readily obtainable at lower levels, the lower level number will be appreciated. If plus and minuses can be put on the answers to indicate the number of significant figures, this will also be appreciated.

1. Hydrocarbon Phase

Benzo-a-pyrene is a difficult analysis, but one which is often made. Two methods for making this measurement are included in

the Appendix. They come from two different companies. Nickel and vanadium can be measured by atomic absorption. In the Part 2 analysis, preparation of the oil phase, high grade benzene redistilled in glass, such as is available from Burdick and Jackson, must be used to avoid contamination.

2. Aqueous Phase

The aqueous phase should be analyzed for the constituents stipulated on the analytical data sheet by whatever methods you have developed for testing refinery effluent waters. If you don't have experience, we suggest the following approaches. Wet chemical analyses should be used for cyanide and fluoride. The designated elements can be analyzed by atomic absorption. The recommended reference is the latest EPA volume entitled "Manual for Chemical Analysis of Water and Wastes, 1974." Another useful reference is the 13th edition (1971) of "Standard Methods for the Examination of Water and Waste Water" prepared and published jointly by the APHA, AWWA, and WPCF.

Hexavalent chromium can be measured by the EPA wet chemical method or the special AA procedure provided in the Appendix. It is unlikely that hexavalent chromium will show up in the waters drawn off of oily samples. However, this is a point we would like to get information on in this program.

3. Solids Phase

The solids phase is to be analyzed for the constituents stipulated on the analytical data sheet. Each laboratory should choose methods with which they have the most experience and in which they have the greatest confidence. These may include emission spectroscopy, X-ray fluorescence, neutron activation analysis, electrochemical methods, and atomic absorption. Here again, we are seeking numbers as low as the 0.1 ppm level. In the absence of other experience, it is suggested that the Simple Wet Ashing Procedure, 211.1A, in the 13th edition of Standard Methods followed by an AA finish be used. A digestion procedure especially for the recovery of arsenic, mercury, and selenium is listed in the Appendix with the special analytical Methods.

ANALYTICAL DATA SHEET

Sample Description _____ Lab No. _____

Part 1

Bulk Density: _____g/100 ml.

Phase Portions	
Hydrocarbon Phase	_____
Aqueous Phase	_____
Solid Phase	_____
Loss	_____
	100.0%

Part 2

Parameter	CONSTITUENT CONCENTRATIONS mg/kg of Phase	mg/kg of Total Sample
HYDROCARBON PHASE		
Benzo-a-pyrene	_____	_____
Nickel	_____	_____
Vanadium	_____	_____
AQUEOUS PHASE		
Arsenic	_____	_____
Cadmium	_____	_____
Chromium (Total)	_____	_____
Chromium (Hexavalent)	_____	_____
Copper	_____	_____
Cyanide	_____	_____
Fluoride	_____	_____
Lead	_____	_____
Mercury	_____	_____
Nickel	_____	_____
Selenium	_____	_____
Vanadium	_____	_____
Zinc	_____	_____
SOLID PHASE		
Arsenic	_____	_____
Cadmium	_____	_____
Chromium	_____	_____
Copper	_____	_____
Lead	_____	_____
Mercury	_____	_____
Nickel	_____	_____
Selenium	_____	_____
Vanadium	_____	_____
Zinc	_____	_____
Total Sample		
Phenolics	1422	_____

API Code Number _____

AMERICAN PETROLEUM INSTITUTE

REFINERY SOLID WASTE SURVEY

1976

APPENDIXES

Appendix	Special Analytical Method
A	Exxon method for Benzo (a) pyrene
B	ARCO method for Benzo (a) pyrene
C	Chevron method for Hexavalent Chromium
D	ARCO method for Wet Ashing Procedure for As, Hg, and Se

APPENDIX A

Method for Benz(a)anthracene, Benzo(a)pyrene, And Other Polynuclear Aromatic Hydrocarbons in Automobile Exhaust, Gasoline and Crankcase Oil[1]

Introduction

This method was developed to determine polynuclear aromatic hydrocarbons in gasoline, crankcase oil, and tar from auto exhaust.

Scope[a]

The method covers polynuclear aromatics (PNA) ranging from pyrene to benzo(g,h,i)perylene. As described herein, eleven PNA's are measured, including: pyrene, benz(a)anthracene, chrysene, triphenylene, methylbenz-(a)anthracene, dimethyl and/or ethylbenz(a)anthracene, benzo(a)pyrene benzo(e)pyrene, methylbenzo(a)pyrenes, methylbenzo(e)pyrenes and benzo(g,h,i) perylene. Additional PNA's can be included. The procedure was successfully demonstrated for gasoline, exhaust tars and crankcase oils.

Summary

A sample to be analyzed is spiked with known quantities of carbon-14 labeled benzo(a)anthracene (BaA) and benzo(a)pyrene (BaP). Some polar compounds are removed by a caustic treat[b] and then a PNA hydrocarbon concentrate i obtained by solvent elution off a column of partially deactivated alumina. The solvents are cyclohexane, cyclohexane-benzene, benzene, and benzene-methanc The fraction containing the PNA's is reduced to a small volume by evaporation on a steam bath. An aliquot of this sample is injected into a gas chromatograp and fractions are collected for measurement by UV and, in the case of BaA and BaP peaks, also for carbon-14 activity. These activities, compared with known concentrations originally added, give factors by which to relate the concentrations of each PNA to its total weight in the sample.

Apparatus & Isotope Dilution

1. The Gas Chromatograph is equipped with a flame ionization detectc a linear temperature programmer and a flow controller. The injection port consisted of an aluminum block with a stainless steel tube which slides into the block. A quartz sleeve fits inside of the stainless steel tube. The chromatograph is modified by the addition of a by-pass and trap so that 15% of the column effluent will go to the detector and 85% to the trap. This arrangement shown in Figure 3 (p.9). A Perkin-Elmer 900 chromatograph was used in the development of this method, but equivalent instruments should perform satisfactor

a = At the time of this report, work is in progress to also include fluoranthen benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, peryle and coronene.

b = The caustic treat is donc on tar samples only.

[1] Excerpt from CRC-APRAC Project Final Report CAPE -12-68 U.S. Public document #PB219-025 - Author Exxon research personnel R. A. Brown, T. D. Searl, W. H. King, W. A. Dietz, and J. M. Kelliher. 1971.

2. Recorder, 0-1 millivolt, 2 min./inch chart speed.

3. Trapping Tubes, 20 or more stainless steel tubes, 18 cm long by 0.32 cm diameter.

4. Column, 300 cm of .22 cm I.D. stainless steel tubing packed with 2% SE-30 (GC Grade) on Chromosorb G (acid washed and DMCS treated), 80/100 mesh.

5. Syringe, 10 microliter.

6. Spectrophotometer, spectral range 225-400 nanometers, with spectral slit width of 2 nm or less. Under instrument operating conditions for these absorbance measurements, the spectrophotometer shall also meet the following performance requirements: absorbance repeatability, ± 0.01 at 0.4 absorbance; absorbance accuracy, ± 0.05 at 0.4 absorbance; wavelength repeatability, ± 0.2 nm; wavelength accuracy, ± 1.0 nm.

7. Spectrophotometric Cells, fused quartz cells having optical path lengths of 1.000± 0.005 cm and 5 cm cells. The 5-cm cells are microcells and contain about 3 ml of solution.

8. Graduate Glass, 5 ml.

9. Vials, one- and three-dram with cap.

10. Steam Bath equipped with nitrogen outlet for purging vials.

11. Medicine Dropper, with tip drawn out.

12. Special Low UV Emission Room Lights, Westinghouse W-40-gold fluorescent lamps.

13. Chromatographic Column, two feet long 0.5 inch OD and 0.43 inch ID with 300 ml receiving bulb on top and stopcock with Teflon barrel on the bottom.

14. Radiation Counters used are Intertechnique SL-20 and Packard Tri-Carb.

15. Counting Vials, 20 ml with cap.

Reagent and Materials

Reagent grade chemicals must be used throughout. Benzo(a)pyrene was repurified but other polynuclear compounds were used as purchased. Compounds of comparable purity from other suppliers may be employed.

1. Cyclohexane. As a large amount of cyclohexane is used, it must be of highest purity. To check purity, evaporate 180 ml down to 5 ml. Run a UV scan on this residue in a one-cm cell from 280-400 nm. The absorbance should

not exceed 0.01 units. To purify, percolate through activated silica gel, Grade 12, in a glass column, 90 cm long and 5-8 cm diameter. "Distilled in Glass Solvents" are generally of suitable purity.

2. Toluene.

3. Acetone.

4. Sodium hydroxide.

5. Hydrochloric Acid.

6. Benzene B&J.

7. Methanol B&J.

8. Benz(a)anthracene $C_{18}H_{12}$, MW 228, Eastman 4672.

9. Benzo(a)pyrene $C_{20}H_{12}$, MW 252, Eastman 4951.

10. Pyrene $C_{16}H_{10}$, MW 202, Eastman 3627.

11. Benzo(g, h, i)perylene $C_{22}H_{12}$, MW 276, Columbia Organic.

12. Test Blend.

CAUTION

Exercise care when handling these compounds to avoid inhaling them or getting them on the skin. Wash hands thoroughly after handling.

Weigh exactly 25.0 mgs of each of the four compounds listed as Items 8 through 11. Place in a 25-ml volumetric flask, add 20 ml of toluene and swirl until compounds are in solution. Then make up to volume. This will contain 1 microgram of each compound per microliter of solution. Pour into a small, narrow neck brown bottle and keep in a cool, dark place, preferably a refrigerator.

13. Organic Counting Solution, 8 gm of BBOT in a liter of toluene.

14. ^{14}C benz(a)anthracene, ^{14}C benzo(a)pyrene, Mallinkrodt Chemical Works.

Method

Precautionary Note: Because of the sensitivity of the test, the possibility of errors arising from contamination is great. It is of the greatest importance that all glassware be scrupulously cleaned to remove all organic matter such as oil, grease, detergent residues, etc. Examine all glassware, including stoppers and stopcocks, under ultraviolet light to detect any residual fluorescent contamination. As a precautionary measure it is recommended practice to rinse all glassware with purified isooctane immediately before use. No grease is to be used on stopcocks or joints. Great care to avoid contamination of samples in handling and to assure absence of any extraneous material arising from inadequate packaging or storing is essential. Because some of the polynuclear hydrocarbons sought in this test are very susceptible to photooxidation, the entire procedure is to be carried out under subdued light. Avoid use of fluorescent lamps. Special yellow lights are available. Tygon tubing must absolutely be avoided to eliminate di-isooctyl phthalate (DOP) contamination which interferes in both the GC and UV.

Radioactive Materials must be handled and disposed of by accepted methods. Glassware should be rinsed with chloroform-acetone solvent and washed in dichromate-sulfuric acid cleaning solution.

A. Sample Preparation

1. Distillation of Tar Samples

Before commencing the distillation prepare the radioactive BaA and BaP spikes. Add 50 λ of BaA to a 25 ml. volumetric flask and 50 λ of BaP to a second. Make up to volume with cyclohexane and remove duplicate 100 λ aliquots from each for counting. Pour the contents of the flasks into the still and rinse out well with cyclohexane and acetone. Conduct the distillation as described elsewhere (1A).

2. Gasoline

The volume of starting sample is varied according to the level of PNA's. PNA-rich gasolines can be analyzed by using 50 ml and spiking with 50 λ each of ^{14}C labeled BaA and BaP. For gasolines of low PNA content, 1000 ml of sample is spiked with 10 λ each of the BaA and BaP internal standards.

3. Used Crankcase Oil

A weighed amount of sample (~ 500 mg) is made up to 25 ml of cyclohexane which has been previously spiked with 10 λ each of carbon-14 labeled BaA and BaP.

(1A) G. P. Gross, "Gasoline Composition and Vehicle Exhaust Gas Polynuclear Aromatic Content," U.S. Clearinghouse Federal Science Technology Information, PB Rep. Issue No. 200266 (1971) 124 pp.

B. Caustic Extraction (Tar Samples)

1. The volume of still bottoms will be about one liter. Take exactly one-half of this and place in a one-liter separatory funnel.

2. Add 50 ml of 0.5 N aqueous sodium hydroxide solution, shake one minute, and remove lower aqueous phase.

3. Repeat the extractions with 30 and 20 ml portions of sodium hydroxide.

4. Wash with 50 ml of water, then 50 ml of 1/10 N HCl.

5. Finally, wash with 25 ml of water.

6. Evaporate cyclohexane to about 150 ml and filter, if necessary.

7. Evaporate filtrate to below 50 ml, place in a 50 ml volumetric flask and make up to volume with cyclohexane.

8. Take 25 ml for placing on the alumina chromatographic column.

C. Column Chromatographic Separation

1. Seventy-five grams of Woelm Neutral alumina is dried for one hour at 150°C. The alumina is transferred to a bottle and allowed to reach room temperature. 1.5 ml of water are added dropwise with shaking. The bottle is capped and placed on a paint shaker for 15 minutes to obtain a uniform mixture.

2. A glass wool plug is placed in the end of the chromatographic column and the alumina is poured in along with gentle tapping to pack the alumina. The column is filled to within one inch of the top and another glass wool plug is placed on top.

3. Ten ml of cyclohexane are placed on top of the column and allowed to run into the column under nitrogen pressure of 2 pounds. The sample is then poured into the 200 ml bulb on top and allowed to run into the column. 90 ml cyclohexane is added to the bulb.

4. When the cyclohexane has run into the column below the top glass wool plug, 100 ml of cyclohexane benzene (4:1) are added and run into the column. The first 100 ml of cyclohexane is collected and set aside. The following solutions are collected in 3-dram vials and capped. Each should contain 10 ml of solution.

5. After the cyclohexane/benzene (4:1) is below the top of the glass wool plug, 100 ml of benzene are added to the column. Collection of 10 ml fractions is continued.

6. After all the benzene has passed the top glass wool plug, 100 ml f benzene/methanol (1:1) is added to the column. The benzene/methanol front an usually be followed by the movement of an orange colored band. The front an also be detected by a warm front moving down the column which is apparent o the touch or it can be followed by a UV lamp. When the front reaches the nd of the column, a two-phase system becomes visible in the collecting vial. t this point, the remaining solution is collected in one large bottle and llowed to run off the column (cut 3). The column should not be stopped or llowed to run dry between solvent additions.

7. The solutions in the individual three-dram vials are scanned in rder of elution on a UV spectrophotometer. The peak at 340 nm is used as a uide in determining the start of elution of tetracyclic PNA compounds. The olution whose spectrum shows a 340 peak is the start and all remaining solutions re combined as the PNA fraction (cut #2).

I. Preparation of Concentrated PNA Solution

1. Transfer the contents of the first 4 vials of cut #2 to a 50 ml beaker and rinse each vial twice with 1 to 2 ml of cyclohexane and combine with the contents of the beaker.

2. Place the 150 ml beaker on the steam bath under a small jet of nitrogen.

3. As evaporation progresses, add the contents of the remaining vials with similar rinsing to the beaker. Do not evaporate to less than two mls and in no case let the contents go to dryness.

4. Transfer the concentrated solution to a one-dram vial. Wash beaker with cyclohexane and add to vial.

5. Place the vial in a 30 ml beaker for support. The beaker is placed on a steam bath under a gentle jet of nitrogen.

6. Rinse the 150 ml beaker with 3 or 4 small portions of cyclohexane (~1 ml) and combine with the contents of the one-dram vial as evaporation proceeds.

7. If, as is preferable, it is unnecessary to obtain the weight of the PNA residue, evaporate the solution down to about 50 µl (0.05 ml). Add about 0.5 ml of acetone and again evaporate to 50 µl.

8. If the weight of the residue must be obtained, exercise great care as the solution approaches dryness. Keep the vial under constant observation and the instant all the solvent has been removed, cool and weigh the vial.

9. Return the vial to the beaker under nitrogen for an additional minute, cool and reweigh. Repeat this procedure until a constant weight is reached. For the GC analysis add 10 to 20 microliters of acetone to lower the viscosity of the sample. Cap and save.

E. Gas Chromatographic Analysis

Parameters

The following parameters are employed in developing the gas chromatographic separation with the Perkin-Elmer 900. Other instruments might use different conditions.

Carrier Gas - Helium
Flow Rate - 30 ml./min.
Hydrogen and Air - at manufacturers recommendation, or optimum rates.
Injection Port - 300°C.
Detector - 340°C.
Program - 175°C to 300°C at 4° per minute. The temperature is held at 300° until all peaks are eluted, but in any case, for 20 minutes.

Column Conditioning

1. The Supelco Co. states that only minimum conditioning is needed on the column specified in (4) of apparatus. Connect the column to the inlet of the GC but not with the detector.

2. Pass helium through at 30 ml. per minute program at one degree per minute from 150°C to 275°C. Keep at 275 for 30 minutes. Cool and connect to the detector.

3. If SE 30 as supplied by the manufacturer is used in place of GC grade, connect as in (1). Purge with helium for 10 minutes and then put a cap on the exit end, keeping a helium pressure on the column.

4. Raise the oven to 350°C and bake for 3 hours.

5. Cool to room temperature, remove cap, pass helium through at 30 ml. per minute and continue conditioning column as shown below without attaching to the detector.

Temp., °C.	150	200	250	275
Time, Min.	30	30	30	60

6. Cool to room temperature and attach to detector. The column is now ready for use.

Performance Test

This test is used to measure retention times and demonstrate suitable recovery of individual PNA's. Recoveries of $\geq$ 83% are required except for benzo(g,h,i)perylene. For this compound, a recovery of $\geq$ 75% is satisfactory. With the column conditioned and the parameters set as described in 1, prepare to inject a sample.

7. Flush the 10 µl syringe twice with the test blend.

8. The third time fill the syringe and hold vertically point up. Stick the tip in a rubber septum and depress the plunger to compress air bubbles which rise to the top.

9. Now advance the plunger to the desired amount, for instance 2 µl; the rubber is removed, and the plunger retracted until the air-liquid meniscus enters the glass bore.

10. Note the volume from meniscus to plunger.

11. Insert the syringe up to the hilt in the GC injection port, depress the plunger. Start the recorder.

12. Remove the syringe from the port and retract the plunger.

13. Note the volume remaining (generally about 0.2 µl) and subtract from the previously noted volume to determine the net volume injected.

14. Have stainless steel trapping tubes and one-dram vials available. The vials should be supported in small holes drilled in a board. A plastic cup filled with ice surrounds the stainless steel insert.

15. As a peak approaches, insert a tube. Remove as the trace returns to the baseline. Mark the peak No. 1 and place the tube in a one-dram vial labeled 1.

16. Continue taking cuts, putting each tube in a separate vial labeled 2, 3, etc.

17. Typical retention times obtained in setting up this method are shown in Table IA.

Table IA

OBSERVED RETENTION TIMES [a]

Compound	Retention Time, Min.
Pyrene	13.6
Triphenylene	19.4
Benz(a)anthracene	19.4
Chrysene	19.6
Methylbenz(a)anthracenes	21.4
Dimethyl/ethylbenz(a)anthracenes	23.3
Benzp(e)pyrene	25.7
Benzo(a)pyrene	25.8
Methylbenzo(e)pyrenes[b]	) 27.5, 28.0, 29.0
Methylbenzo(a)pyrenes[b]	)
Benzo(g,h,i)perylene	31.4

a = Conditions given on page 40.
b = Measured in three different peaks.

18. When the run is completed take the first tube and place in a 5-ml graduate. With an elongated medicine dropper add enough cyclohexane[a] through the top of the tube to fill the spectrophotometric cell to be used. In developing this method, 3.8 ml was a convenient volume to employ, but all cuts must be made up to the same volume.

19. Pour the solution into the original vial, cap and protect from light. Rinse out the graduate with cyclohexane and use for the next tube. Save the fractions for UV, and calculation of recoveries.

20. When the run is completed, measure and record the retention time in minutes from injection point for each compound including the internal standard.

Analysis of Samples

21. From the vial containing the PNA concentrate, take 5-10 µl of sample and inject into the GC unit. Trap the peaks at the retention times obtained on the test blend and also trap any other peak that might be of interest. Trapped fractions must be made up to the same volume employed for the test blend.

a - At the time of this report, some preliminary data indicated that benzo(g,h,i)-perylene might not be completely dissolved by cyclohexane, resulting in low recovery. A preferred step would be to use acetone. In this case, the UV measurement might be done with the cyclohexane/acetone mixed solvent or it might be necessary to replace the acetone with cyclohexane by careful evaporation.

F. Ultraviolet Spectrophotometric Analysis and Scintillation Counting

1. Prepare solutions of known concentrations of each PNA in cyclohexane, e.g., 2.4 μg/ml.

2. With cyclohexane in the reference cell, obtain the spectrum of each solution from 400 to 225 nm.

3. From the spectra obtain the absorbances of the various compounds at the wavelength shown in Table IV (p. 12). Calculate absorptivity from the known concentrations. Typical calibration data are also shown in the table.

4. Rinse the cell thoroughly with cyclohexane between spectra and remove the last traces of solvent by vacuum or a gentle jet of air.

5. Obtain the UV spectrum of each selected fraction as directed in step E-21. Measure the absorbance at the specified wavelength and reference point as determined by the base line having anchor points as listed in Table IV.

6. One ml of each fraction containing BaA and BaP is placed in a counting vial, along with 9 ml of toluene and 10 ml of counting solution. Counts per minute are measured using a scintillation counter.

G. Calculation to a Sample Basis

1. To calculate the micrograms of the individual PNA's in the sample, the aliquot factor (activity ratio) must be determined based on radioactivity per ml of the cyclohexane solutions of GC fractions containing ^{14}C BaA and BaP, respectively.

Equation 1. $$M = \frac{ON}{(K-L)}$$

M = activity ratio
Q = activity in DPM added to sample
K = average CPM in a measured volume (ml) of the solution containing the GC fraction
L = background in CPM
N = counting efficiency CPM per DPM

CPM is counts per minute
DPM is disintegrations per minute.

The concentration of each component is determined from the UV absorbance.

Equation 2. $$D = \frac{A}{BC}$$

D = concentration of each PNA (μg/ml)
A = absorbance of each PNA
B = absorptivity of each PNA (ml/μg cm)
C = cell length (cm)

The weight of added radio tracer is determined.

Equation 3. $$X = \frac{Q}{S}$$

X = weight of radio tracer added, e.g., 1 μg of ^{14}C BaP.
S = specific activity (DPM/μg)
Q = activity in DPM added to sample.

Calculate weight of PNA in the sample.

Equation 4. $$T = MVD - X$$

T = weight of PNA in the sample.
V = volume in ml of the solution containing the GC fraction taken for counting.

The subtraction of X (Equation 4) is done only for BaA and BaP. The weight of benzo (g,h,i) perylene is corrected upward by 1.10 (p. 8).

Where more than one internal standard is used, all components eluting in the same peak with a standard are calculated based on that standard's activity ratio. All other components are calculated using the smallest activity ratio since this represents the maximum recovery of standard.

APPENDIX B

POLYCYCLIC AROMATIC ANALYSIS IN SOLID WASTE

In analyzing polycyclic aromatics (PCA) in solid waste, the sample is separated into water, solids, and cyclohexane soluble fractions. The separation of the PCA's in the cyclohexane fraction is based upon work by Norris & Hill(1) and White & Howard(2). The general scheme is outlined in Figure I.

The first alumina column is used to "clean up" the sample which is necessary for high boiling petroleum stocks, cokes, and complex samples such as obtained from the API Separators. The second column (2.5% H_2O) is used to provide concentrates of polycyclic aromatics (PCA's) of interest. Cut 3 should contain the 4 and 5 ring compounds and cut 4 should contain the larger PCA's. Experimental work to date indicates that cut 3 contains some of the larger PCA's. Cuts 3 and 4 are concentrated and applied to 20% acetylated cellulose TLC plates, developed, and regions of interest removed. The regions of interest are extracted with hot methanol, concentrated, and analyzed by HPLC using a reverse phase system, consisting of a Vydac TP column and methanol-H_2O as the solvent.

Each of the above procedures are described in detail in the attachment, "Analytical Procedures".

To date, the separator bottoms from an API separator sample has been analyzed using this procedure. The analysis of the HPLC chromatograms are not complete, but concentrations for 1,2-benzanthracene, 3,4-benzpyrene and chrysene have been obtained and are listed below in ppm:

1,2 - Benzanthracene	254 nm	288 nm
on cyclohexane extractable basis	111	29
on total sample basis	31	7
3,4 - Benzpyrene	254 nm	296 nm
on cyclohexane extractable basis	46	47
on total sample basis	13	13
1435 Chrysene	254 nm	--
on cyclohexane extractable basis	78	--
658 on total sample basis	22	--

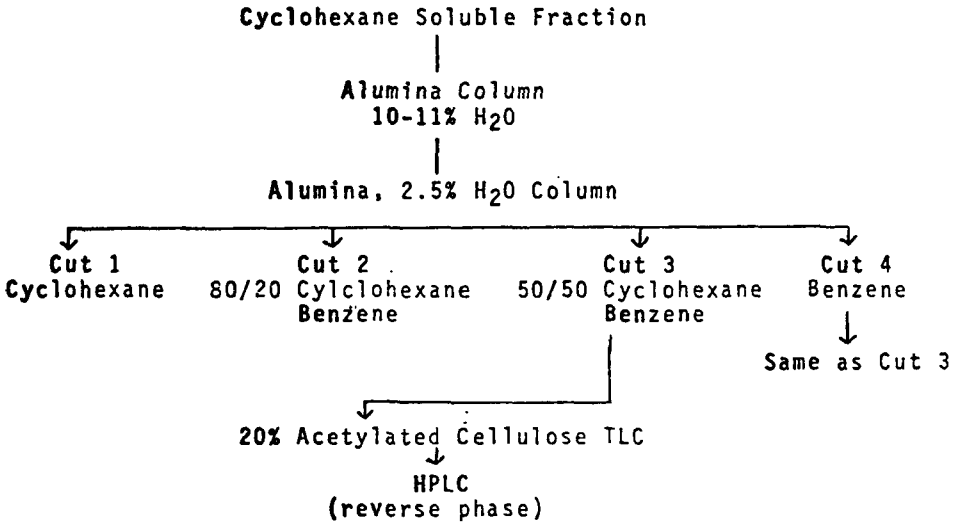
Two U.V. detectors were used in series, the Perkin-Elmer which is fixed at 254 nm and the Schoeffel, which is a variable wavelength detector. There is no agreement for 1,2-benzanthracene for the two wavelengths, suggesting that interferences are present at 254 nm. The agreement for 3,4-benzpyrene suggests that either it is fairly pure or that any interferences have the same absorptivity at both wavelengths.

M.S., G.C., and G.C.-M.S. procedures are being developed to aid in the analysis. We can analyze the TLC portions by M.S. using a probe, but some of the TLC portions are very complex, and G.C.-M.S. would be useful. In the future, we plan to take fractions from the HPLC separation and subject these to additional analysis. At the present, sample size appears to be a limiting factor, and additional work will have to be done to determine the lower limit of detection.

1. "Polynuclear Aromatic Hydrocarbons in Petroleum Products", M. S. Norris & E. D. Hill, of Gulf, presented at API 60, June 1974, not published.

2. R. H. White & J. N. Howard, Chromatog., 29 (1967) 108-114.

FIGURE I


Cyclohexane Soluble Fraction
Alumina Column
10-11% H_2O
Alumina, 2.5% H_2O Column
Cut 1
Cyclohexane
Cut 2
80/20 Cylclohexane
Benzene
Cut 3
50/50 Cyclohexane
Benzene
Cut 4
Benzene
Same as Cut 3
20% Acetylated Cellulose TLC
HPLC
(reverse phase)

ANALYTICAL PROCEDURES

I. Sample size

API Separator, cyclohexane extractables = 1 gm

II. Alumina Separations

1. 10-11% H_2O

30 gm of deactivated alumina are prewet with cyclohexane, the sample applied as a solution; and 200 ml of cyclohexane used to eluate the sample, and concentrated to = 20 ml.

2. 2.5% H_2O

30 gm of the deactivated alumina are prewet with cyclohexane, the sample applied, and eluated with the following solvents: cut 1 - 200 ml cyclohexane, cut 2 - 150 ml 80/20 cyclohexane/benzene, cut 3 - 400 ml 50/50 cyclohexane/benzene, and cut 4 - 400 ml benzene. Cuts 3 and 4 are concentrated to = 0.4 ml.

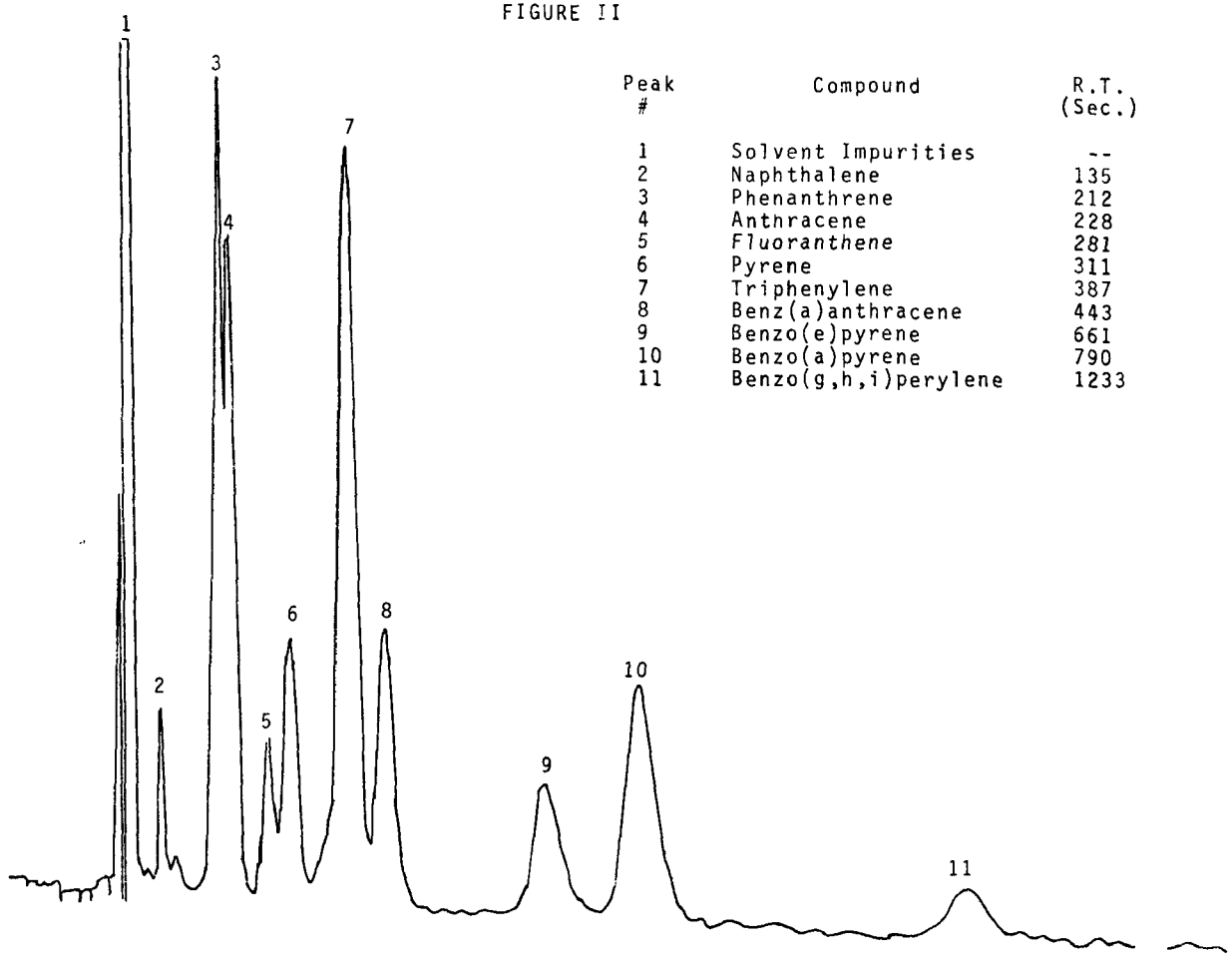
III. 20% Acetylated Cellulose TLC

20 x 20 cm, 1 mm thick plates of 20% acetylated cellulose plates are prepared. The samples are streaked at = 1.5 cm from the bottom, with a standard applied at one side of the plate. The plates are developed in a chamber containing 68% ethanol, 16% H_2O, and 16% toluene until the solvent front reaches up to = 1-2 cm from the top of the plate. The regions of interest are removed by vacuum and extracted with 3-10 ml portions of hot methanol. The methanol extracts are concentrated to a known volume (1 to 5 ml).

IV. HPLC

A 25 cm Vydac TP$^{(R)}$ reverse phase column is used with 80/20 methanol/H_2O at 30°C and 1 ml/min. ΔP = 1200 psig. A 5 µl loop is used to inject the sample and identification is based upon retention time. A calibration is made at least once a day, to correct for changes in temperature. A Perkin-Elmer detector @ 254 nm and a Schoeffel variable wavelength detector are used for quantitation. A typical calibration is attached. Figure II.

FIGURE II



Peak #	Compound	R.T. (Sec.)
1	Solvent Impurities	--
2	Naphthalene	135
3	Phenanthrene	212
4	Anthracene	228
5	Fluoranthene	281
6	Pyrene	311
7	Triphenylene	387
8	Benz(a)anthracene	443
9	Benzo(e)pyrene	661
10	Benzo(a)pyrene	790
11	Benzo(g,h,i)perylene	1233

APPENDIX C

CHEVRON RESEARCH COMPANY
RICHMOND, CALIFORNIA

DETERMINATION OF Cr^{+6} IN THE PRESENCE OF LARGE AMOUNTS OF Cr^{+3}

APRIL 1, 1974

Author - J. O. Larson

Due to recent EPA water quality requirements, the Process Design Division needed a reliable method for separating and determining 1-10 ppb of Cr^{+6} (chromate) in the presence of a hundredfold excess of Cr^{+3} (chromic) in refinery effluent waters. This report describes a method based on an ammonium pyrolidine dithiocarbamate (APDC) chelation of Cr^{+6} (leaving Cr^{+3} unreacted), extraction of the chelate with methyl isobutyl ketone (MIBK), followed by direct carbon rod atomic absorption analysis of the extract. The method is rapid (8-10 samples per day), has good sensitivity and accuracy (1 ppb $\pm$ 0.5 ppb), and shows remarkable selectivity (1 part Cr^{+6} in 2000 parts Cr^{+3}).

Sampling

Samples should be taken in 1-quart Teflon bottles, frozen, packed in Dry Ice, and shipped to Chevron Research as soon as possible. This is to prevent conversion of Cr^{+6} to Cr^{+3}. For the same reason, these samples must Not be acidified as in the case of sampling for other metals analyses. Presence of dissolved and suspended organic matter will accelerate this reduction in an acid medium.

Analytical Procedure

1. Bring the samples to room temperature and filter through a 0.45-micron Millipore filter if they appear turbid or if suspended solids are present.

2. Pour 200 ml of sample into a graduated 400-ml beaker. Add 10 ml of 1% APDC solution and mix.

3. Add the contents of one "pH-3 Hydrion Buffer" capsule (potassium phthalate and tartaric acid) and allow the powder to dissolve completely. Using a magnetic stirrer will speed the process.

4. Using the pH meter, adjust the pH to 2.5 by dropwise addition of 1:1 HNO_3.

5. Transfer the sample to a 250-ml volumetric flask, add 20 ml of MIBK, and shake well for three minutes. Set the flask aside for 10 minutes to allow the aqueous and organic phases to separate. Go onto the next sample.

Encl. - Table

6. Add sufficient demineralized water to the volumetric flask to force the MIBK (upper layer) to the top of the neck. The sample is now ready for atomic absorption measurement. If convenient, the sample solution is stable enough to stand overnight.

7. Prepare a reagent blank from 200 ml of 0.5 M NaCl solution and carry through Steps 1-6.

8. Likewise, prepare a 50-ppb Cr^{+6} check standard by addition of 1 ml of the Cr^{+6} standard solution to 200 ml of 0.5 M NaCl.

9. To determine the extent of recovery of Cr^{+6}, add 1 ml of the Cr^{+6} standard solution to 200 ml of one of the samples and repeat Steps 1-6.

10. The atomic absorption measurement is done by direct addition of 5 µl of the MIBK solution to the Varian-Techtron carbon rod atomizer. Typical instrumental parameters are as follows:

Dry: 6/30 Inject sample 10 seconds after start.

Ash: 7/30

Atomize: 8/3 Cool 2 minutes and inject next sample.

No Scale Expansion
Span: 10 µ
Slit: 100 µ

Chemicals and Equipment

1. pH meter and pH-4 Buffer solution (VWR 34179-200) for standardization of pH meter.

2. Magnetic stirrer, Teflon-coated magnetic stirring bars, and stirring bar retriever.

3. 0.45-µ Millipore filter and filter assembly.

4. pH-3 Hydrion Buffer powder (VWR 34175-060).

5. 400-ml beakers and 250-ml volumetric flasks.

6. Cr^{+6} standard solution. Pipette 1 ml of Harleco 1000-ppm Cr^{+6} standard solution into a 100-ml volumetric flask, add 1 ml of 1:1 HNO_3, and dilute to mark with demineralized water.

7. 1:1 HNO_3. Mix 50 ml of Baker Ultrex nitric acid and 50 ml of demineralized water.

8. 1% aqueous APDC. Dissolve 2 g of 1-pyrrolidine carbodithionic acid, ammonium salt (Baker U 712) in 200 ml of

demineralized water. Filter through No. 541 Whatman paper. Prepare fresh daily.

9. MIBK (Baker's Q879) 4-Methyl-2-Pentanone

10. 1 ml MLA Precision pipette and a 5 µl Eppendorf pipette.

TYPICAL RESULTS

	Sample	Found, ppb Total Cr	Found, ppb Cr^{+6}	Recovery of Cr^{+6}, %
1.	0.5 M NaCl + 1000 ppb Cr^{+3}		<1	
2.	0.5 M NaCl + 2000 ppb Cr^{+3}		<1	
3.	0.5 M NaCl + 250 ppb Cr^{+3} 250 ppb Cr^{+6}		247	99
4.	Outfall Canal	110	<1	
5.	Final Effluent	-	2	
6.	No. 5 + 50 ppb Cr^{+6}	-	52.6	101
7.	No. 4 Pond Effluent	1300	1.9	
8.	No. 7 + 50 ppb Cr^{+6}		50.4	97
9.	No. 4 Pond Effluent (H_2S)	36	<1	
0.	No. 9 + 50 ppb Cr^{+6}		30	60

CHEVRON RESEARCH COMPANY
RICHMOND, CALIFORNIA JOL
3-27-74

A P P E N D I X D

WET ASHING PROCEDURE[1] FOR As, Hg, AND Se

1. Preferably, new glassware should be cleaned with hot nitric acid followed by 1:1 nitric acid and deionized water rinses. The digestion apparatus should consist of a 500-ml two-neck flask, a distillation receiver equipped with two-way glass stopcock, an addition funnel, and a Friedrichs condenser. All joints should be lubricated with concentrated sulfuric acid.

2. Add 25 ml of sulfuric and 50 ml of nitric acid to the weighed sample in the digestion flask. Reflux the mixture until no more nitrous fumes are evolved. (More nitric acid should be added as required to maintain oxidizing conditions until all organic material is gone.)

3. The mixture is evaporated to sulfuric acid fumes and allowed to fume for five minutes, the distillate being collected in the receiver.

4. The mixture is allowed to cool. When cool, 25 ml of nitric acid is added dropwise; and the digestate is again taken to fuming sulfuric and fumed five minutes.

5. After cooling, the distillate is returned to the flask; and the mixture is refluxed for 15 minutes. The flask contents are again distilled, the distillate being collected in the receiver. Once cooled, the distillate is returned to the flask, the mixture is briefly refluxed, allowed to cool. The condenser and receiver are rinsed with deionized water.

6. The digested mixture is filtered through glass paper. The flask is rinsed with deionized water. This preparation is especially designed to recover arsenic, mercury, and selenium.

7. This mixture can be used for all the metal analyses except lead. Note the high acidity. Standards will have to be prepared in a similar acidic medium.

8. Water-insoluble metallic sulfates are left in the flask and glass paper. If these insoluble sulfates are dissolved in ammonium acetate solution, they may be made up to volume and used for lead analysis.

:clr

[1]ARCO - unpublished method.

Pub. 2015 A
First Edition
May 1975

A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning

A Supplement to API RP 2015
Cleaning Petroleum Storage Tanks

American Petroleum Institute
1801 K Street N.W.
Washington, D.C. 20006

Price: $1.00

1445

CONTENTS

0. Introduction

1. Scope and application

2. Organization for lead hazard tank entry and cleaning
2.1 General
2.2 Organization

3. Check list for lead hazard tank entry and cleaning
3.1 General
3.2 Check list of key points

4. Guide for use of lead-in-air analyzer
4.1 General
4.2 Precautions
4.3 Lead-in-air analyzer
4.4 Sampling location
4.5 Interpretation of results

5. Disposal of sludge
5.1 General
5.2 Methods
5.3 Weathering procedure

The data and methods described in this publication may be used by anyone desiring to do so, but the American Petroleum Ins shall not be held responsible or liable in any way either for loss or damage resulting therefrom or for the violation of any Fe state or municipal regulation with which they may conflict.

INTRODUCTION

: purpose of this guide is to provide information on potential hazards and the steps to follow to prevent ıecessary exposure of personnel when entering and ıning tanks which have been used for leaded petro-m products.

SCOPE AND APPLICATION

tanks which have been used for leaded petroleum ıducts will contain residual lead of varying concen-tions. They must be regarded as dangerous to the ent that respiratory and skin protection must be used il the tank is determined to be thoroughly cleaned safe for entry without personal protective equip-nt.

s guide outlines safety precautions and procedures controlling the lead hazard associated with entry l cleaning activities in storage tanks which have con-ıed leaded products. It does not cover specific fire :vention measures or control of other hazards not ated to the lead hazard problem.

s *intended to be used with* API RP 2015 *Recom-nded Practice for Cleaning Petroleum Storage Tanks* ich contains additional information related to asso-ted hazards. It should be regarded as a manual and : as an industrial standard.

is guide only relates to the following:

a) The company system for lead hazard tank entry and cleaning.
ı) The check list to be followed for tank entry and cleaning as related to the lead hazard.
c) The use of the lead-in-air analyzer.
d) How to dispose of sludge from leaded gasoline storage tanks.

ORGANIZATION FOR LEAD HAZARD TANK ENTRY AND CLEANING

General

ıch company should organize and maintain a system responsibility for lead hazard tank entry and clean-policies. Procedures should be established to pro-de controls within the company on tank entry and eaning activities for the purpose of:

a) Ensuring that only competent personnel are em-ployed.
b) Making certain personnel are familiar with the hazards, precautions and procedures.

2.2 Organization

Each company should have a firm, written, well-defined tank entry and cleaning policy.

Persons who have the direct responsibility to authorize the entry or cleaning of a leaded tank should know the proper tank cleaning procedures. No tank should be entered without their approval and a work entry permit.

3. *CHECK LIST FOR LEAD HAZARD TANK ENTRY AND CLEANING*

3.1 General

A check list which outlines safety precautions and procedures for controlling the lead hazards associated with tank entry and cleaning should be prepared. The items to be considered before, during and after a tank is cleaned should be reviewed and used as a guide by the personnel responsible for supervising safe tank entry and cleaning as well as by those who do the actual cleaning.

3.2 Check list of key points

3.2.1 *Review:*

a) Company policy regarding tank entry and cleaning.
b) Contract (if used) for cleaning work.
c) API RP 2015 *Recommended Practice for Cleaning Petroleum Storage Tanks.*
d) API PSD 2202 *Dismantling and Disposing of Steel from Tanks Which Have Contained Leaded Gasoline.*
e) API PSD 2207 *Preparing Tank Bottoms for Hot Work.*
f) ANSI Z88.2 *Practice for Respiratory Protection.*
g) ANSI Z117.1 *Safety Requirements for Working in Tanks and Other Confined Spaces.*

3.2.2 *Discuss safety precautions with supervisor*

Be sure the supervisor understands and knows:

a) The work entry permit procedure.
b) The difference between gas free and lead hazard free.
c) Why tank cleaners should wear proper clothing and equipment.
d) That the ventilation of a tank must be maintained continually.
e) That personnel must be properly trained and required to use respiratory protection equipment.
f) The safe location of a blower type air supply:
   1) Upwind.
   2) Away from manhole.

3) Away from sludge disposal site.

g) The need for continual surveillance of men in the tank.

h) How to avoid undue exposure at manhole by men outside of tank.

i) The safe handling of sludge.

j) The requirement that men must wash before eating and smoking.

k) That men must bathe and change clothing at end of each day's work—or immediately if wet and dirty with sludge

l) The cleanup requirements for personal protective equipment and tools.

m) The things to avoid during progress of work.

1) Removing face piece while in tank
2) Removing gloves
3) Twisting hose.
4) Wet sludge on clothing.
5) Blower type air supply unattended
6) Handling of sludge and equipment removed from tank by outsiders without gloves.
7) Hose left in tank or outside and dirty overnight.
8) Entry to tank by anyone for any purpose without protective equipment before tank is thoroughly cleaned and is lead hazard free
9) Poor housekeeping.

3.2.3 *Discuss personnel with supervisor*

a) Are they sufficient in number?

b) Do they have experience?

1) Have they cleaned tanks?
2) Have they worked while wearing masks?

c) Are they in good physical condition?

d) Are they trained to use respiratory protective equipment?

3.2.4. *Describe tank*

a) Tank number.
b) Capacity
c) Size.
d) Location.
e) Type roof.
f) Coated bottom or sides.
g) Location and number of manholes.
h) Date of last cleaning
i) Tank history; types of products stored.

3.2.5 *Discuss reason for cleaning*

a) Repairs—note whether hot work is required.
b) Change products.
c) Routine cleaning.
d) Inspection.
e) Dismantling—note whether hot work is required.

3.2.6 *Discuss sludge disposal*

a) Select the method

1) Weathering.
2) Burying.
3) Other.

b) Select a site according to company rules.

3.2.7 *How to prepare the tank*

a) Remove all hydrocarbon possible through existing connections.

b) Remove any sources of ignition from the area.

c) Blank off all lines to tank.

d) Lock out mixer (if there is one).

e) Remove manhole cover on side and/or roof after it has been determined that vapors will disperse safely.

f) Remove balance of hydrocarbon through manhole or water draw-off.

g) Ventilate tank.

3.2.8 *Arrange for tools and equipment*

a) Approved pump for removing sludge and liquid from tank—check on fire and explosion-proof drive, switches, etc.

b) Shovels.
c) Brooms.
d) Scrapers
e) Squeegees
f) Buckets.
g) Rags or drying compound

3.2.9 *Arrange for personal protective equipment*

a) Clothing (from skin out as needed for weather condition)

1) Quantity (depends on length of job and number of men used in tank and handling sludge and equipment outside of tank).
2) Clean clothes for each shift with spares to change to if needed.
3) Underwear, socks, caps and coveralls.
4) Gloves (gauntlet)—impervious to gasoline.
5) Boots—impervious to gasoline.
6) Location of shower facilities—if remote, how are personnel transported?
7) Location of cleanup facilities.

b) Air-supplied respiratory protective equipment.

1) Approved type.
2) Full face piece masks and hose, clean and in good working condition.
3) Respiratory protection for each man in tank
4) Ample supply of breathing quality air and sufficient hose for each man to reach farthest point in tank.
5) An extra complete set of air-supplied equipment for emergency rescue use.
6) Each hose connection properly made up (tight

and washer in place).
7) Harness and safety line (when required) for each man in tank.

.10 *Discuss tank entry*

a) Check work entry permit procedure—be sure it s available and followed.
) Check to be certain gas test has been made as er API RP 2015, *Recommended Practice for Cleanng Petroleum Storage Tanks.*
) Check men for proper attire.
) Check breathing air supply.
1) If blower type air supply pump is used, check wind direction and locate up wind. Check wind direction frequently and change pump location if wind direction changes.
2) If air is supplied from cylinders check to make sure it is breathing quality air (do not use oxygen).
) Put on air mask and check for seal—note beard rowth, glasses, etc.
) Check each man for sufficient air.
) Check for odor coming through mask.
) Check for compliance with all safety regulations.
) Assist men through manhole.
) Watch air line hose and (when used) safety line o keep free and untwisted.
) Assign observer and review his duties.

.11 *Inspect tank*

) Wear protective attire and use air-supplied resiratory equipment.
) Make a thorough visual inspection.
) Check these four conditions:
1) Has all sludge been removed?
2) Have all loosely adherent material been removed from the portion of the tank that has been in direct contact with the sludge?
3) Is the tank essentially dry and free of liquids?
4) Be sure the tank does not contain absorbent material such as wood or concrete (see section 4.5.2).

.12 *Analyze lead-in-air*

sure a qualified individual understands:

a) The use of proper sampling procedures (see section 4).
1) After tank inspection.
2) The method of sampling.
) How to interpret results.
c) The need to clean up lead-in-air equipment and dispose of reagent containers.

.13 *Clean-up*

At end of day or job:

a) Join air line hose ends to prevent interior contamination.
b) Wash exterior of air line hose thoroughly with soap and water.
c) Wash and sanitize face pieces.
d) Wash and thoroughly flush sludge pump and hose.
e) Wash all tools.
f) Dispose of dirty water with sludge.
g) Scrape ground around manhole and dispose with sludge.
h) Wash boots and gloves with kerosene and then water.
i) Shower and change clothes.
j) Launder clothes used during tank cleaning separately (not with other clothing). Clothes wet with sludge should be rinsed in kerosene, then in soap and water before laundering with other tank cleaning clothes.

4. GUIDE FOR USE OF LEAD-IN-AIR ANALYZER

4.1 General

Before making a lead-in-air test, the tank must be cleaned, dried and ventilated in accordance with applicable provisions of API RP 2015 *Recommended Practice for Cleaning Petroleum Storage Tanks.* The use of the analyzer is a supplement to the visual inspection of the cleaned tank. It should be used only after all the necessary steps have been completed to clean the tank. At this point the analyzer is used to measure the lead-in-air concentration in the tank to determine if people can enter without respiratory protective equipment.

The person making the lead-in-air test must wear recommended attire and air-supplied respiratory equipment with a full face piece mask as prescribed in API RP 2015.

4.2 Precautions

Do not use a lead-in-air analyzer to determine if a tank has been in leaded service. A tank which has had a history of leaded service or has an unknown history since previously being declared lead hazard free will always be considered a lead hazard tank until:

a) The tank has been cleaned and all sludge removed.
b) Loosely adherent materials have been removed from the portion of the tank which has been in direct contact with sludge.
c) The tank is essentially dry and free of liquids or puddles.

d) A satisfactory lead-in-air analysis has been obtained after the above three steps have been completed, showing the lead-in-air concentration to be within the prescribed limits shown in section 4.5.

Samples for lead-in-air analysis should not be taken while forced ventilation is being used, since an analysis at such time will be diluted and not reflect the most severe conditions that would be encountered during work.

Do not enter a tank for the purpose of taking a lead-in-air sample until the tank is gas-free.

4.3 Lead-in-air analyzer

The analyzer which is used to measure the concentration of lead-in-air should be capable of determining the organic lead content of the tank atmosphere.

The operating instructions to be followed when using a lead-in-air analyzer should be those recommended by the equipment manufacturer with special emphasis being given to its proper operation each time before use.

4.4 Sampling location

In order to obtain representative samples of the atmosphere within the tank, samples should be collected while operating the analyzer and walking near the inside periphery of the tank and diagonally across the tank.

Always collect at least two samples which should be in close agreement before interpreting results. If the two sample results do not agree, collect a third referee sample.

4.5 Interpretation of results

The current standard under the Occupational Safety and Health Act of 1970 (Subpart G, 1910.93; Table G-1) or as amended, limits personnel exposure to organo lead compounds to 0.075 mg/m^3 (2 ug/ft^3) time weighted average on any 8 hour shift in a 40 hour week. The following table can be used to determine permissible exposure times for men working in tanks without respiratory equipment provided conditions outlined above have been satisfied and the tank has been thoroughly ventilated.

Permissible Exposure Times Based on Values Given in Table G-1, 1910.93, Occupational Safety and Health Standards, 1974—0.075 mg/m^3

Analyzer Results (ug/ft^3)	Time Allowed in Tank per Day
2	8 hr.
3	6 hr.
4	4 hr.
8	2 hr.

The above criteria applies to the lead hazard only a is without regard to other hazards which may be pr ent It must be emphasized that the tank is lead haz free only for the conditions described above and d not apply when:

a) Surfaces of the tank which have been in cont with the leaded material are to be heated above normal temperature as with cutting, burning, we ing or steaming unless all iron rust, scale or ot foreign material have been removed from the ar to be heated.

b) The tank contains absorbent materials which n continue to release lead.

c) There is apparent evidence of a leaky bottom this is the case, frequent lead-in-air analysis sho be made to insure safe conditions throughout the j

d) Conditions in the tank change. Should this occ repeat lead-in-air analysis to ensure safe conditi are present.

5. DISPOSAL OF SLUDGE

5.1 General

The residue remaining in leaded gasoline storage tar after all recoverable gasoline has been removed, c sists of a liquid phase and a solid phase. The lic phase is primarily water and a small quantity of hyc carbons which readily float on top of the solids. efficient recovery of gasoline from the storage tan necessary to minimize the amount of hydrocarbons c tained in the liquid phase. This liquid phase can t be disposed of as waste water in a manner consist with current industry practice.

The solid phase is a mixture of insoluble deposits v ted with water and hydrocarbons containing orga lead. This mixture is referred to as sludge.

5.2 Methods

Two methods are commonly used for disposing sludge from leaded gasoline storage tanks. They 'burying' and 'weathering.' Both methods are rec nized by API RP 2015 *Recommended Practice Cleaning Petroleum Storage Tanks.* Thermal meth are effective but not commonly used because incin tion equipment is not always available.

a) *Burying*—In this method a pit is dug. The slu is dumped into the pit and then covered with on two feet of fresh earth. This area should be adequ ly marked so that no one inadvertently uncovers buried sludge. Experience indicates that buried ganic lead compounds decompose slowly. If a d or trench is dug through the sludge pit, organic l compounds may be uncovered.

b) *Weathering*—This method is safe, effective economical. Laboratory tests show that organic l

compounds in sludge, when exposed to the elements, will decompose to inorganic lead compounds. Laboratory and field tests indicate that when the procedures, as outlined in the prescribed method are followed, there has been no air, soil or water contamination problem.

The reason for this is indicated to be:

1) The total quantity of organic lead in a sludge weathering bed is small. Concentrations rarely exceed the normal range of 0.1 to 0.4 pounds of organic lead per ton of sludge.
2) The amount of organic lead exposed to the atmosphere at the surface of the weathering bed is very small. Lead-in-air tests taken directly above or immediately downwind of the weathering bed indicate that lead-in-air concentrations are low. This indicates that the atmosphere in the area is safe from an occupational health hazard as soon as the sludge is spread.
3) Organic lead compounds are dissolved and held in the liquid hydrocarbon fraction of the sludge and and do not migrate into the soil or ground water.

Weathering procedure

cation of disposal area:

a) The site selected for sludge disposal should be in an area where it can be fenced off from the public. It should be located away from buildings and be far enough from the tank being cleaned so that the possibility of gasoline vapor affecting the tank cleaning operations is eliminated.
b) The disposal area should be located so that personnel working in, on or around the tank will not walk in the spread out sludge.
c) The disposal area can be a bare ground, grass or concrete surface.
d) The area must be fairly smooth and well drained so that water will not stand on it.
e) The location should be remote from streams or rivers.
f) The total area, whether in one or several patches, must be sufficiently large to permit spreading the sludge in a layer not over three inches thick. The total area required will be determined by the amount of sludge in the tank.
g) It should be so located that air can circulate freely over the surface of the sludge. Exposure to the sun is desirable but not necessary.

Remove sludge from the tank in the usual manner following the safety recommendations contained in API RP 2015, *Recommended Practice for Cleaning Petroleum Storage Tanks.*

The sludge can be moved from the tank to the spreading area by wheelbarrows, buckets or other small containers. Dump trucks, lugger buckets, etc., may be used for longer distances. All containers used should be made of metal. After use, they should be washed thoroughly with water.

The sludge can be spread with hoes, rakes or shovels. It should be spread as uniformly as possible to a maximum thickness of three inches. If the area permits it, a thinner spreading is desirable. After use, hoes, rakes or shovels should be washed thoroughly with water.

Personnel handling and spreading the sludge should be dressed in protective clothing as recommended for tank cleaning. Respiratory equipment will not be necessary unless there is very little air movement (0 to 5 mph). If respiratory equipment is necessary, it can be full-face canister type (approved for organic vapors).

After the spreading is completed, the sludge patch or patches should be roped off and marked so that no one will walk through or stand in the sludge.

While sludge will normally weather within four weeks when the sludge temperature is above 0°C (32°F), lead-in-sludge tests should be made before declaring it free of the lead hazard. If after the four week weathering period the organic lead content is 20 parts per million or less (0.002 weight percent) as determined by lead-in-soil analysis, the sludge from an organic lead standpoint may then be treated as any other nontoxic industrial waste material Signs and fences may then be removed.

Order No. 800—2015A

3M—May 1975

THE CHAIRMAN: Thank you. We have a question.

Mr. Lindsey?

MR. LINDSEY: Yes, sir. We are quite interested in the weathering process that you discussed and that we have heard about from other people from the Petroleum Institute in other cities.

If possible, could you make data available to us on the study which you undertook on which you base your statement here for the record?

MR. KNOWLTON: If you put a question in writing, we will be glad to give you a written answer on the question.

MR. LINDSEY: Okay. I will do that right after the session.

One other question. You indicated in one statement here, I think on Page 7, "We feel that the generator, the treater, and the disposer should each be responsible for all facets of employee training to insure compliance . . ." and so forth.

Do you see a permitting system for either generators, treaters and/or disposers in order to accomplish this or to be sure that this is being done? How do you see that?

MR. KNOWLTON: To be very honest with you, I do not think we addressed that question in our discussion.

If you look back further, I think the definition of the responsibility of the various people are covered under Discussion Topic 2, I believe.

THE CHAIRMAN: All right. I had a question.

MR. KNOWLTON: Sure.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

THE CHAIRMAN: On your testimony on Page 4 you say, "The disposer should be responsibile for maintaining records of wastes received and disposal techniques employed, for obtaining an operator's license, and for complying with applicable emission regulations."

What if the generator is also the disposer?

MR. KNOWLTON: In many cases in the petroleum business we would expect that to be true, and we would expect to maintain the applicable records.

THE CHAIRMAN: Well, I am also referring to obtaining an operator's license and so forth, and complying with that. In other words, in your view would the same rules and regulations and requirements for licenses and so forth apply to on-site disposal as well as off-site disposal at some contractor's facility?

MR. KNOWLTON: I am a member of a committee. I would think in all fairness the answer would be "yes." The answer would be "yes."

THE CHAIRMAN: All right.

Mr. Kovalick.

MR. KOVALICK: With regard to your statement where you describe the sets of requirements that a responsible generator -- starting on Page 3 and 4 -- the responsible generator, the responsible treater should follow, we have had a similar statement in at least one of the other cities, as I

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

recall. And I would like to ask you the same question I asked those individuals: Given that contract document with which this is all constituted as a legal one -- and, of course, not everyone is as responsible as they might -- what is to prevent waste from not entering one of the links in the system?

That is, suppose that the generator did his responsible part and the transmitter did his responsible part, but that the waste never reaches the ultimate treater -- or move back a link and we talk about the midnight dumping or other kinds of irresponsible disposal.

I guess what I am really interested in is your comment on the manifest system that California uses, which I gather from Dr. Collins' comments this morning which he feels partially addresses that issue.

Does the API have a position on the manifest issue?

MR. KNOWLTON: As of this moment, I would have to say no. If you would like us to give you our opinion, I would be glad to do so.

MR. KOVALICK: Fine. I would appreciate that.

Could I ask some more questions?

MR. KNOWLTON: Sure.

MR. KOVALICK: On Page 5 you say that, "Obviously, all wastes should be disposed of in an environmentally acceptable manner." And then you describe the fact that some of those environmentally acceptable processes are more expensive.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

And I was wondering what your feeling was on how you motivated individuals to adopt those more expensive methods, given that they are desirable?

MR. KNOWLTON: I would say that if two methods are both environmentally acceptable, we should use the less expensive method. Because the consumer obviously is ultimately going to pay the costs of the disposal.

MR. KOVALICK: But what are you recommending to at least get the least expensive one adopted to prevent environmentally unacceptable methods?

MR. KNOWLTON: I think that in our industry we are responsible people, and we will follow all the rules. That is my answer to you. And I have seen no indication that that is not true.

MR. KOVALICK: I was not speaking necessarily of your industry. I mean how does one motivate people to take the higher cost option without some kind of guidance or some kind of a program that Dr. Collins described here today?

MR. KNOWLTON: Once again, if the higher cost option is the only option that is environmentally acceptable, then I would assume that your permit system -- the man has no choice. But obviously if you have an option -- obviously, incineration versus land spreading as we see it, incineration is much more expensive in our opinion, and it also is least effective. And we would like to use the one that does the job best at the least

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

cost.

MR. KOVALICK: One more clarification, Mr. Chairman.

I was reading along with you when you were reading your statement with regard to training on Page 7, and you indicated that there are abundant industry publications outlining recommended safety and security procedures for the treatment, storage and disposal -- and your statement says in writing, "hazardous materials." But you said, "wastes." You meant to say "materials"?

MR. KNOWLTON: I meant to say "materials," right.

MR. KOVALICK: There are extensive materials available on hazardous wastes.

MR. KNOWLTON: Right.

THE CHAIRMAN: Mr. Lazar.

MR. LAZAR: Mr. Knowlton, you mentioned that the proper and effective government rule should be to set minimum standards and to monitor activities as necessary to protect the health and welfare.

In your opinion, should the monitoring activities be done only by the government, or do you believe that industry should do a part or all of it?

I am thinking of such things, for example, as monitoring the ground water at the on-site disposal sites, for instance.

MR. KNOWLTON: When we use the word "monitor activities," we did not have in mind the government actually running leachate

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

monitors in a land spreading operation. We had in mind the same type of monitoring activity that you do in the solid waste office where you monitor by reports coming into you. And if you wish to sample on occasion, sure. But the actual job being done by the waste disposer himself.

MR. LAZAR: But what about in the case of, let's say, an on-site disposal, would you say that the generator should assume the expenses of monitoring to prove that nothing has been done to harm the environment?

MR. KNOWLTON: I would say that we would assume presently today in the waste water system we assume the cost of monitoring our waste water.

I assume in this particular case, in solid waste treatment facilities, we would assume the cost of monitoring those waste treatment facilities.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: We have spent much time puzzling as we have been at these meetings over the kinds of guidance, and that led to the kinds of discussion topics. And the sense I got from your statement was that we should leave as many technology options open as possible to the generator of wastes so that they can properly choose an economically feasible one that is also environmentally acceptable.

I was following that drift of argument, and then I got towards the close of your statement. And if I can quote

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

that -- Page 8 -- "Regulations should be developed designating a reasonable timetable for the phase-out of environmentally unacceptable waste disposal practices."

I was just curious if you could elaborate on that a little bit.

Are you saying that certain kinds of treatment and disposal processes ought to be identified as environmentally unacceptable, say, perhaps for certain kinds of wastes and therefore -- you see, that is a little more specific than the initial testimony that I thought you were giving. I am a little confused.

MR. KNOWLTON: I would like on this particular one to return you an answer after discussing this with the other members of the committee.

As you might recognize, this statement is prepared by committee, and this particular item I am not that familiar with.

MR. KOVALICK: All right. But is my question clear, though, from that point of view, in terms of not specifically addressing particular waste streams or specific technologies. And this would seem to be back on that point.

MR. KNOWLTON: All right.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: I have a question from the audience.

Isn't it true that your recommended practice of spreading TEL -- tetraethyllead -- depends on volatilization of organic

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

lead followed by subsequent oxidization in the atmosphere to the inorganic form and then precipitation?

Is that true?

MR. KNOWLTON: There is one item left out. There is the photochemical reaction process which takes place within minutes of spreading the material on the ground which separates the lead from the hydrocarbon.

I would be happy to give them a written statement in detail which we will stand behind.

THE CHAIRMAN: All right. Any other questions?

Thank you very much.

MR. KNOWLTON: Thank you.

ıerican Petroleum Institute
)1 L Street Northwest
ıshington, D.C. 20037
2-457-7000

. W. Umstead
202) 457-7084

January 30, 1976

:. John P. Lehman
:fice of Solid Waste Management Programs
.S. Environmental Protection Agency
ıshington, D.C. 20460

ear Mr. Lehman,

Your letter of December 22, 1975 raised two questions regarding ıe text of the American Petroleum Institute - Western Oil and ıs Association statement presented before EPA at the December 11, 975 meeting held in San Francisco on Hazardous Waste Management.

We agree that the sentence in question in our discussion of opic 16 is inconsistent with the position advocated earlier in ıe text concerning emission regulations. Enclosed is a revised age 8 to replace pages 8 and 9 of the statement submitted in an Francisco.

Also enclosed, in response to your question on weathering/land oreading, is a paper entitled Assimilation of Oil By Soil Bacteria ıich includes technical information on the weathering/land oreading process.

Sincerely,

W. W. Umstead

VU:lab

nclosures

c: K. E. Blower
H. E. Knowlton
K. C. Hunt

TEXT CORRECTED

1461

equal opportunity employer

ASSIMILATION OF OIL BY SOIL BACTERIA

R. L. Raymond, J. O. Hudson, and V. W. Jamison
Sun Ventures, Inc., Marcus Hook, PA

recommendation of wide-spread use of the soil disposal process we must determine if residues remain in the soil and if so, their consequences to the environment.

Probably the most extensive study of application of oils to soil was that reported by C. B. Kincannon (3) at the Shell Oil Company refinery at Deer Park, Texas. He reported rates of degradation of the order of 70 bbls/acre/month for crude oil tank-bottoms, a fuel oil (Bunker C), and a waxy raffinate. Bacterial assimilation was assumed to be responsible for the oil's disappearance, but the increased number of microbial populations observed were not shown to be hydrocarbon-utilizing bacteria. Very high initial concentrations of oil (10%) in the test plots and lack of data on quantities of the various oils added makes it difficult to draw any conclusions as to levels of non-biodegradable residues which remained at the conclusion of this study.

In a more recent publication, Francke and Clark (2) state that "a biological assimilatory process for the disposal of plant oil waste products has been successfully demonstrated." The process to which they refer involves adding used crankcase and vacuum pump oils to fairly large experimental field plots (0.088 acres) in Oak Ridge, Tenn. They, like the Shell study, depended upon the natural soil flora to degrade the oil. They did not demonstrate with the microbiological techniques employed a direct relationship between oil degradation and hydrocarbon-utilizing bacteria. For a three-month period they calculated a degradation rate of approximately 100 bbls/acre/month with approximately 40% of the applied carbon being degraded at the end of that period. The length of study period reported does not permit any evaluation of possible residue levels.

Studies in colder climates have been reported by Cook and Westlake (1) and Parkinson (6). Parkinson, working with Artic terrestrial ecosystems, found that spilling a crude oil (Norman Wells, N.W.T.) stimulated the microflora but he did not distinguish between non-hydrocarbon and hydrocarbon-utilizing microorganisms. It was concluded that addition of nitrogen and phosphate speeded up the utilization of the alkane fraction of the crude oil which had been spilled on the soil. The overall degradation of the crude oil cannot be deduced from the data reported. In more extensive studies Cook and Westlake determined the influence on degradation of such factors as fertilizer and oil-utilizing bacteria application to field plots in the Norman Wells area of the Northwest Territories and in the Swan Hill area of north central Alberta. Applications of the crude oils obtained from wells in these areas were made at a rate of 170 bbls/acre (60 l per 9 sq.m.).

ASSIMILATION OF OIL BY SOIL BACTERIA

R. L. Raymond, J. O. Hudson, and V. W. Jamison
Sun Ventures, Inc. P.O. Box 1135
Marcus Hook, Pa., 19061

INTRODUCTION

The removal of oil that has been accidently or purposefully spilled into the environment is of great concern to the petroleum industry. The present study was undertaken to develop ecological background data which would give a better understanding as to ways in which biodegradation might be speeded up and to determine what might be the environmental consequences of oil disposal in soils in the United States.

The literature on the subject of microbial assimilation of petroleum and it's products is quite voluminous. Because it has been reviewed so frequently in the past few years, we shall take the liberty of citing only a few recent papers which we consider most pertinent to oil degradation in soils.

Before doing this, however, we would like to point out several areas of concern to experienced microbiologists in the petroleum industry relative to microbial assimilation of hydrocarbons. It seems to us that there is a lack of appreciation on the part of many microbiologists and engineers for the complexity of composition of petroleum. The seemingly facile microbial utilization of "simple" substrates such as alkane cuts used to produce single cell protein or a paraffinic crude from Louisiana cannot be assumed for a Bunker C fuel oil or a heavy asphaltic crude. Microorganisms have a high degree of specificity for substrates. Each species is usually very limited in the type of compounds which can be utilized for growth. Another area of concern is the lack of understanding of the nature of the environment in which microbial systems function. The rate at which a single species may grow on hexadecane in an isolated environment such as a fermentor or shaken flask, may be orders of magnitude faster than having that same microorganism mixed into the complex environment of soil. It is imperative that the above factors be taken into consideration. From our viewpoint, this means extensive examination of the degradative process of the many different types of petroleum under as well defined field conditions as possible. Before

industrial sources could influence the microbial populations at all three locations. In the year prior to the test the Marcus Hook and Corpus Christi locations had very heavy weed cover. The Tulsa site had a very heavy Bermuda grass cover.

Oil Chracterization, Application and Tilling. As shown in Figure 1, six oils were selected for study. Properties of these oils are given in Tables 1, 2 and 3. The oils were poured from five gallon cans onto the leveled plots, lightly raked into the surface with the results shown in Figure 2. The oils were then incorporated into the top four to six inches of soil with a rototiller. The equipment used at Tulsa, shown in Figure 3, was a Howard Rotovator manufactured by Rotary Hoes, Limited. West Horn, England. It was necessary to use smaller but similar equipment at Corpus Christi and Marcus Hook for incorporation and tilling. All plots at Tulsa and Corpus Christi were tilled once a month for the first three months, followed by tilling at three month intervals for the remainder of the project life. At Marcus Hook it was not possible, due to frozen soil, to till in January and February. Additional tilling was carried out in March, April and May so that the amount of cultivation was equal at all three sites.

Runoff and Leachate Water Collection. Before application of oils a hole was drilled in the center of each plot to accomodate a quart bottle holding a funnel filled with glass wool (Figure 4). This collector was positioned and covered with soil so that the top of the funnel was approximately one foot below the soil surface. Water was removed from these bottles with a syringe or hand vacuum pump.

The runoff water collectors were five-gallon plastic tubs positioned about five feet from the center of the plot, six inches below grade (Figure 5).

Analytical Methods. Residual oil remaining in the soil was determined on a composite sample taken from five locations in each plot. Immediately following sampling, samples (2-3 kilograms each) were shipped by air from the Tulsa and Corpus Christi sites to Marcus Hook. In theory, the shipping process should not have taken more than sixteen hours, but in practice delays after turning the samples over to the airlines resulted in most deliveries taking from 24-72 hours. Samples from the Marcus Hook site could be processed almost immediately. Samples were held at 4°C if delays were encountered. Once the samples arrived at

This rate produced significant increases in the microflora but no effort was made to assess what fraction of the total were hydrocarbon-utilizing types. Chromatographic separations of recovered oils indicated that extensive degradation of the alkane fractions was taking place but no data were given for quantities of residual oil remaining with time. They concluded from the chromatographic data that fertilizer speeded up degradation. They also suggested that application of oil-utilizing bacteria to the natural flora was beneficial.

Odu (4) reported that the microbiological activity of a sandy sedimentary well-drained soil in Nigera was enhanced by an oil spill that resulted from a blowout of an oil well. No indication was given as to proportion of hydrocarbon-utilizing flora present in those enumerated.

In the work to be described below we have attempted to define the magnitude of the stimulation of the specific hydrocarbon-utilizing flora in the soil following the addition of six different oils to small field plots. The ultimate goal is to determine if residues remain which are harmful to the environment.

MATERIALS AND METHODS

Field sites. A location on or near refinery property was chosen in Marcus Hook, Pa., Tulsa, Okla., and Corpus Christi, Texas. The layout of the experimental plots as shown in Figure 1 was the same at each location. Following plowing and discing, soil samples were taken and submitted to Penn State University Soil and Forage Testing Merkle Laboratory, and the Texas A&M University Agricultural Extension Service for determination of soil nutrient levels. Limestone and gypsum were added at Marcus Hook to correct a low pH. The fertilized plots at Marcus Hook received a 10-5-5 (N:P:K) mixture at a rate of 3000 lbs/acre. At Tulsa the fertilized plots received a 10-20-10 mixture at a rate of 6000 lbs/acre. The Corpus Christi plots had sufficient phosphorus, potassium, and a satisfactory pH necessitating only the addition of 6000 lbs/acre of ammonium sulfate to the fertilized plots.

All sites were chosen with the intent of using land that probably had in the past been under cultivation or grazing and had not been exposed to intentional petroleum hydrocarbon contamination. It was recognized, however, that air contamination from automobile and

the laboratory they were thoroughly mixed and aliquots removed for biological analyses. The remaining soil was then dried at 105°C and sized through a ten-mesh screen. A 50 gram aliquot was extracted as follows: the soil and 100 ml of reagent grade benzene were heated to boiling in a 400 ml beaker containing a Teflon coated stirring bar; the mixture was permitted to settle and the benzene decanted off; the above procedure was repeated three times with 50 ml aliquots of benzene; the benzene extracts were combined, reduced in volume by evaporation, centrifuged to remove sediment and the residual benzene removed carefully on a warm steam table.

Residual oil determinations in run-off and leachate waters were carried out using the procedure for oil and grease given in "Standard Methods for the Examination of Water and Sewage, 13th Edition 1971."

After extraction for residual oil the leachate waters were exhaustively extracted with diethyl ether to recover water soluble organic compounds.

Metal analyses were carried out using emission spectroscopic or atomic absorption techniques on 10% nitric acid solutions. For soils, this involved boiling ten grams of benzene extracted soil with 25 ml of 10% nitric acid for one hour with stirring. Water samples were reduced to dryness and dissolved in 25 ml of 10% nitric acid.

Silica gel fractionation of oils was carried out by the following procedure. Silica gel (Davison Co.) 100-200 mesh, was activated prior to use at 150°C overnight. Glass columns (18 cm in length and 9 mm in diameter) were filled with 9 grams of activated gel. A 30 to 50-mg portion of the residual oil, dissolved in 5 ml. aliquots of the solvents being used as eluants, was placed on the column prewet with 3 ml. of n-hexane, and the column was eluted successively with 15 ml. each of n-hexane, carbon tetrachloride, benzene, and methanol. The fractions eluted by each eluant were collected separately, and like fractions of the same sample were combined. The fractions were recovered by blowing to constant weight at 40°C.

Microbiological Methods. Ten gram aliquots of soil were shaken in 90 ml distilled water blanks and appropriate dilutions made for enumeration of the hydrocarbon-utilizing population by the spread plate

technique. Two different media were used. For bacteria, a basal mineral salts medium described previously (6) was modified by substituting ammonium nitrate for ammonium sulfate. For enumeration of hydrocarbon-utilizing fungi and yeast the following agar medium was employed: K_2HPO_4, 1.0g; $NaNO_3$, 3.0 g; $MgSO_4 \cdot 7H_2O$, 0.5 g; KCl, 0.5 g; $FeSO_4 \cdot 7H_2O$, 0.01 g; penicillian G, 0.05g; chloroamphenicol, 0.5 g; streptomycin, 0.025 g; agar, 20.0 g; in 1,000 ml of distilled water. The antibiotics were added as filter-sterilized solutions to the autoclaved, cooled agar medium. The pH was adjusted to 4.0 with concentrated HCl after antibiotic addition. Hydrocarbon substrates were placed on filter paper discs in the lid of the petri dishes.

RESULTS

Incorporation of the oils was accomplished without difficulty at all three locations except for residual fuel oil (#6). This oil was very viscous and was not readily adsorbed into the soil at any of the three sites as is shown in Figure 6. After rototilling it was distributed in the plots as hard black lumps (1-2 inches in diameter). With each succeeding tilling these lumps became smaller, breaking up into light brown friable balls. It was still possible, after one year, to find small discrete lumps in the plots treated with this oil. At the application rate of 100 bbls/acre the other oils changed the appearance of the soil only slightly. When compared in the laboratory with the control soils, the soils from the plots containing used crankcase oil from diesel trucks and the Arabian Heavy crude oil were perceptibly darker in color. The characteristic odor of all six oils could be detected in the sample bags of soil up through the ninth month of the field trials.

The data for residual oil concentrations and the microbial responses at three month intervals after application of oils in November and December 1973, as measured by growth on different hydrocarbon substrates, are shown in Figures 7-12. In these figures the results shown were derived from averages of data from all the plots treated with similar oils, i.e., in Figure 7 the initial concentration of used crankcase oils (32 g/kg soil) at Marcus Hook resulted from an average of the concentrations found in the soil from fertilized and unfertilized plots treated with used crankcase oil from cars and trucks (4 plots). Similarly the concentration of microorganisms found in the soil after an interval of three months which could use n-hexadecane as a growth substrate, result from combining the data from the two control plots to give an average value of $\sim$900,000/g

and the four crankcase oil-treated plots an average value of 10,000,000/g. Data for the oil-utilizing fungi have not been shown due to the lack of difference between numbers in control and treated plots. Colony forming units of fungi were generally in the range of 5,000-10,000/g soil for each of the hydrocarbons employed as substrates.

The data in Figures 7-12 indicate that microbial degradation was occurring but significant quantities of these oils were still present after one year. The magnitude of this degradation is shown in Table 4. The lack of significant differences in the degree of degradation between the cooler Marcus Hook site and the warmer Corpus Christi site seems to indicate that termperature was not a factor. There is some indication that the heavier tilling equipment used at Tulsa may have contributed to somewhat better degradation at this location.

Changes in the microbial populations as the result of the oil additions are illustrated in Figures 13 and 14. In the top photograph of Figure 13, a soil sample has been plated on a mineral salts agar and incubated for 30 days over home heating oil (#2). These colony types were typical for all three sites in November and December 1973 before any oil had been applied. The middle and bottom photographs illustrate the large increase in numbers by April 1974 of a relatively minor population as the result of adding the home heating oil to the plots. Typical microbial responses to the addition of Arabian Heavy crude and residual fuel (#6) are shown in the middle and bottom photographs of Figure 14. The top and middle photographs illustrate typical paraffin-utilizing colony development as determined by a plating technique employing n-hexadecane as the only carbon source.

Results of analyzing the run-off and leachate waters at Marcus Hook for oil are shown in Tables 5 and 6. Using the rototilling method of incroporation, it does not appear that application at a rate of 100 bbls/acre results in loss of oil through the water route. Comparable results for run-off waterwere obtained at Tulsa. Collectior of run-off water was not accomplished at Corpus Christi and the leachate collection system was unsatisfactory at both Tulsa and Corpus Christi.

The data in Table 7 probably indicate that acidic organic water soluble compounds were formed as the result of oil degradation. These compounds are now under study.

The fate of lead present in the used crankcase oils at the three sites is shown in Tables 8, 9, and 10. The lead apparently does not

move with the water systems but stays fixed in the oil or soil phase. At the present time we have no explanation for the differences at the three locations in concentration of lead in the extracted oils. We have recently carried out a depth study in an attempt to determine if there was any physical movement of lead and the results are shown in Table 11. We conclude there is no downward movement.

Other Biological Effects. One of the primary goals of this research was to determine if residual oils do remain in the soil and, if so, what effects they may have on other biological systems. We employed two systems in an attempt to evaluate these effects. In one case we measured the concentration of free-living nematodes in the soil. Generally, we found significant reductions in these populations as the result of the oil application. Further work will be required to establish if this is a long-lasting effect.

The second method of evaluating residual effects involved planting vegetables in the experimental plots. Here, as above, significant phytotoxic effects were noted when seeds of radishes, beans and turnips were planted ten months after application of the oils; but long-term residual effects cannot be predicted at this time. The details of these last two studies will be published at a later date.

CONCLUSIONS

The results of this study establish that at three widely separated geographical locations in the United States (Marcus Hook, Pa., Tulsa, Okla., and Corpus Christi, Tex.) a naturally occurring microbial hydrocarbon-utilizing flora is present at concentrations of 1×10^5-1×10^6 microorganisms/g of soil. The addition of six types of oils; used crank case oil from cars, used crankcase oil from diesel trucks, Arabian Heavy crude oil, a Gulf coast mixed crude oil, a home heating oil (#2), and a residual fuel oil (#6), to frequently tilled field plots at a rate of 100 bbls/acre stimulated this natural population to a level of 1×10^7 microorganisms/g of soil throughout the year following application. Under the conditions employed, the rate or degree of degradation did not appear to be influenced by differences in temperature resulting from differing geographical location of these experimental plots. After one year the magnitude of degradation in order of decreasing rate (% degraded) was as follows: home heating oil (#2) 87.3, used crankcase oils 67.9, crude oils 61.9, and residual fuel oil (#6) 57.8. Examination of run-off and

leachate waters failed to demonstrate any movement of oil or lead out of the immediate plot area. Significant increases in ethyl ether extractable matter in leachate waters indicated that incomplete degradation of some individual components in the oils was taking place.

ACKNOWLEDGMENTS

We thank Mrs. Joyce Rizzo and Mr. J. O. Johnson of Sun Oil Company for their assistance in maintaining and sampling field plots at Corpus Christi and Tulsa, respectively.

This study was supported by a grant from the American Petroleum Institute.

LITERATURE CITED

1. Cook, F. D., and D. W. S. Westlake. Biodegradability of Northern Crude Oils. Canada—Task Force on Northern Oil Development Report No. 73-20. Information Canada Cat. No. R72-8373 (1973).

2. Francke, H. C., and F. E. Clark. Disposal of Oil Wastes by Microbial Assimilation. U.S. Atomic Energy Report Y-1934 (1974).

3. Kincannon, C. Buford. Oily Waste Disposal by Soil Cultivation Process. U.S. Environmental Protection Agency Report—EPA-R2-72-100 (1972).

4. Odu, C. T. I. Microbiology of Soils Contaminated With Petroleum Hydrocarbons. I. Extent of Contamination and Some Soil and Microbial Properties After Contamination. J. Inst. Pet. 58, 201-208 (1972).

5. Parkinson, D. Oil Spillage on Microorganisms in Northern Canadian Soils. Canada—Environmental-Social Committee Northern Pipelines, Task Force on Northern Oil Development Report No. 73-25. Information Canada—Cat. No. R72-8573 (1973).

6. Raymond, R. L., V. W. Jamison, and J. O. Hudson. Microbial Hydrocarbon Co-oxidation. I. Oxidation of Mono- and Dicyclic Hydrocarbons by Soil Isolates of the Genus Nocardia. Appl. Microbiol. 15, 857-865 (1967).

TABLE 1

PROPERTIES OF OILS USED IN BIODEGRADATION STUDY

	Arabian Heavy Crude Oil	Gulf Coast Mix Crude Oil	Home Heating Fuel Oil (#2)	Residual Fuel Oil (#6)
Gravity, API/60°F	27.4	23.6	35.0	16.0
Vis., SUS/77°F	164.0	324.0		
Vis., SUS/100°F	103.0	161.0		
Vis., KV/100°F cs			2.4	
Vis., SFS/122°F				160.0
Flash - PM, °F	<40.0	88.0	140.0	200.0
Pour Point, °F	+10.0	<-50.0	-20.0	+55.0

TABLE 2

CHARACTERIZATION OF OILS APPLIED TO EXPERIMENTAL PLOTS

	Type Of Oil				
Silica Gel Fraction	Crankcase	Heavy Arabian	Coastal Mix	#2	#6
Paraffinic	70.5*	45.8	53.6	52.0	37.1
Cycloparaffinic	9.5	13.3	9.7	3.2	11.2
Aromatic	8.6	26.4	22.8	34.7	35.0
NSO	11.3	14.4	13.8	10.1	16.7
Sulfur	0.3	3.01	0.38	.15	.66

* per cent

TABLE 3

METALS IN OILS

(ppm)

	Used Crankcase Oil (car)	Used Crankcase Oil (truck)	Arabian Heavy Crude	Gulf Coast Crude	#6 Oil
CA	700	780	-	21	17
BA	480	36	-	-	-
P	1400	1350	-	-	-
ZN	1500	1300	21	17	12
MG	1600	1100	-	-	21
B	10	-	-	-	-
AL	22	10	-	-	-
NI	-	-	23	2	13
PB	7500	75	-	-	-
SN	5	3	-	-	3
CU	17	18	-	-	-
FE	260	180	3	5	18
CR	21	3	-	-	1
AG	-	-	-	-	-
SI	18	8	-	-	-
NA	51	39	-	9	27
MO	10	4	-	-	-
V	-	-	65	-	38
MN	3	-	-	-	2

TABLE 4

PERCENTAGE REDUCTION IN OIL CONCENTRATION AFTER ONE YEAR

	Location of Field Sites			
Type of Oil	Marcus Hook, Pa.	Tulsa, Okla.	Corpus Christi, Texas	Average
Used crankcase oils	69.2	73.8	60.8	67.9
Crude oils	54.2	77.5	54.2	61.9
Home heating oil (#2)	86.0	90.0	86.0	87.3
Residual oil (#6)	48.5	65.5	59.4	57.8

TABLE 5

OIL IN RUN-OFF WATER FROM CONTROL AND OIL-TREATED SOIL PLOTS

MARCUS HOOK, PA.

Dates -	12/73	3/74	4/74	5/74	9/74	11/74
IL PLOT						
ontrol #1	4.3*	2.8	0.6	3.7	1.7	2.4
:**	-	1.9	0.5	3.6	1.3	1.7
: + F	7.8	3.1	1.6	1.8	2.5	2.1
:	-	0.9	1.6	1.7	1.3	2.0
: + F	5.9	2.7	1.4	2.5	1.6	1.4
IC	-	1.5	1.6	1.9	1.6	1.2
IC + F	6.8	3.5	2.4	2.7	3.0	1.3
.C	-	2.6	1.8	3.1	4.0	1.9
C + F	3.9	2.4	1.8	3.1	3.1	1.4
'	-	1.7	1.1	5.4	1.2	2.3
' + F	6.6	3.5	1.6	2.8	1.1	1.7
;	-	1.8	1.4	3.3	2.3	1.6
; + F	3.0	6.4	2.5	3.5	2.4	1.5
ntrol #2	4.3	2.0	2.1	3.3	2.8	1.8

* Values in ppm

** CC - car crankcase oil; CC + F - with fertilizer; DC-diesel truck crankcase oil; HAC - Arabian heavy crude oil; CLC - coastal oil; #2 - home heating oil (#2), #6 - residual oil (#6).

TABLE 6

OIL IN LEACHATE WATER FROM CONTROL AND OIL-TREATED SOIL PLOTS

MARCUS HOOK, PA.

DATE	3/74	4/74	5/74	9/74	11/74
Soil Plot					
Control #1	1.8	4.0	-	4.5	7.3
CC*	5.4	1.9	-	5.0	8.0
CC + F	-	-	-	-	-
DC	3.7	6.0	8.4	5.8	7.4
DC + F	2.7	3.6	7.5	10.1	14.7
HAC	3.2	5.1	6.8	14.0	7.0
HAC + F	-	-	-	-	-
CLC	-	-	-	-	-
CLC + F	2.4	8.9	18.2	15.9	3.7
#2	4.1	7.5	8.6	11.3	6.6
#2 + F	4.9	5.9	36.0	3.9	3.9
#6	2.9	4.9	7.1	3.9	3.9
#6 + F	3.2	2.4	8.7	40 0	17.7
Control #2	3.3	2.2	21.0	4.1	3.6

* See Table 5

TABLE 7

ETHER EXTRACTABLES IN LEACHATE WATER FROM CONTROL AND OIL-TREATED SOIL PLOTS

MARCUS HOOK, PA.

DATE	3/74	4/74	5/75	9/74	11/74
Soil Plot					
Control #1	36.5	13.0	-	10.0	153.0
CC*	30.5	26.6	-	61.0	164.0
CC + F	-	-	-	-	-
DC	50.2	23.0	37.5	58.5	172.0
DC + F	73.0	21.5	95.5	180.0	351.5
HAC	32.0	26.5	28.5	126.5	282.0
HAC + F	-	-	-	-	-
CLC	-	-	-	-	-
CLC + F	53.0	73.2	149.5	251.5	1339.0
#2	55.0	70.5	104.5	154.5	2019.5
#2 + F	32.0	87.0	34.0	107.0	1336.0
#6	18.5	23.0	36.0	105.5	49.5
#6 + F	42.0	53.0	82.0	121.0	201.0
Control #2	12.0	12.5	23.3	95.0	148.5

* See Table. 5

TABLE 8

DISTRIBUTION OF LEAD IN SOIL PLOTS FOLLOWING APPLICATION OF USED CRANKCASE OILS

Marcus Hook, Pa.

Date	Recovered Oil		Soil			Leachate		
	Car	Truck	Control	Car	Truck	Control	Car	Truck
11/73	90*	0	34	448	31			
3/74	33	7	125	325	53	0.2	0.2	0.2
4/74	0	0	100	221	50	0.2	0.0	0.0
5/74	0	0	190	320	110	0.0	0.0	0.0
9/74	7	2	135	295	52	0.2	0.4	1.4
11/11	102	100	100	275	55	0.6	0.0	0.3

* Values in ppm

TABLE 9

DISTRIBUTION OF LEAD IN SOIL PLOTS FOLLOWING APPLICATION OF USED CRANKCASE OILS

TULSA, OKLAHOMA

Date	Recovered Oil		Soil			Run-Off Water		
	Car	Truck	Control	Car	Truck	Control	Car	Truck
12/73	495*	160	14	198	9			
1/74	580	<10	20	128	6	0.3	0.2	0.1
2/74	586	40	25	338	5			
3/74	493	24	9	313	23			
6/74	676	<10	50	155	10			
9/74	-	-	50	162	35	0.8	1.2	0.3
12/74	525	49	27	147	8	0.03	0.03	0.03

* values in ppm

TABLE 10

DISTRIBUTION OF LEAD IN SOIL PLOTS FOLLOWING

APPLICATION OF USED CRANKCASE OILS

Corpus Christi, Texas

	Recovered Oil		Soil		
DATE	Car	Truck	Control	Car	Truck
12/73	600*	43	2	325	47
1/74	830	35	25	280	63
2/74	480	98	55	288	90
4/74	12	0	25	62	62
6/74	23	16	45	110	130
10/74	0	4	50	215	70
12/74	41	12	21	268	63

* values in ppm

TABLE 11

CONCENTRATION OF LEAD IN SOIL AT VARIOUS DEPTHS

MARCUS HOOK (2/21/75)

pth in Inches	Control Plot	Used Crankcase Oil & Fertilizer Plot (ppm)
0 - 4	108	247
4 - 8	108	94
8 - 12	69	42

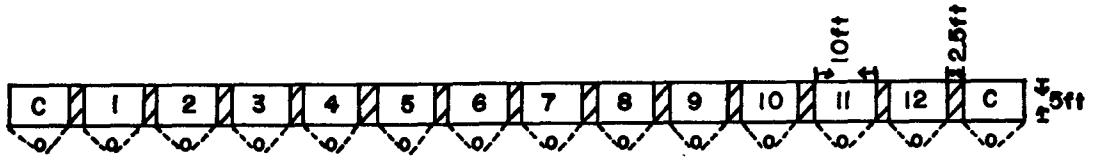


Figure 1. Layout of the field plots: c - control; 1 & 2 - used crankcase oil (car); 3 & 4 - used crankcase oil (truck); 5 & 6 - Arabian heavy crude; 7 & 8 - coastal mix crude; 9 & 10 - home heating oil (#2); 11 & 12 - residual oil (#6). Fertilizer was added to plots 2, 4, 6, 8, 10, 12, and one control.

Figure 2. Appearance of field plots after application of oils at a rate of 100 bbls/acre.

Figure 3. Howard Rotovator used to incorporate oil into field plots and subsequent tilling operations.

Figure 4. Leachate collectors

Figure 5. Run-off water collector in place.

Figure 6. Residual fuel oil (#6) after application to field plots.

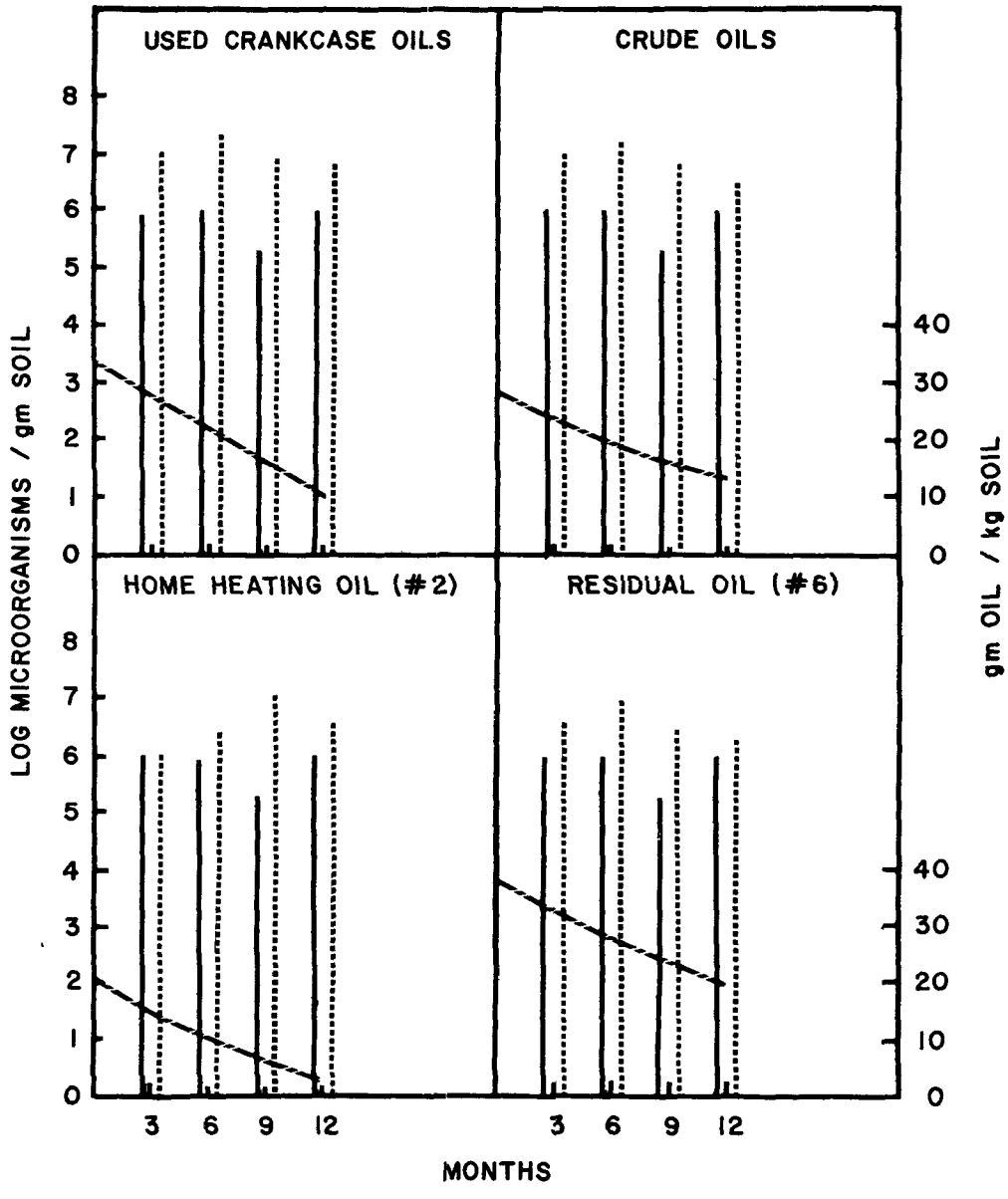


Figure 7. Numbers of hexadecane-utilizing microorganisms and residual oil concentrations in Marcus Hook, Pa. experimental plots. Numbers in control plots ———. Numbers in treated plots ..... Oil concentration ———. The values are averages of both unfertilized and fertilized plots.

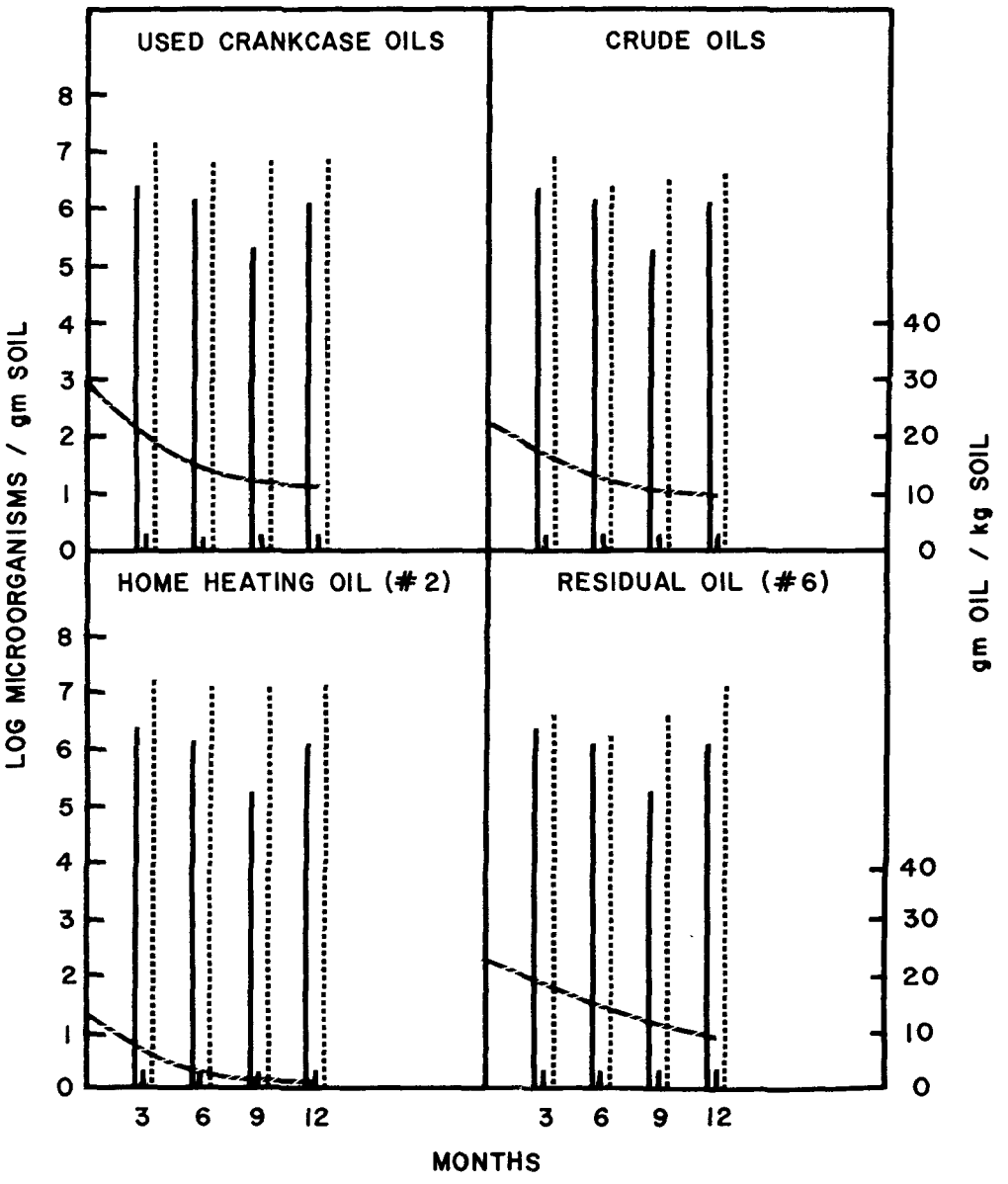


Figure 9. Numbers of hexadecane-utilizing microorganisms and residual oil concentration in Corpus Christi, Tex. experimental plots. See Figure 7 for explanation of symbols.

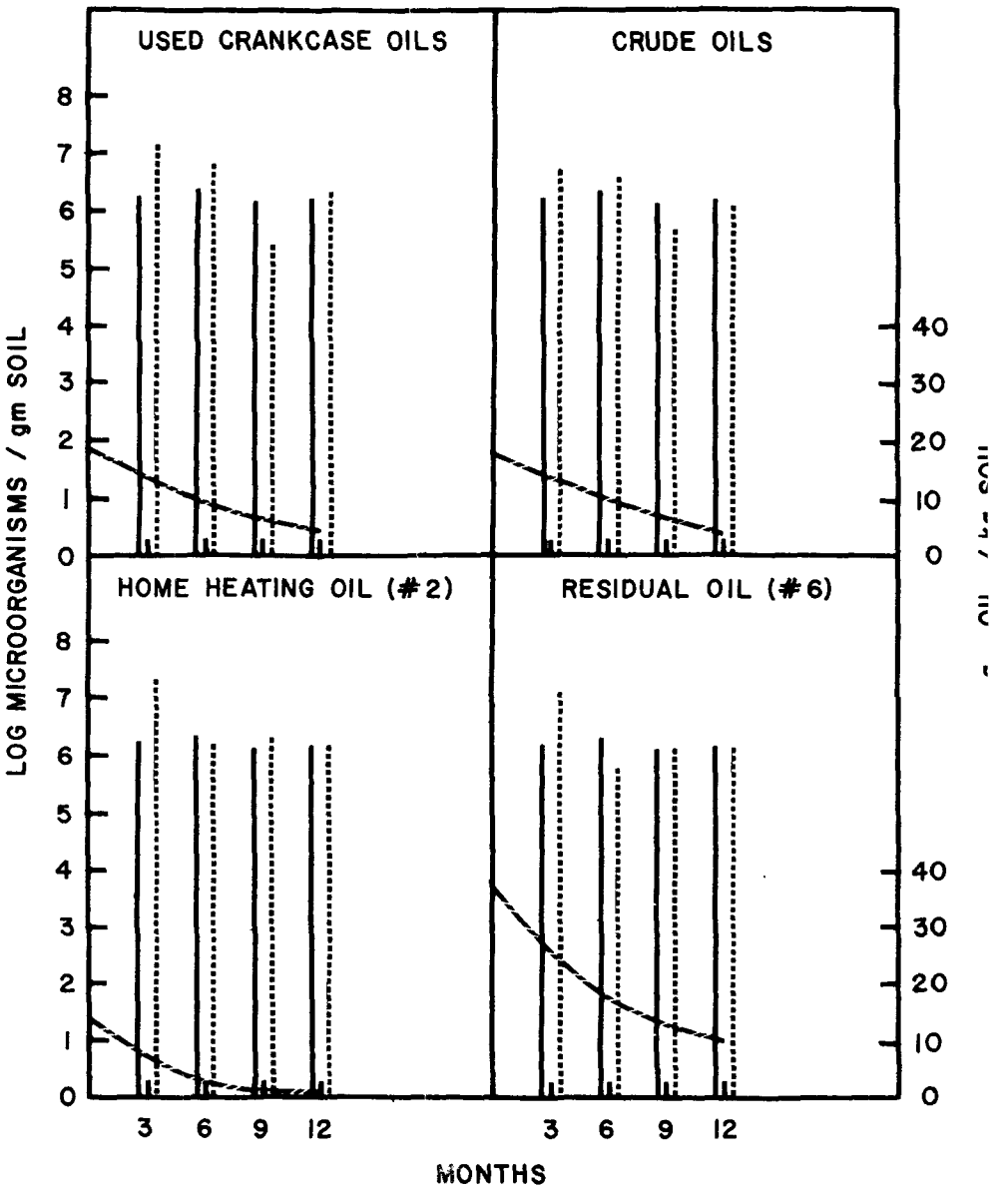


Figure 8. Numbers of hexadecane-utilizing microorganisms and residual oil concentration in Tulsa, Okla. experimental plots. See Figure 7 for explanation of symbols.

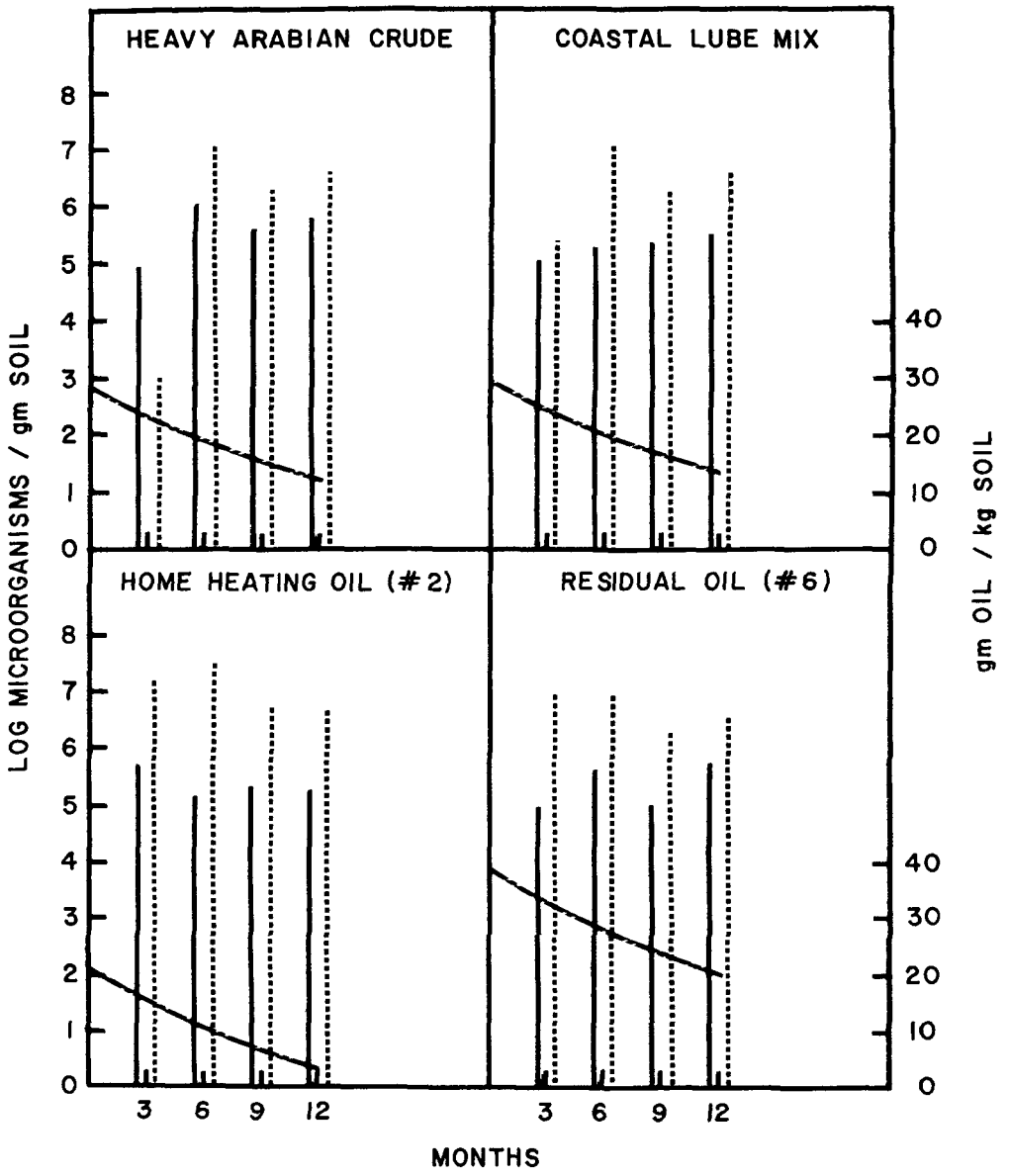


Figure 10. Numbers of oil-utilizing microorganisms and residual oil concentration in Marcus Hook, Pa. experimental plots. See Figure 7 for explanation of symbols.

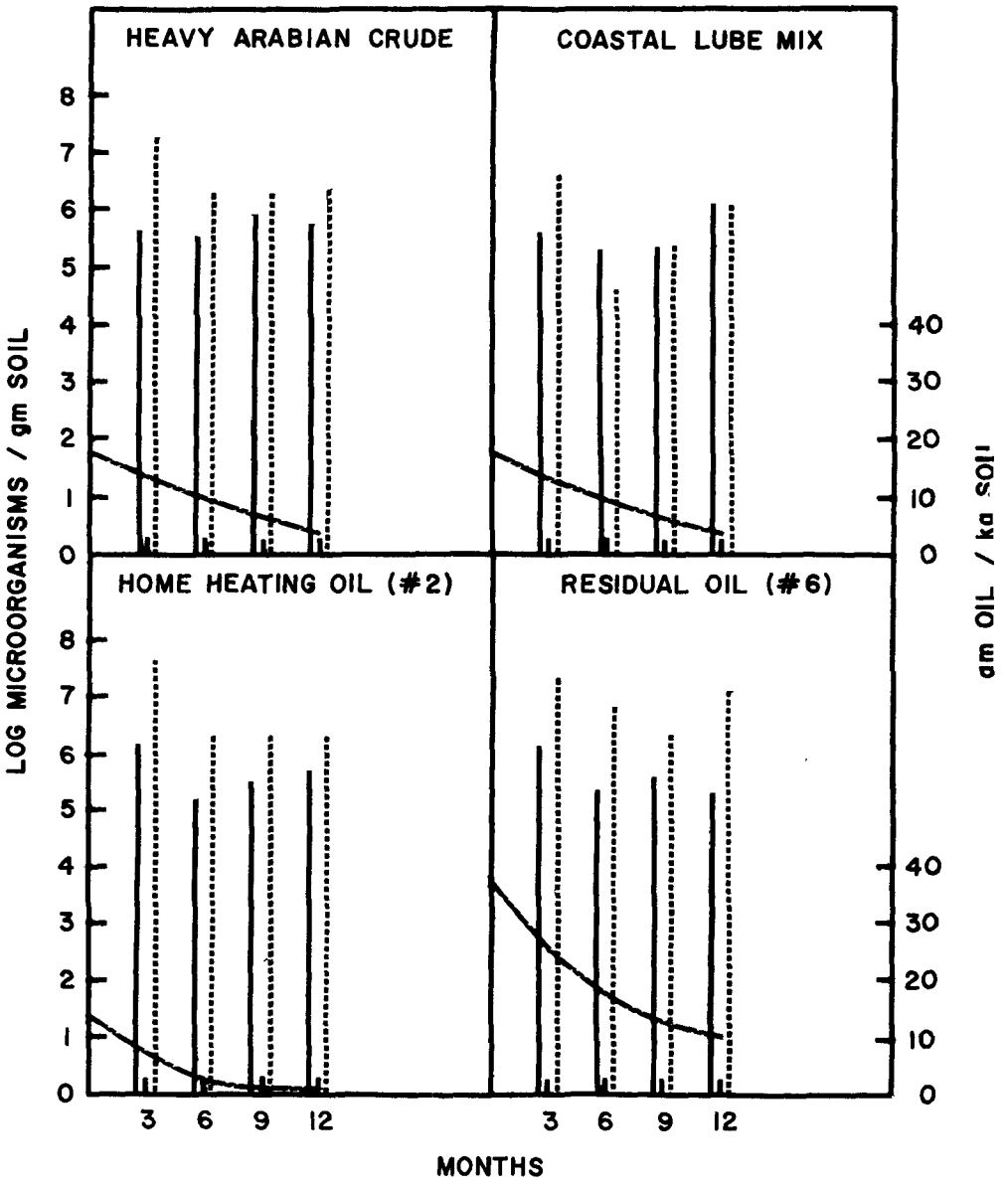


Figure 11. Numbers of oil-utilizing microorganisms and residual oil concentration in Tulsa, Okla., experimental plots. See Figure 7 for explanation of symbols.

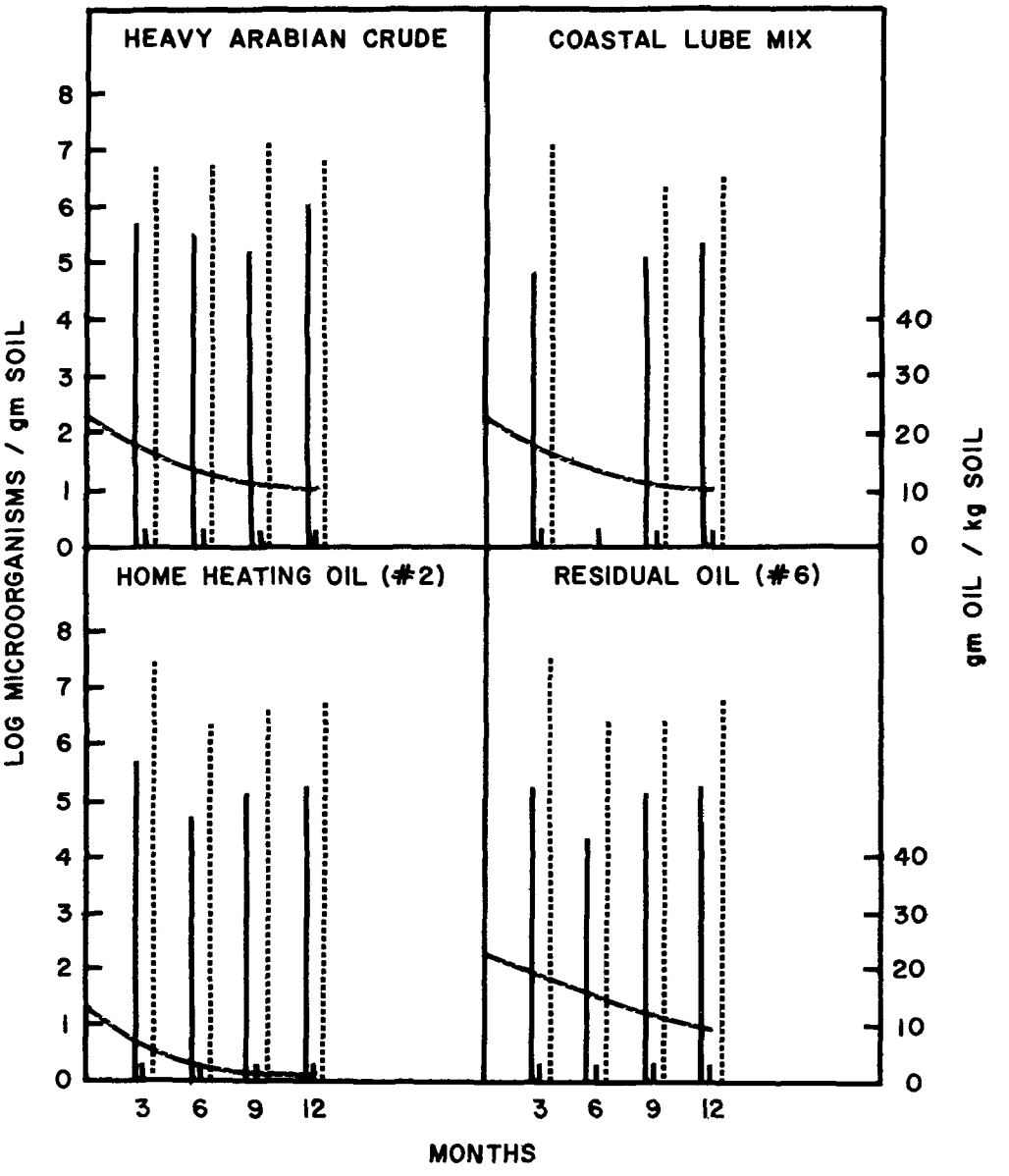


Figure 12. Numbers of oil-utilizing microorganisms and residual oil concentration in Corpus Christi, Texas experimental plots. See Figure 7 for explanation of symbols.

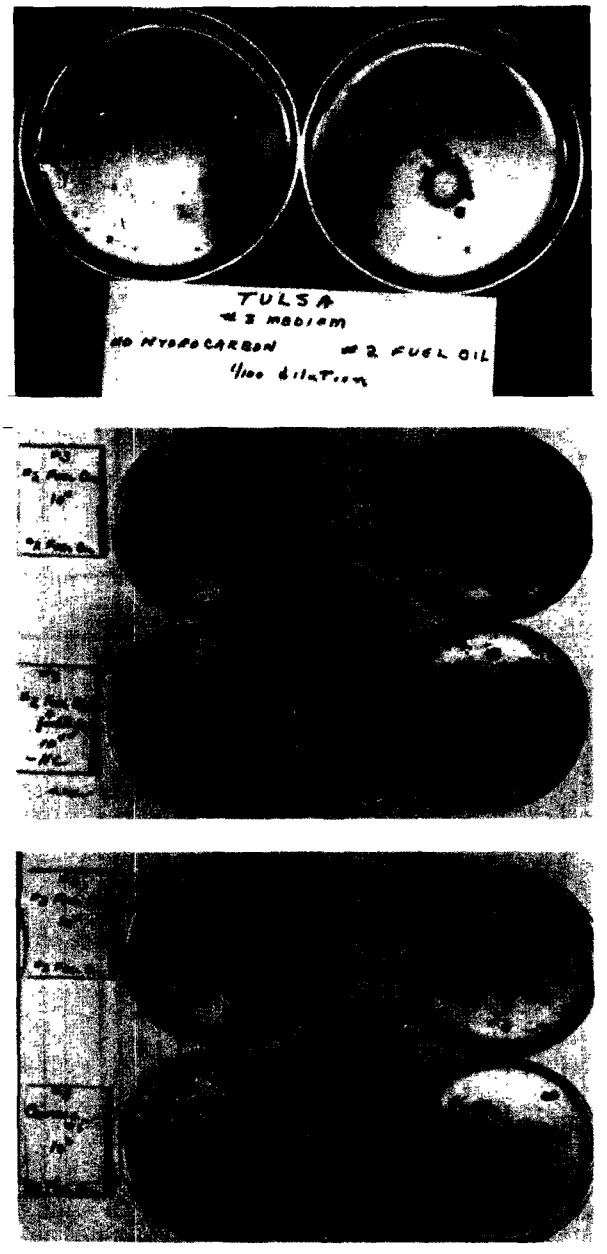


Figure 13. Home heating oil-utilizing bacterial colonies found in control and treated plots.
Top - Tulsa soil before application of oil.
Middle - Corpus Christi soil 4 months after application.
Bottom - Marcus Hook soil 5 months after application.

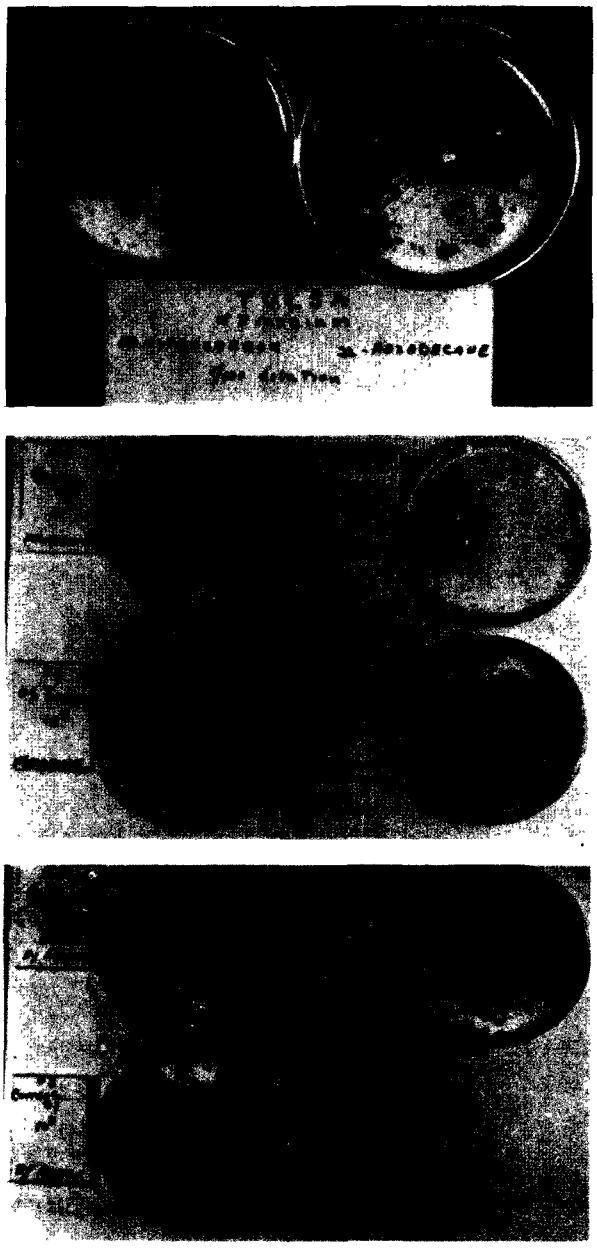


Figure 14. Bacterial types found in control and treated plots.
Top - Typical colony types found in control soils which use paraffinic hydrocarbons.
Middle - Typical response to treatment with residual fuel oil (#6).
Bottom - Typical response Arabian Heavy crude oil.

SESSION ON CURRENT SAFETY ASPECTS OF LHG

Wednesday, May 14, 1975 - 2:00 P.M.

Developer:
N. E. Sumner, Sun Oil Co., Philadelphia, PA

Presider:
G. E. King, The Standard Oil Co. (Ohio), Cleveland, OH

Considerations in Siting LNG Terminals
R. F. Hill
Federal Power Commission
Washington, DC

Safety Considerations in the Design and Operation of a Refrigerated LP-Gas Marine Terminal
R. A. Reid
Petrolane, Inc.
Long Beach, CA

Safety Considerations for Liquefied Natural Gas
D. A. Dundore
Philadelphia Gas Works
Philadelphia, PA

Panel Discussion:
General Safety Developments in LHG Facilities
(No transcript available.)

Moderator:
T. E. Davis, Continental Oil Co., Houston, TX

Panelists:
D. A. Dundore, Philadelphia Gas Works, Philadelphia, PA
R. F. Hill, Federal Power Commission, Washington, DC
W. H. Johnson, National LP Gas Association, Chicago, IL
D. Levine, Federal Railroad Administration, Washington, DC
R. A. Reid, Petrolane, Inc., Long Beach, CA

THE CHAIRMAN: All right. Next I would like to call JoAnn Ferguson of the U.S. Naval Facility, Hawthorne, Nevada.

MS. JOANN FERGUSON: I am JoAnn Ferguson, and I am representing the Naval Ammunition Depot, Hawthorne, Nevada, Management Association. The Management Association is composed of supervisors and management personnel at the Naval Ammunition Depot in Hawthorne.

What I have today is an approach to some of the problems I have heard this afternoon. And this afternoon I am going to tell you about the disposal of hazardous wastes generated during the demilitarization of military items.

And hereinafter I will refer to it as "Demil,"because demilitarization is a mouthful.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

I will tell you how the Demil is accomplished now, then how a modern facility under construction at Hawthorne, Nevada will accomplish this task, and lastly how this facility could be utilized in a disposal mission other than ammunition.

The basic Demil is:

One. Reduce ammunition to components;

Two. Salvage useful items;

Three. Dispose of the remainder in a safe and environmentally acceptable manner.

At present, Demil is done on a piecemeal, as required basis, both functionally and geographically. Basically, hazardous waste is disposed by open burning or detonation or through deep water dump -- which is, they load an old barge with all the old ammunition and take it out to sea and sink it. All three of those are environmentally disastrous.

The new facility under construction will accomplish this task under controlled conditions that will utilize state-of-the-art equipment that meets or exceeds EPA standards for environmental protection.

This is a composite of the facility under construction (indicating). It is a one-of-a-kind facility complete with equipment designed especially for the demilitarization of conventional ammunition.

Briefly it operates as follows: The material is off-loaded and the ammunition designated for Demil/Disposal is

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

ransferred directly to a storage area. Dependent upon the type f ammunition and loads, it is then sent to one of the break-own facilities for further demilitarization.

Of specific interest is the Washout/Steamout Building. ght next to it is a water treatment plant. The contaminated ater goes through a process of purification so that when it mes out it is virtually ready to drink. The only reason we n't pump it into the depot water supply is that the water is ecycled into the building -- again, to go through the washout/ eamout process.

Notice the several evaporation ponds situated through-t the facility. In the dry climate of Hawthorne the water sappears rapidly with little or no problem of stagnation and aves residue that can be readily collected for cycling through e incineration process. Throughout the total facility, water d air are so treated that tons of ammunition and explosives n be processed without adverse effect on the environment.

We envision an extended role for this facility to clude decontamination and disposal of all hazardous waste d other undesirable commodities. Bear in mind that the basic ndamentals for waste disposal are the same as for militarization: breakdwon, salvage and disposal without dversely affecting the environment. This extension would corporate a DOD wide waste disposal facility that could be panded to a national hazardous waste facility. Capabilities

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

we have at NAD Hawthorne are:

One. A modern facility now under construction.

Two. State-of-the-art machinery and processes.

Three. Costly overhead items such as utility systems, fire protection and security systems, OSHA requirements, and administrative conveniences are already provided for.

Four. Unlimited space for expansion. (85 percent of the State of Nevada is Public Domain.) Encroachment in our area is non-existent.

Five. Expertise and management capabilities.

Six. A near temperate climate.

Seven. Transportation facilities -- rail and truck -- to the door. You know, it is only a couple of hours from her to Nevada, or three, depending upon how you observe the 55-mil speed limit.

And as we have heard today, most waste disposal requirements are looked upon as a headache and an expense and a continuing problem, but looking at it from a positive point of view, we feel with proper capabilities that they can become a paying proposition.

For example, TNT washed out of projectiles in a present day Demil facility sells for 22 cents a pound.

TNT melted out and reclaimed in the Demil process und the new facility sells for 85 cents per pound. It has been estimated that the net annual revenue from this facility will b

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

$4.4 million from ammunition alone.

We believe that there are comparable revenues from the disposal of non-ammunition commodities.

Further, an R & D capability could be established on-site for ongoing development of disposal and salvage technology.

It is estimated the current capital investment for the Western Demilitarization Facility as it is now envisioned is between 55 and $75 million. We believe that a nominal additional investment would considerably widen our scope of operation in the disposal of hazardous waste.

All the basic assets are already in existence at the Naval Ammunition Depot in Hawthorne, Nevada.

And what I am saying is now is the time to take a look at this facility and expand it to include a nationwide waste disposal facility.

While this is under construction, with very few additional taxpayer dollars, we feel it could be incorporated to take care of some of the present day problems.

Thank you.

THE CHAIRMAN: Thank you, Ms. Ferguson.

Do we have questions?

Mr. Lindsey.

MR. LINDSEY: Just a point of clarification. I think I understand this correctly. At the present time the Navy is building this facility, is that correct?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MS. FERGUSON: Right.

MR. LINDSEY: And you are advocating or your organization is advocating that it be expanded into a larger facility to handle, essentially, all DOD type hazardous wastes, is that the idea?

MS. FERGUSON: That is correct. And further expanded to become the national waste facility to handle industry waste.

MR. LINDSEY: I see.

THE CHAIRMAN: Mr. Lazar.

MR. LAZAR: Ms. Ferguson, has anyone at the Navy made any calculations as to the practical feasibility -- i.e., from transporting wastes from the East Coast to Nevada -- the transportation costs?

Would this be a viable option for a waste generator who is on the East Coast?

MS. FERGUSON: Yes. I think it would.

No, no one has made any studies.

MR. LAZAR: Are there any plans to make a study, since you made the recommendation?

MS. FERGUSON: We have made this recommendation, and we would like to have all the endorsement possible. Because we have to go higher. And this would be included in a standard study, no doubt, as to the feasibility of making this facility a nationwide disposal facility.

THE CHAIRMAN: Mr. Mausshardt?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MR. MAUSSHARDT: I have two questions here from the floor.

Let me read the second question first; it is shorter.

The current international price of TNT is 31 cents per pound. Who will pay 85 cents for TNT?

MS. FERGUSON: The prices I have quoted are the ones that we have been using. And no doubt they have changed, because prices change from day to day, but the ones we have basically used in our demilitarization facility is in the presentation.

MR. MAUSSHARDT: The second question is: Aren't most all of the military explosives now sold surplus to private industry? In fact, hasn't there been some second thought about completing the final phases in light of the high prices of these explosives fixing -- I believe that is the word -- in light of the high prices of these explosives?

MS. FERGUSON: A lot of the explosives are now sold on bid to competent contractors. And the contractors probably work and recycle it back into private industry.

What we have done in Hawthorne -- upon the completion of the facility -- what is not sold, some of it can be reused within the Department of Defense for ammunition production.

This question I cannot answer fully because I am not equipped to go into all the technical questions.

I am here to sell an idea.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

THE CHAIRMAN: Ms. Ferguson, could we perhaps clarify for the record the nature of the NAD Hawthorne Management Association. Is this a public or private organization, is this a private organization but not associated with the Department of Defense?

MS. FERGUSON: It is a private organization composed of supervisors and management personnel working for the Naval Ammunition Depot in Hawthorne, Nevada.

We operate under an executive order for this type of association. It is like blue collar workers and lower-rated people have their unions. And we are here to improve the management capability of NAD, Hawthorne and try to expand it throughout the Department of Defense and the government.

THE CHAIRMAN: Thank you. Now, Mr. Kovalick?

MR. KOVALICK: I was curious as to whether the association has had a chance to explore what we feel is a fairly significant policy question. And I am interested as to whether you have any thoughts on it. That is that by advocating such a facility and its expansion to the non-government trade, if you will, you are advocating putting the government in the business of treating and disposing of wastes. And I was wondering if you had a chance to bounce that concept off the industry, those already in the business, or have thoughts as to what the relationship of these kinds of facilities ought to be to people who are in that business already.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

MS. FERGUSON: No.

THE CHAIRMAN: It doesn't appear as if we have any other questions. Thank you very much, Ms. Ferguson.

MS. FERGUSON: Thank you.

THE CHAIRMAN: Ladies and gentlemen, we are very close to the time we have been asked to take a break.

I do not anticipate that this meeting will go into the dinner hour or will require another day's session.

I would like to take a short break at this time for 15 minutes and reconvene at 3:40.

(Short recess.)

THE CHAIRMAN: Ladies and gentlemen, please take your seats.

I want to indicate to the audience that Mr. Baker from the California State Solid Waste Management Board has his written testimony as well as his oral remarks, and his written testimony will be made a part of the record.

At this time I would like to call Sanford Jay Fleisher of the S. Rose Cooperage Company, Montebello,California.

Mr. Fleisher, please.

MR. SANFORD JAY FLEISHER: Mr. Chairman, members of the panel, ladies and gentlemen.

My name is Sanford Fleisher, and I am here today on behalf of our firm, S. Rose Cooperage Company of Montebello, California, and as a member of the Western Region of the National

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Barrel and Drum Association from whom you have already heard speakers in Newark, New Jersey and Rosemont, Illinois.

For about one year our firm has been engaged in a new program of decontaminating and reconditioning used pesticide containers. This program was set up under permit from the California Department of Agriculture. To date we have successfully reconditioned several thousand of these containers for reuse or recovery.

The Environmental Protection Agency's publication, "Hazardous Wastes," illustrates in depth some of the many problems associated with improper disposal, storage and land emplacement associated with these containers.

As an industry we are aware of the problems associated with the transportation, storage, and employee safety involved in reconditioning these containers, and we for one feel that these problems can be dealt with, thus resulting in the reuse and recovery of these materials from the hazardous waste stream.

The pesticide container disposal problem is an old one and a large one to chemical formulators, applicators, farmers and regulatory agencies. I feel that we can make substantial inroads on this problem by the reuse and recovery of these containers wherever economically feasible; and by this approach reduce injury to humans, livestock and the environment.

There exists, throughout every area of the country,

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

reconditioning plants, many of which I feel would be willing to participate in a plan aimed at the recovery and reuse of these containers.

There does, however, exist one area of concern that would hinder the efforts to utilize the reconditioning industry as an alternative to land emplacement of used pesticide containers. Our industry has discussed that problem with members of your staff and the Office of Pesticide programs in August of this year.

The problem is that under existing Federal Insecticide, Fungicide, and Rodenticide Act Regulations, any container which bears a label directing the user to puncture and bury the container whem emptied, cannot be reconditioned. Under a plan submitted by Dr. Hooper of W & H Industries, Incorporated during the August meeting, this problem could be eliminated by the issuance of a Pesticide Enforcement Policy Statement or by modification of the existing regulations.

To date no action has been taken on that plan. My recommendations to this panel are as follows:

One. Review with the Office of Pesticide Programs a modification of its existing regulations, or the issuance of a PEPS to authorize the reconditioning of all used pesticide containers.

Two. Adopt guidelines recommending that land emplacement of pesticide containers, with a capacity greater than five

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

gallons be prohibited, except where reuse or recovery could not economically be achieved.

Thank you.

THE CHAIRMAN: Thank you, Mr. Fleisher. Do we have questions?

Mr. Lazar.

MR. LAZAR: Mr. Fleisher, just one question. How can you recondition a drum which has been punctured? I did not understand that particular part of your presentation.

MR. FLEISHER: What I was calling attention to is that under the existing regulations -- where a label says to puncture or crush that drum -- in other words, to dispose of it --

MR. LAZAR: You are against it?

MR. FLEISHER: That is right. We need an alteration of the regulations to change that.

THE CHAIRMAN: I believe we have questions in preparation here.

Mr. Kovalick?

MR. KOVALICK: Mr. Fleisher, we have had several sets of testimony from the National Barrel and Drum Association, and we have had none from the container manufacturers. And if they were not in existence you would not be in existence.

MR. FLEISHER: That is correct.

MR. KOVALICK: Would you care to comment on their

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

reaction or attitude towards the kinds of recommendations that you and Dr. Hooper have made?

Is their silence indicative of anything special, or do you think it is just that you have taken the interest?

MR. FLEISHER: I do not think I am qualified to comment on their position.

THE CHAIRMAN: Mr. Kovalick?

MR. KOVALICK: From the audience.

How do you guarantee that a pesticide container has been properly decontaminated?

MR. FLEISHER: What we are doing is following to the letter the prescribed procedures as set down in regulations by the California Administrative Code. And we are one of two reconditioners in the state that are licensed to transport, store, and decontaminate and recondition these drums.

And the regulations call for burning the drum out, removing the lid of the drum and burning the drum out at 1400 degrees and 1650 degrees through our afterburner. And we are following those standards.

MR. KOVALICK: Presumably then you are subject to some kind of an inspection at the option of the State of California?

MR. FLEISHER: They are welcome to come in at any time.

THE CHAIRMAN: Any other questions? Apparently not.

Thank you, Mr. Fleisher.

I would like to call at this time Dr. Joseph Hooper of

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

W & H Industries.

DR. HOOPER: Mr. Chairman and members of the panel.

W & H Environmental Systems Division of W & H Industries, Inc. is a firm which in part has specialized in pollution abatement technology development predicated on resourc recovery. Our research in this area is both pure and applied based upon specific client needs and involves an inter-disciplin approach.

Much of our work during the past three years has concerned itself with development of technology to reduce the volume of materials required to be disposed of by land emplacement from industry. One observation that we can make at this point in our work is that most hazardous wastes can best be managed by a resource recovery approach if not cross contaminated with other hazardous wastes.

A second observation that we can make is that there is no lack of technology in the area of resource recovery but rather it is the cost of implementation. Only when the regulato criteria begins to compel more extensive and costly environmenta safeguards over disposal practices than now exist will the resource recovery approach to management of hazardous waste blossom.

Some hazardous waste management problems could be resolved or the impact reduced at this point in time without additional legislation. This would require an educational

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

program aimed at the producer of these wastes to show him how he might reduce his operating cost by utilizing certain in-house recovery programs.

We can cite the example of a client who utilized a hot tank cleaning operation in his plant which required frequent changes and disposal of 83,500 gallons of hazardous solution per year. A system was designed and built for the client at a totoal cost of $3,500. It resulted in a reduction of offsite disposal by 65 percent and reduced the clients' purchases of new chemicals by $7,300 per year.

Another problem area we have worked with which we feel can be minimized at this time is the disposal of used containers which contained either pesticides or other hazardous substances. Much of our work in this area has already been heard by this panel at other public meetings and therefore need not be covered again, but if the panel has any questions regarding that work I would be glad to try and answer them at the close of my statement.

Other hazardous substances could best be managed by the development of regional reclaiming centers which should be generated as a cooperative program between government and the private sector. Government efforts taking the form of special tax incentives to encourage private sector participation and grants to defray a portion of the initial capital costs. In recent years virgin raw material costs have increased in part

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

as a result of higher energy costs to industry. This condition in the marketplace is beginning to create a place for reusable raw materials which could be recovered from the hazardous waste stream at such centers.

Hazardous waste generated by industry is taking their toll on our available land emplacement disposal sites with an annual increased demand for land emplacement increasing by an estimated ten percent. Unless this tide is turned we are going to find ourselves with a number of new inadequate sites receiving hazardous wastes and resulting in damage to the environment and public health.

In conclusion, it is our recommendation that a National Hazardous Waste Policy be developed that differentiates between recoverable and non-recoverable wastes and that all wastes determined to be recoverable and reusable wherever feasible be prohibited from disposal by land emplacement.

Thank you.

THE CHAIRMAN: Thank you, Dr. Hooper.

Do we have questions?

Yes, Mr. Lindsey.

MR. LINDSEY: Yes. Dr. Hooper, with regard to your work on the barrel reclamation project, could you give us any cost information on what it costs the user to use a new 55-gallon drum as compared to a reclaimed or reused one?

DR. HOOPER: Currently there is one thing that we have

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 403
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

to point out. When we held meetings on, I believe, August 12th with members of your staff and the Office of Pesticide Programs, the Department of Transportation and National Agrochemists Association -- the new container manufacturers were invited, by the way, but did not choose to attend the meeting, to clarify an earlier question -- members of the reconditioning industry and other concerned parties. It was pointed out that there exists now a problem in the DOT Class B poison regulations which specifically prohibit anything but a single-trip container of those substances, so that you could not reuse that container, but that container could be reused for a lesser toxic substance or a lesser hazardous substances as defined by DOT.

For example, what is referred to as 5-B drum is commonly used for a shipment of technical grade parathyome between manufacturer -- formulator. That drum could not be reused to ship technical grade parathyome under DOT regulations as they now exist. But that drum could be recovered, reconditioned, and reused,for example, for the packaging of sodium hydroxide.

MR. LINDSEY: Under present regulations?

DR. HOOPER: Yes, under present regulations.

MR. LINDSEY: Would you like to go further and state why this paradox exists?

DR. HOOPER: As I recall, there was a statement made by a member of the DOT staff at the August 12th meeting which

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

said, based upon a request from EPA, quote-unquote -- he didn't specify what part of EPA -- DOT would be willing to review that regulation and modify the Class B poison regulations that now exist.

I frankly do not think that that would come to pass too quickly.

MR. LINDSEY: Could you, however, speculate on what the cost would be if it were allowed?

DR. HOOPER: Let us talk about the cost of a new drum. Regardless of what its use is going to be. And we are talking somewhere -- depending on the specific drum and the specification of the drum -- but we are talking between probably 15 to $20 for that drum new.

We are talking a reconditioning drum market, probably the best with everything built into it that they are going to want, the upper limit of it would be around $11.

If it was a service reconditioning, the cost would be far less. I think the national average right now for service reconditioning is under $4.

THE CHAIRMAN: Yes, Mr. Lindsey.

MR. LINDSEY: I have one here from the floor, and I think perhaps you have answered it, but I will just be sure and ask it again.

Why does the inside of, for instance, a pesticide drum have to be cleaned if destined for the same reuse?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673-7747

I guess the answer is because as far as you are concerned the DOT requires that, is that right?

DR. HOOPER: Well, cross contamination being one point. Number two, something that others -- Dr. Hayes, for example, originally with the Department of Public Health, pointed out recently in his book, "Toxicology of Pesticides," there is a big problem in the whole area of these containers. And you heard Mr. Simon address that problem this morning.

Look at the photographs in front of the room (indicating) and start counting the containers that you cannot identify. You cannot tell me what was in those containers. Because there is no way, once that drum is put out in the environment and the label is lost, to identify what was in that container. So who is going to take the gamble of cross contamination? I think the liability would be horrendous to a reconditioner.

THE CHAIRMAN: Mr. Kovalick?

MR. KOVALICK: I wanted to explore one of the sentences in your statement regarding regional reclaiming centers and one suggestion was that government efforts take the form of special tax incentives to encourage the private sector or perhaps grants to defray a portion of the initial capital costs were suggested.

Again, I would like to bring up the fact that there is an industry already in existence, and I guess from an economist's point of view, it could be viewed as a subsidy from the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

government to this new entrance into this industry, thereby putting those who are already in this business at a disadvantage

Would you care to comment on that?

DR. HOOPER: I am not particularly advocating that we create a new marketplace or a new industry in the marketplace.

What I am saying -- the best example that I can cite to you is chromates.

We all know the issue of toxicity of chromates. There are many small generators, particularly the plating industry, of chromate wastes. Chromate costs have increased steadily in the past few years. It is a raw material which we have no domestic supply of whatsoever in this country. Every bit of it is imported, and imported from countries which to say the least we are not on friendly terms with other than our trade relationship with those countries. And yet here we are talking about a problem with disposal of these types of wastes.

The technology readily exists for reclaiming chromates in the same form that they are sold back to the industry.

Yes, there is high initial capital cost. There are transportation problems associated with getting those substance to one center where it would be economically feasible to recover them.

Do we want to continue spending tax dollars to study the problem or do we want to take those tax dollars and put them someplace to solve the problem?

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

And do we want to do that in the form of a tax incentive or an outright cash outlay to get something done about the problem?

I think you only have to look at Tricell in Montreal or the Tricell program that is going on in Toronto, and we can get some very good demonstrations of joint government-private sector participation in the management of hazardous wastes.

THE CHAIRMAN: Any other questions? Apparently not.

Thank you very much, Dr. Hooper.

At this time I would like to call Mr. Ron Eggers from Alameda County, California.

Mr. Ron Eggers, Alameda County, California?

Is he in the audience, please?

Perhaps he stepped out, we will come back.

I would like to call Mr. Leonard Tinnan of the BKK Company.

MR. LEONARD TINNAN: My name is Leonard Tinnan . I am technical director of the BKK Company located in the Los Angeles area.

Our company, including its subsidiary divisions, is the only organization licensed by the State of California to both transport and dispose of all forms of non-radioactive solid and liquid hazardous wastes. By quantity of waste disposec hazardous waste disposed, we are the largest disposer of hazardous wastes in the State of California.

In much the same way that the State of California

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

pioneered sanitary landfilling throughout the United States, the State of California is pioneering the management of hazardous wastes in the nation. The BKK Company is pleased to have been with the State of California, the pioneer for the design, construction and operation of sanitary landfills, and we are pleased to be the pioneer in the State of California for the land disposal of hazardous wastes within this pioneering state.

Among other operations our company operates a 600-acre Class One disposal site located in the City of West Covina, California in Los Angeles County.

The site is a fully contained site, meaning that any materials which enter the site, liquids or leachates, resulting from waste deposited cannot leave the site.

Part of that self containment was derived from natural origin, meaning we started with a geological bathtub; we had a geologic substructure such that material could not vertically migrate into ground waters. But our bathtub is a little tilted and a little open at one end. And we have over the past several years designed and built artificial hydraulic barriers to prevent the migration laterally, the potential migration into drinking waters, ground waters.

In addition to the barriers, we have leachate collection provisions, leachate monitoring and leachate pumping provisions at the site to assure that the barriers are in fact intact and provide for full containment of materials within the facility.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

We believe that the experience in the West Covina Class One landfill demonstrates full well that land disposal of hazardous wastes is environmentally effective and probably the lowest cost mechanism for disposal of non-recoverable wastes.

Now, at our site, every liquid load which enters is sampled upon entry and prior to disposal. Measurements are made of such parameters as temperature, pH, explosivity and odor evaluation and other special examinations.

The primary reason for this evaluation is neither to decide whether to accept or reject the load, since our site is capable of accommodating all forms of non-radioactive wastes, but is principally to assure the public health and safety of the truck driver bringing in the load, of our own personnel operating at the site, problems which could arise during the dumping operation itself.

After the chemical evaluation is made of the incoming waste load, the chemical technician gives to the truck driver a placard with a number which indicates the specific disposal technique and the disposal area which the foreman on the working deck then leads or directs the truck driver to. Certain types of materials highly corrosive and malodorous materials, for example, are placed in deep injection wells. Other materials of a less toxic nature can be pooled in the daily intake of rubbish, which by the end of the day is fully compacted and covered with at least six inches of earth material.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Other materials such as highly dangerous cyanide materials are directed to remote disposal points, special holes are cut while the truck is there, load is dumped, and the load is immediately covered.

We do not and are not permitted to operate solar evaporation ponds in Southern California as exist in some areas up here, for example, the highly discussed and controversial Contra Costa County operations that were discussed earlier today

Now we do occasionally upon examination of the liquid waste manifest, which has been discussed by Dr. Collins and many others today, after a careful assessment of what it says about the character of the chemical and our own chemical evaluation, may choose to reject a waste load. The contemptuous waste load which was discussed by Ms. Siri earlier today, which traveled from Contra Costa County to Southern California to Nevada and back to Contra Costa County was rejected at the BKK disposal site. The generator had properly identified the material. But it was classified -- it is a material which is extremely hazardous and requires State Department of Health approval prior to moving on the roadways. That approval had not been obtained by the Department of Health.

The material was highly toxic from inhalation, and had it been permitted to be dumped openly could have killed personnel operating at the site. In addition, it was highly odorous and that was the basis for it being rejected. It was a load proper

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

identified by the producer. It was collected and transported by a legitimate waste hauler without prior state approval and then it was eventually disposed of improperly at a site not authorized to accept same.

We believe that the techniques and the facilities, the procedural steps, the techniques for evaluating loads and disposing of them properly do exist, but they do need to be enforced rather rigidly. And I wish to touch upon that aspect as I proceed through this statement.

Waste disposal in the State of California is actually regulated by the Water Resources Control Board. Unfortunately, not represented at this hearing today. We have had an excellent presentation by Dr. Collins from the State Department of Health. Their concern is with hazardous materials which are hazardous from a public health and safety standpoint. But landfilling practices and landfilling disposal of wastes in this state are principally a water quality problem regulated by the Water Resources Control Board at the state level and by the regional Water Quality Control Boards. There is a document which is issued periodically. This blue book is entitled "Waste Discharge Requirements for Waste Disposal Land" issued November, '75 by the California State Water Resources Control Board. It is from that agency that we as a landfill operator obtain our permit to operate a disposal site.

We must of course adhere to all health regulations, all

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

the policies and the criteria the State Solid Waste Management Board promulgates; we must comply with all air pollution control district regulations as well, but this is our boss. This agency which puts out this document is the boss and they in fact are unfortunately not represented here today.

Now, the reason I make that point is because we think that much of the confusion by generators, transporters, treaters and disposers of hazardous industrial liquid waste is in fact due unfortunately to the terminology "hazardous."

With due deference to the committee and the title of this hearing, I acknowledge that the word "hazardous" has a tremendous impact, but what we are concerned with is non-sewerab industrial liquid wastes. They may be hazardous in some cases from a personal safety standpoint, health and safety standpoint. They may in other cases be quite harmful from a water quality standpoint.

We urge and have urged the state committee with Dr. Collins and Mr. Baker who are representatives here in the state that have reported here earlier, we have urged that a consolidat state listing or consolidated state set of criteria be establish to avoid or minimize any future confusion which does exist.

Let me give you a couple of interesting examples of the problem that exists for a waste disposal operator. The State Water Resources Control Board classifies as Group One wastes, acceptable only by Class One disposal sites, such materials as

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

brines from food processing industries. The State Department of Health does not consider that hazardous. But they are unacceptable from a water quality standpoint for disposition in any place other than a Class One disposal site. So the generating industry of brine, the food processing industry, does not have to mark as the producer of that material that it is a hazardous waste because it is not hazardous by state definition. But it still must be directed to a Class One disposal site.

Drilling muds, likewise, are considered Group One wastes, acceptable for disposal only at Class One disposal sites. Again, in many cases, in most cases, they are not classified as hazardous materials by the State Department of Health.

And the fact that these two types of materials -- just as examples -- are not defined or marked or identified on the manifest as hazardous, has allowed some people the room, if you will, to interpret that they are suitable as Group Two wastes for disposition at Class Two sites. They are not hazardous by state definition, but they are detrimental to water quality. And that is where some of the Group One wastes are going and how they are going into Group Two sites, Class Two sites.

Let me offer the other side of the coin. Chemical toilet wastes are not considered detrimental to water quality. They are considered as Group Two wastes by the Water Resources Control Board, but they are considered as hazardous materials by the State Department of Health. Settling sludges are

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

considered as Group Two wastes, but, likewise, are identified as hazardous.

Now, here are materials which are hazardous and can be shown and marked properly identified on the manifest as hazardous and still end up in a Class Two disposal site because the Water Resources Control Board identifies them as Group Two waste materials.

Those are some of the anomalies that must be eliminated. And the terminology "hazardous" is not the indication. We need a list that does not need a name. If in fact a list is possible -- just a list of what can go into a specific site. And I do not think one could even generalize. Each site probably has certain types and quantities of materials it could accept.

Now, without intending to be facetious, let me give you another example of this problem of identifying or titling materials as hazardous.

Suppose we had a vacuum truck rolling in this afternoon carrying four or five thousand gallons of lemon juice. People would tend to scoff at this being hazardous. Some of my colleagues in discussing this example said they ought to get 5,000 gallons of water and a hundred pound bag of sugar and open the largest lemonade stand in California. But lemon juice is citric acid and would show a pH of about three -- fairly acidic, fairly acidic indeed.

Now, if we took this harmless lemon juice and placed

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

it in a disposal area such that it could possibly comingle with cyanide base, we could in fact release highly dangerous gas, cyanide gas. And the cyanide materials may have previously been placed, and it was the lemon juice that in fact became the hazardous contributor to this chemical reaction.

In our judgment, then, we are not sure that any list will ever be made which can properly identify all hazardous situations, and that in fact nothing will supplant logic, technical knowledge and skilled operators in terms of effective handling of wastes. We think that lists and sets of criteria can serve as guidelines, but skilled and trained personnel, we believe are the answer for handling all materials, whether they be labeled hazardous or not.

Now, the question arose this morning, a member of the committee asked the question I think of Dr. Collins about training materials and training programs, are they adequate or suitable.

While our company believes that every company involved in the handling, either of the producing, the transporting, the treating or the disposing of the waste materials should institute and maintain a rigorous self-training program which is tested by the state in a means that produces certification or a licensing of all personnel, facilities, and equipment associated with the handling of these types of waste materials.

So we have training, self-training, with state

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

certification, and then with state enforcement with a system that has teeth in it such that after one or two minor violations which might result in monetary fines, revocation of that license or certifcate would be the penalty.

Now, if I am a habitually bad driver, I get fined the first one or two times in the court, and then my license is suspended or revoked. Why can't we use the same sort of though pattern on this type of operation? Let us license our people, make sure that they are properly trained, skilled in the procedures and care, and then penalize them with revokation of that ability to do business should they violate the law.

Now, in fact, the State of California has a major anomaly in the legislation governing waste materials. In fact, the law permits a negative incentive or disincentive on the legal disposition of hazardous waste materials.

Everytime a hazardous waste that is properly disposed of in an approved Class One disposal site is taxed 60 cents per ton, and that fee goes back to the state to help administer the surveillance program that Dr. Collins spoke of earlier today. But keep in mind the impact on the producer and the transporter or both if they are trying to save a buck. If you dispose of the material, if you mark it improperly, meaning you mark a hazardous material as non-hazardous or if you dispose of it illegally, it does not get taxed. So one is actually encouraged to engage in illegal operations.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

The waste producer first, then the waste transporter. The waste disposer does not care. We collect the tax when it comes in as a hazardous material and we pay it to the state as one does in any other form of taxation. But we have got to stop the principle that the legislation requires legal disposal and that illegal disposal be permitted to go free. And in fact we have recommended to the state committee that as an alternate to the 60 cent per ton imposition on hazardous materials, something like two cents a ton be imposed on all liquid wastes, and the same revenues could be derived by the state. And in fact, monitoring by the state agencies, the Water Resources Control Board and the State Department of Health and others, really needs to be at the Class Two sites rather than at the Class One sites. Class One sites can accept these materials. Class One sites should be required to institute chemical sampling of all the incoming loads so that the disposition can be properly directed, but the monitoring should be at Class Two sites to insure that loads that are not suitable at that area should be rejected.

I would like to close with one thought which deals with the legal liability. Mr. Knowlton, representing the Western Oil and Gas Association, expressed some thoughts that we share and endorse completely. We do, however, disagree as to where the liability of the producer stops.

Waste dispoers like ourselves, the disposal industry,

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

obviously is responsible for assuring once it is in their hands at the proper site that odor control, air pollution, water quality control provisions are all enforced.

Now, the waste producer, we believe now that either Federal and/or state legislation should be enacted which makes the ultimate disposal the legal liability of the producing industry, and in that way, number one, the producer will proper. identify the materials. Number two, he will select a legitimat transporter. Number three, he will direct that transporter to an appropriate and approved disposal site. And then the responsibility of the disposal operator takes over.

It is very easy for industry to fill out his part of the waste manifest, identifying properly what the material is, and then goes to low bid for the waste hauler, and the waste hauler got the job because he underbid it, not calculating in waste disposal charges that the BKK Company or the LA County Sanitation District or others would charge, and then dumps it down a manhole or in some other outlawed disposal technique. He did not have to pay a disposal fee. He therefore could reduce his price.

So it does not suffice for the waste producers simply to pick a low bid waste hauler. It is his responsibility by picking a licensed and certified hauler to assure and directing the disposal site to make sure it gets to the proper dispositio

The direct cost for the producer may be a little highe

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

as Mr. Knowlton pointed out, and may have to be passed on to the consumer or the products in that industry. But that technique will certainly avoid the potential downstream huge liability costs that may be legally the producers if he does not do that.

Thank you.

THE CHAIRMAN: Thank you. Do we have questions?

Mr. Kovalick?

MR. KOVALICK: You mentioned that you are in the transport business as well as the disposal business.

Is there any portion of your hauling that is done interstate, and, if so, what have been your experiences with that?

MR. TINNAN : Yes. We haul interstate.

We do our transportation through a subsidiary known as Chansler, Ogden, Incorporated. We utilize materials being brought into this state or being hauled out of this state, the same liquid waste hauler manifest that we do for materials starting and ending inside the state.

MR. KOVALICK: Related to that, then, you would have to comply with DOT regulations for labeling and placarding if you are hauling interstate.

And it is not often that we get to ask directly of a transporter this kind of question, but we have had some statements in other cities that the information required for a DOT label of a hazardous material -- for example, corrosives -- is

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

that information sufficient for you to use at the treatment and disposal site, or do you require additional information than that which is required for the transporter to the disposal site?

MR. TINNAN : We do not really use the labeling or placards as any more than a first order warning. The manifest is the thing we depend upon, first. And secondly, our own chemical evaluation upon receipt at the disposal facility. So the placard is simply a warning so it doesn't go astray, if you will.

MR. KOVALICK: So the information is not sufficient on the placard. You need additional information.

MR. TINNAN : I think that is correct.

THE CHAIRMAN: Before we go on to another question, I would like to request Mr. TINNAN , because you mentioned and showed the audience the November, 1975 document from the California State Water Resources Control Board. And I was wondering if you would introduce that for the record, too, since it is part of your testimony.

MR. TINNAN : Yes, I would be pleased to.

THE CHAIRMAN: Thank you. Let us now go on with the questions.

Yes, Mr. Lazar.

MR. LAZAR: I have a question concerning your sampling procedures. You mentioned that every load is sampled. And am I correct in understanding that there is a trained chemist at

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

the gate who is able to do laboratory analysis while the truck driver is waiting?

MR. TINNAN : That is correct.

MR. LAZAR: Now, I have a question from the audience.

What sampling and analysis procedures of incoming wastes do you recommend for -- long-term -- for the proper operation of the Class One site? What type of testing do you do now, and what do you think should be done to assure long-term safety?

MR. TINNAN : Is this again referring to sampling upon entry?

MR. LAZAR: Yes, yes.

MR. TINNAN : Well, what we have instituted is, if you will, fairly cursory evaluation based upon available information, quick reaction portable instruments. It is unfortunate that it does not exist, there do not exist many instruments that will allow us to do a much more complete spectroscopic or chromatographic analysis of materials. They take time. We cannot keep a driver waiting that long.

So the basic purpose is one -- we have loads that come in with a pH reading of 11, and the pH is really one or two. Well, that could give us a real problem had we dumped what appeared to be an alkaline material in an area that should have been reserved for acids. So we provide that kind of safeguard for ourselves. We think the pH is a measurement which must be

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

made in all cases simply to verify the manifest.

We are strong believers of the state's policy of liqu. waste manifests. We use it first to verify the pH. We do an odor evaluation, not from a public health and safety standpoin but we have to live as a good neighbor in the City of West Covina. And we can get fined very heavily should those odors permeate. So we do the odor evaluation so as to know whether we can take the non-toxic material. Cannery wastes, for examp -- we simply pool it in the rubbish pool which is a temporary pool. It is not an evaporation pond. Or we determine whether we have to make a special hole immediately for that truck and cover it immediately. So the odor evaluation is important from a good community relations standpoint. The explosivity evaluation, which can be done with good portable meters, is, I think, its benefit is obvious.

We would urge that anything else that could be done to check the load without more than a five-minute tie-up.

MR. LAZAR: My last question concerns the potential incompatibility of wastes. Now, you mentioned the example of lemon juide and cyanide. That is a rather simple example.

But I presume there must be waste loads where you really do not know whether it may be compatible with the material that had been deposited earlier. Or even if you take the simple example of cyanide, what safeguards do you have that later on at the same site someone might pour some

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

hydrochloric acid on it?

MR. TINNAN : Let me take the second point first.

Materials like cyanide are in designated areas that are not and will not be used for other materials such as acids. So we simply have kind of a land use plan of our own, if you will.

As far as the first question is concerned, there are many strange materials that arrive. And if we do not know what it is, in those cases that truck will be stopped and pulled aside at the gate and our chemist or one of our management team will actually call the producer and get a detailed explanation of it and an explanation of the potential hazards that are not clear from the manifest itself.

We have materials that come in -- they will not make any sense to us. We have not heard of them before or the load is not fully explained. In that case we will delay the operator. We cannot risk it going in and say, oh, well, it's probably all right. So he is pulled aside and stopped.

MR. LAZAR: Do you have shipments that are hetrogeneous, that come from various sources on the same truck or from research laboratories where you have a variety of potential hazardous materials?

MR. TINNAN : We often get liquid waste haulers with their vacuum trucks bringing in two or three loads. But we get the liquid waste manifest, a separate record on each one of them.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

So a truck could come in, we get three records. And we look at those and determine whether they were compatible with each other. And part of the test was that they survived the trip that far.

(Laughter.)

And then as far as the laboratory portion, Mr. Lazar, many of those are individual packages in drums, cans, other containers, rather than being mixed together. And then they are isolated by type.

THE CHAIRMAN: Mr. Mausshardt.

MR. MAUSSHARDT: I have a question from the floor. It is a question of liability which you raised in your paper earlier.

If you propose to place the legal liability ultimately on the producers, what assurance does a producer have that you will properly dispose of the material when in fact you have no legal obligation to that particular producer?

MR. TINNAN : Perhaps I have oversimplified the dividing line.

What I meant to say was that the producer has the legal liability through the point of delivery to a state approved disposal site for that material.

But the trucker serves only as his agent, and indeed therefore maintains the liability for that agent until it is accepted at the disposal site.

If we turned away from our gate and it was still in

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

that truck, that producer still has a responsibility until final disposal at some point.

I really did not mean for him to take the responsibility of the legal disposer.

THE CHAIRMAN: Mr. Lindsey.

MR. LINDSEY: In that same regard, if the producer were to mislabel the material -- whatever it was -- on the manifest, and through disposal created some sort of damage incident, either people or whatever, who would have liability in that case -- you, the producer, you together, or what -- as it stands now?

MR. TINNAN : Well, if it were improperly completed either through negligence or malintent, I think the law would find the right person to be liable.

MR. LINDSEY: I have one from the floor.

Do you practice any treatment processes in addition to the land-to-land disposal?

MR. TINNAN : Through an R & D arm of our company we are quite active in trying to reclaim many waste materials that are coming in.

I can cite an example which is strong in our current plan. We handle huge quantities of acids, waste acids, sulfuric, phosphoric, nitric. If our current engineering and economic studies work out we are currently producing methane gas from our wells, from four wells at the West Covina landfill. Should

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

these studies continue, the results continue as they now show, the conversion of this landfill gas into a pure methane by essentially a separation of CO_2 and other impurities, provides us with a valuable feedstock from which ammonia can be synthesized. And then the ammonia can be blended with the sulfuric acid, for example, to make ammonia sulfate, and it would end up as fertilizer, as an ingredient in a final fertilizer product, and would not require land disposition and would not have to go back into sulfuric acid in its use.

THE CHAIRMAN: Mr. Bourns, you had a question?

MR. BOURNS: Yes. I had a question that came to mind in your discussion when you were talking about the fee being collected by the state for monitoring of 60 cents a ton and collected at the site by the site operator.

I wonder if moving this fee up to the producers or generators would not do several things, like encourage pre-treatment or recycling or correct identification of the waste and correct disposal. Because no longer would the hauler have this responsibility. It would not be a dead consideration.

Do you have any thoughts on that?

MR. TINNAN: Well, I am sure that the intent of the legislation originally was to motivate source reduction. And I think that is what you just said if we move it back to him. Well, he pays it anyway. We collect it from the transporter, but the transporter simply bills it back to the producers. He

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

is paying it, whether he is paying it through us or directly to the state.

I have no way of assessing what real effect it has on source reduction.

THE CHAIRMAN: Mr. Kovalick.

MR. KOVALICK: From the audience.

If you get waste in drums, one, do you puncture them or bury them whole, and, two, do you require a waste manifest for it?

MR. TINNAN: Well, the second question first, yes, they require a liquid waste manifest whether they come in bulk in the vacuu truck or come in by drums, bottles or whatever have you.

The first part of the question is, depending upon the nature of the material, we either bury intact or we will empty the drums.

MR. KOVALICK: I suppose a logical follow-up on that would be what do you do with the drums?

MR. TINNAN: Bury them.

MR. KOVALICK: Bury the empty drums?

MR. TINNAN: As some of the people have testified earlier, if they would like these drums, we would be glad to give them these drums free.

THE CHAIRMAN: I had a point of clarification from a member of the audience. Perhaps you would like to comment on this.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

As a point of clarification, both the State Department of Health and the State Water Resources Control Board classify chemical toilet waste as Group One or hazardous waste. There are two chemicals on the market that are accepted. Do you have any comment on that? I believe your testimony indicated that it was not --

MR. TINNAN : Well, then that must be a change or a clarification revision from our previous information.

THE CHAIRMAN: All right. Do we have any more questions?

Apparently not.

Thank you very much, Mr. TINNAN .

MR. TINNAN : Thank you very much.

THE B. K. K. CO.
3031 EAST I STREET
WILMINGTON, CALIF. 90744
830-7662 · 775-3607

December 15, 1975

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 Company deeply appreciates the opportunity that it had to offer its statement and views at the EPA's Public Meeting on Hazardous Waste Management in San Francisco on December 14. We commend you and your staff on your excellent handling of this highly important and informative meeting. We hope that our statement contributed information that will be of value in your continuing studies and analysis.

In my haste to catch a scheduled airline flight at the end of the meeting, I inadvertently failed to leave with you a copy of the California State Water Resources Control Board document entitled "Waste Discharge Requirements for Waste Disposal to Land," which was entered into evidence as part of our statement. Therefore, I am submitting a copy of this document as you had requested as an enclosure to this letter.

As pointed out during our presentation, the B.K.K. Company is highly active in the transport and disposal of hazardous waste in the western United States. The enclosed "Capabilities" brochure depicts some of the B.K.K. operations, facilities and equipment engaged in such waste management activities. We are particularly proud of the Class I sanitary landfill which we operate in the City of West Covina (Los Angeles County), California.

We believe that our West Covina disposal site--with its unique waste sampling and handling procedures--may, in fact, serve as a "model" for hazardous waste disposal operations elsewhere in the United States. Further, the existing facility, its trained operational personnel and associated equipment may well permit the site's effective use for research and development functions of current interest to the EPA's Hazardous Waste Management Division. I and other B.K.K. representatives currently expect in the Washington, D. C. area in mid-January 1976. We would like the opportunity to visit with you and other members of your Division at that time to explore the possibility of applying our capabilities and physical resources to hazardous waste problems of high current interest to the EPA. With your

permission, I will call your office shortly after the holidays to schedule such meetings.

In the interim, should you require any additional data relative to our San Francisco testimony or any other matter, please let me know.

Sincerely,

THE B.K.K. COMPANY

Leonard M. Tinnan

Leonard M. Tinnan
Technical Director

LMT: plb
Enc: Document and
Brochure

BROCHURE DETACHED AND RETAINED
IN SOLID WASTE MANAGEMENT FILES

THE CHAIRMAN: I would like at this time to call Mr. Glen Barlow, Citizens Against Pollution of Berkeley, California.

MR. GLEN BARLOW: Approximately three weeks ago a Congressional subcommittee on health and the environment released a report which was published in the mass media. This report said that they now believe 70 to 90 percent of all human cancers are induced by environmental pollution.

In the last 40 to 50 years hundreds and thousands of new chemical formulas and products have been invented and introduced into our environment. Most of these chemicals were not adequately tested as to their effects on the ecosphere before they were released into our environment. Also the

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

ability of these products to react chemically with other substances is not well understood, as emphasized by the previous speaker's example of lemon juice and cyanide.

There are literally thousands, hundreds of thousands of chemicals that are being poured into our air, into our water, and into the land where there is no understanding of how they are mixing with each other, how they are entering the food chain, entering the agricultural products and other animals in our environment. And through the food chain, entering the human body and concentrating -- even though they may -- we frequently see standards that allow minimum releases -- as low as practical releases -- these are very small amounts. And then they get into the water, into the plants, into the animals, and they concentrate there. And then when they come into us through the food chain they concentrate even more. And they are often filtered out by kidneys and livers and concentrate there.

I would like to suggest that we are about to experience a new national awareness of the health effects of hazardous substances. And yet in this health subcommittee report which I mentioned, it noted that American medicine says no adequate means of diagnosing diseases that are caused by specific environmental pollutants -- and I think the significance of this is tremendous. We are being exposed to all of these new chemicals that have been invented and released into the environment within our lifetime or within the last two

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

generations. And yet the American Medical Association and the National Cancer Institute are just at a loss to decide which specific cancers were caused by which specific chemicals. And the reason is that cancer does not have a little sign on it or a flag saying this cancer was caused by this pollutant. Cancers are there. They are caused by one of hundreds of thousands of chemicals.

And I think that this is very frightening and the potential consequences of this are enormous.

There was a meeting of the National Council on Environmental Quality recently, and their report is in today's Chronicle. They said that now the environmental pollution control industry now employs one million people for environmental pollution control. And I think that with all our unemployment and economic problems, what we should do and what this committee should recommend in its report is that the Federal government and state and local governments and industrial generators of pollution and businesses that handle environmental pollutants should look towards the future with an attitude of hiring and employing even more people.

I was very impressed by the last speaker's suggestion that perhaps the licensing of transporters and other people that are involved with the handling of hazardous wastes is not adequate on a state, Federal or local level. And I think that this is very frightening. And I think that we need more and

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

more people to be employed in the special field of handling each pollutant and each chemical that we are having to deal with.

I think one of the most frightening things about all of this, and I do not mean to sound like an alarmist, because I am really trying to be rational in my approach to all this. I do have a medical background, and I was going to be a doctor.

And I think the really frightening thing is that many times I have read and heard explained that a lot of these chemicals will not kill you or cause you to get sick immediately, but the thing is that they build up, they concentrate in the environment, in the food chain, in our bodies, and over a period of time -- which can be easily up to 20 years, 30 years or 40 years -- the concentrations build up. And then they cause cancer. And by then, 30 years later, you do not know why you are dying of cancer. You do not know which pollutant it was that you breathed or ate or drank that has concentrated in your body and caused the cancer.

And I think that we can no longer be so lax in our controls and in our approach to environmental pollution.

Just because it is not killing off thousands of people today or this year does not mean that it will not be killing millions of people ten or twenty years from now or thirty years from now.

I think that we really have to reevaluate all standards

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

at all levels of what we are allowing and what the Federal government agencies are allowing industries and business to introduce into our environment.

Are we going to be known in the future as history looks back at us and analyzes this period in our history -- it may well be seen as the carcinogenic era. The cancer rates are increasing tremendously. Lung cancer rates have gone up -- I forget the percentages. And almost every single kind of cancer has increased in the last 50 years at an alarming rate at the same time that all of these hundreds of thousands of new chemicals have been invented and introduced into our environment.

And we think that we have such a high standard of living. We often compare ourselves to other countries. And in many ways the United States has many, many advantages supposedly over other societies that are non-industrialized and undeveloped, and yet perhaps we are going to have more cancers and more deaths in the future from these environmental pollutants than any other country. Maybe we have overdeveloped too quickly without an awareness of what these pollutants and chemicals can do to us.

And I am just asking the EPA to carefully reconsider and reevaluate the entire system that allows industries to pour pollutants into our air and onto the lands.

Thank you.

THE CHAIRMAN: Thank you, Mr. Barlow.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

Do we have questions?

Mr. Lazar.

MR. LAZAR: Mr. Barlow, in your statement you stressed the difficulty of associating chronic health effects such as cancer with chemical pollutants.

Do you feel that considerable research is required in this area, and if yes, who should take that leadership?

MR. BARLOW: The National Cancer Institute has been researching it, and I am sure many other agencies also have been researching it for the last 30 to 50 years. And apparently their research has not been enough. And my point is that we can research and research and research for the next 100 years, and it is not going to stop these industries from pouring the pollution into the environment. I noticed recently the EPA has finally added to its list of -- all right, you originally stopped DDT. Now it has taken years for the environmental defense plan to persuade the EPA to finally ban aldrin and dieldrin and chlordane and heptachlor. So there are now five pesticides that are not going to be allowed.

But it took us how many years to reach this point where EPA would finally ban those five pesticides? And we have just thousands more that may be carcinogenic. And the point I am making is related to that. The reason they did not ban these pesticides before was because they said, oh, we need more research. And the reason they are still allowing thousands of

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

other pesticides and chemicals into our food and water chain is because we need more research.

Now, the reason we are not banning aerosol sprays is because we need more research.

Well, meanwhile, it is accumulating, and maybe we will have increased skin cancer rates.

And my point is that can we in terms of public health, can we afford to wait years and years for more research? Are we going to continue to give the advantage to the industries which are polluting or are we going to take a serious public health stance and say that the burden of proof is on the industry initially and that before any new chemical can be introduced into our vast environment it must be proven beyond a shadow of a doubt that it will not accumulate, that it will not react with other chemicals and that it will not concentrate in our food chain and cause cancers.

I do not think we can wait for research to prove it and because of that just allow them to go ahead and pour the pesticides on the land. And meanwhile we have waited -- we have aldrin and dieldrin and chlordane and heptachlor. For how many years did those poisons go into our food and water?

And finally the research proved that they caused cancer.

MR. LAZAR: I understand that our principal and criminal law, namely that a person is innocent until proven guilty does not

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

apply to environmental pollution.

Is that what you are saying?

MR. BARLOW: Should not apply to industries and corporations. And I will show you why.

I did some special research on the town of Minomota, Japan, and I read a book which was recently published that was written by Eileen and Eugene Smith who lived there for three years.

In Japan the Keeso Chemical Company manufactured its products, which released mercury into the bay. They started in 1925. And it was not until the '70's before it was finally proven that the industry, Keeso, was the cause of the health damages that were causing people in Minomota.

Well, what happened was, after years and years in court, it was about a 15-year legal court battle, the courts in Japan decided that the Keeso Industry was responsible for the health damages and deaths that had been caused by the mercury. And they have to pay so many millions -- I think it is $85 million at this point, and it is still going up -- so many millions of dollars to the people who suffered from their pollution that it has put them bankrupt, and they are going out of business.

And there is a new law in Japan that makes -- the speaker before me was talking about liability. There is a new law in Japan now that makes the chemical -- and the industries

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

liable for any health problems that they cause by their pollution. And I think it is just incredible that we do not have a law like that in this country. We need a law that makes the industries responsible for any health hazards they cause. And if it puts them bankrupt, then they should never have gone into the business of poisoning our environment.

THE CHAIRMAN: Mr. Barlow, I believe we are getting a little far afield from the subject of this meeting which is hazardous waste management.

Now, I am sure you are aware that the general thrust of what you are saying is recognized by a number of people, and the Toxic Substances Control Act which is pending in Congress would address many of the points that you have made.

MR. BARLOW: Would it make industries liable?

THE CHAIRMAN: Well, that I am not sure of. But, sir, the purpose of this meeting is to discuss hazardous waste management and not the entire aspect of toxic --

MR. BARLOW: Well, you will be recommending new regulations, I assume, will you not?

THE CHAIRMAN: Not at this time, no. You perhaps are not aware that the Federal government does not have a regulatory program for hazardous waste management.

MR. BARLOW: So here we are in 1975 without regulatory control of hazardous wastes and without liability, that the industries are not liable.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

THE CHAIRMAN: Well, sir, I do not want to get into --

MR. BARLOW: Are you saying that you are not going to make recommendations for changes?

THE CHAIRMAN: Sir, I am not going to get into a dialogue with you. That is not the purpose. I want to hear you opinions. We want to hear questions from the audience and from the panel and your response to them.

Certainly the input of all the speakers will be gathered and used in our work. That is the purpose of this meeting, to gather input to our work which is to develop guidelines. But you must realize that these guidelines are advisory and not regulatory.

MR. BARLOW: I would just like to comment that a lot of recent polls that have been in the mass media say that the American people are losing faith in the Federal government. And I would like to suggest that -- I would really like to have faith in EPA. I think of all the Federal agencies that we have, that the EPA is most hopeful in helping us survive the environmental crisis we are going through. But I mean, you have to do something.

THE CHAIRMAN: Okay. Any other questions?

Thank you very much, Mr. Barlow.

I would like now to return to call on some speakers who we called on earlier and who were not in the room at the time.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

I would like to call upon Mr. James Burch of Project Survival. Is Mr. Burch in the audience?

Please let the record reflect that a second call for Mr. Burch has been made and that he has not responded and did not present a statement.

I would next like to call upon Mr. Ron Eggers of Alameda County, California. I gather, the Alameda County government.

FROM THE FLOOR: The Planning Department is my understanding.

THE CHAIRMAN: Is Mr. Eggers in the audience, please?

Please let the record show that on the second call Mr. Eggers was not in the audience and did not present a statement.

Ladies and gentlemen, that concludes the list of people who have asked for time to present their statements to us.

I would like to page one last call for anyone who at this time would like to make a statement before this panel.

Please let the record show that no one indicated an interest in doing so. Let me remind you once again that written statements will be accepted for the record until January 31st, 1976. So if as a result of these proceedings you feel you have some information or wish to make some further input into this process, we will accept written statements on that until January 31st, 1976.

SCHILLER & COMBS, INC
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

I would like to thank all of the speakers. We heard many thoughful presentations today. I am sure there was a great deal of effort that went into the presentation of many of these statements. And I want to give special thanks to the people who did that.

And it is my hope that the audience received as much valuable information from these presentations as we did. And you can be sure that we will use this information as we return to Washington and prepare guidelines on the hazardous waste management issue.

And lastly, I would like to give special thanks to the Region IX office for the administrative support that went into putting together this public meeting here in San Francisco.

If there is no further business, I now adjourn the meeting.

Thank you very much.

---oOo---

SCHILLER & COMBS, INC.
COURT AND DEPOSITION REPORTERS
601 POLK, SUITE 103
SAN FRANCISCO, CALIFORNIA 94102
TEL (415) 673 7747

WRITTEN COMMENTS

ON

HAZARDOUS WASTE MANAGEMENT

(Written comments submitted by any of speakers have been included with their oral statement in these proceedings.)

ALUMINUM COMPANY OF AMERICA

ALCOA BUILDING · PITTSBURGH, PENNSYLVANIA 15219

ALCOA

January 29, 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:

The Aluminum Company of America would like to take this opportunity to comment briefly on the questions of hazardous waste management posed in the Federal Register, Page 42993, of September 17, 1975. Alcoa owns and operates a number of aluminum refining, smelting and fabricating facilities in many different locations in the United States. Each of these facilities produce solid wastes of varying types, some of which would fall under the classification of hazardous solid waste. Alcoa has been and will continue to be concerned about the generation, handling and ultimate disposal of these wastes. We offer the following comments concerning their management.

Alcoa feels very strongly that the regulation of solid and hazardous wastes be retained on a state and local level wherever possible. Several states already have developed or are developing regulations covering the management of these wastes. EPA should give due consideration to these existing laws, many of which contain good definitions of hazardous wastes, monitoring techniques, and record keeping requirements. Although it is possible to categorize some hazardous wastes on a national level, we feel that it would be unwise to dictate handling and disposal techniques over such a broad area when disposal conditions can vary greatly from one place to another.

Alcoa suggests that a reasonable set of regulations would cover the following:

1. Definitions of hazardous wastes, standard sampling techniques, and analytical methods.

2. Provisions for permitting and licensing of generators and disposers of hazardous wastes, including specific limitations of liability for generators who chose to have others dispose of their wastes. We feel that if generators of hazardous wastes are held liable for the ultimate disposal of their wastes then there will be few of them who will take the risk of allowing others to handle that disposal. It seems more reasonable that when a licensed disposer accepts shipment of a properly labeled hazardous waste he also accepts liability for its proper disposal.

3. Provisions for proper and safe transportation, labeling, reporting, and record keeping, both at the generation and disposal points.

4. Provisions for proper monitoring by a local agency of disposal sites to assure that hazardous wastes remain in an environmentally acceptable condition. These methods could include periodic inspection, groundwater monitoring and permanent marking of the site.

5. Provisions for penalties for improper disposal of hazardous solid wastes commensurate with the potential clean-up costs and/or damage caused by improper practices.

In addition to the above, Alcoa strongly suggests that EPA fund and support studies to better define hazardous solid wastes and disposal methods. Many wastes which are now thrown away have potential fuel or chemical values, or could be used to neutralize other hazardous wastes. The detailed source inventory of generators of potential hazardous wastes would be of great value to better determine what the problems are, where they are, and how they can best be solved. There appears to be a growing effort in the private sector to develop effective ways to reprocess and reuse waste materials. EPA activity should be designed to encourage these efforts through realistic support programs. Economic incentives are developing through the marketplace but additional information services and R & D programs are needed.

We feel that the role of EPA should be one of research and broad supportive regulation rather than specific limitations of operating practices. To this end, Alcoa suggests that regulations requiring certain disposal or handling methods for specific wastes should be avoided. Attainment of acceptable goals can be made through proper permitting and monitoring procedures rather than through dictation of operating practices. Certainly generators and disposers of hazardous wastes would welcome suggestions which would lead to elimination or reduction in waste generation, recovery of potential values in wastes, and better disposal methods. They should, however, be allowed to choose the most cost-effective of these methods commensurate with environmental acceptability.

Alcoa feels that this is an excellent opportunity for EPA to move slowly enough and with enough scientific background to develop truly workable and acceptable regulations dealing with hazardous solid wastes. We feel that EPA should take an immediate role in funding basic research in this area. Only after the problem is well-defined can it be properly regulated. We offer our full cooperation in this effort and we will welcome an opportunity to supply more detailed information at your convenience.

Very truly yours,

Roy H. Carwile

Roy H. Carwile (vb)
Environmental Control Engineer

RHC:vb

AMERICAN CYANAMID COMPANY
WAYNE, NEW JERSEY 07470
AREA CODE 201 831-1234

January 12, 1976

Mr. A. Corson
401 M. St S.W.
Rm 2108 B
Environmental Protection Agency
Washington, D.C. 20460
AW-465

Dear Mr. Corson:

American Cyanamid Company appreciates the opportunity to respond to your request for comments on environmentally safe hazardous solid waste management practices as stated in the Federal Register Vol 40, No. 181, September 17, 1975.

Cyanamid is a diversified manufacturer of agricultural, chemical, consumer, and medical products.

Our sales in 1974 were approximately $1.8 billion. While our principal market is the United States, there has been a continuing and growing demand for Cyanamid products and technology throughout the world. As a result, some 36 percent of our 1974 sales were made in more than 125 countries abroad. In addition, nonconsolidated, jointly-owned companies outside the U.S. had sales of about $275 million.

Cyanamid employs more than 38,000 persons around the world. We operate 59 plants and 64 sales offices in the U.S. Overseas, we have 42 manufacturing plants and 46 sales offices in 36 countries. Worldwide, Cyanamid manufactures 2,500 products.

The following comments we have to make are answers to the questions occurring in the Federal Register.

Question 1

To our knowledge the Environmental Protection Agency has not nor has there been any authoritative evaluation and determination of which chemical, physical or biological criteria should be used to determine if a material should be considered as a "hazardous material" as far as environmentally sound waste management practices are concerned. Therefore, we recommend that each material should be individually reviewed by a panel of qualified experts before being classified as a hazardous waste. These experts should review the entire range of physical, chemical and biological properties of the material that would make the substance hazardous to humans, animals or the environment. As well as considering these properties the quantities necessary

to produce adverse effects on human, animal life or the environment need to be determined. Also the circumstances of disposal need to be considered. It is possible that large quantities of some hazardous substance could be disposed of in a land fill in an environmentally safe manner by proper packaging and sealing of the hazardous materials.

Question 2

Below we have outlined the areas of responsibilities, costs to be borne by, and liabilities to be assumed by waste generators, waste treaters, and ultimate waste disposers. Cyanamid believes the environmentally safe disposal of hazardous wastes involves the clearest possible spelling out of the responsibilities of each waste manager, i.e. generator, treater, and disposer.

Each waste manager must be directly responsible for his own costs. Some governmental assistance in the form of grants, tax incentives, etc. may be necessary to assist waste treaters and ultimate waste disposers to develop new technologies. We also believe that each waste manager should assume complete liability for his portion of the waste management process.

WASTE MANAGER	RESPONSIBILITIES	COSTS ASSUMED	LIABILITIES
W te Generator	1. Characterize waste	All Costs	Spill prevent & control liabilities
	2. Assures waste hauled by responsible parties	All Costs	
	3. Provides safe handling safeguards	All Costs	
Waste Treater	1. Uses currently economically available technology	All Costs	Spill prevent & control liabilities
	2. Verifies character of received wastes		
	3. Control emissions/effluents	All Costs	
	4. Characterizes treated wastes		
	5. Researches and evelops new treatment technology	Receives grant assistance	

ASTE MANAGER	RESPONSIBILITIES	COSTS ASSUMED	LIABILITIES
ltimate Waste isposer	1. Uses currently economically available technology and practices on landfill site.	All Costs with some grant assistance	Full liability for waste accepted
	2. Monitors facilities for environmental impact	All Costs	
	3. Researches and develops new disposal technology	Receives some grant assistance	

Question 5

To our knowledge, reliable cost data are available for only very few processes and techniques for disposing of hazardous wastes. Hazardous waste disposal data will remain inadequate until major efforts are made to identify and characterize these problems.

The above cited Federal Register notice states that the Administrator wishes to gain a better national perspective on needed guidance for the proper management of hazardous wastes. The proper management of hazardous wastes does require the proper regulatory environment, therefore, we offer the following guidelines that should be followed in developing sound regulations for the environmentally safe disposal of hazardous solid wastes.

The Need for a Technical Advisory Committee for Input of Industry Expertise to Establish Environmentally Safe Hazardous Waste Disposal Management Practices

The Environmental Protection Agency should establish a Technical Advisory Committee having among its members industry representatives from industries having hazardous waste disposal expertise. Such a committee could be of valuable assistance to the administrator in such critical areas as; identification of proper criteria for identifying hazardous vs. nonhazardous wastes and identifying the proper techniques and practices for disposal of hazardous wastes.

Hazardous Waste Disposal Sites

Proper hazardous waste management practices should include the funding and acquisition of a national system of regional (state) hazardous waste disposal sites. Logically the program should encompass:

(1) Designation of disposal sites
(2) Promulgation of standards for designated sites
(3) Enforcement of standards allowing sufficient time for owner-operators of such sites to develop and implement the necessary control technology.

Such a program would assure waste generators of a place to dispose of their wastes and prevent regulatory agencies from prematurely closing sites before corrective technology was developed or safe alternatives found for disposing of hazardous wastes. It is important in the regulatory process that site designation precede standards and enforcement. Industry came close to an almost catastropic situation in New Jersey when the State failed to approve the monitoring systems in use at existing disposal sites and consequently the sites were required to close. Fortunately, the State lifted its deadline for closing the disposal sites allowing their continued operation.

Need for Research and Development Grants to Assist Ultimate Waste Disposers of Hazardous Wastes to find Environmentally Safe Disposal Practices.

Due to the vitality of American industrial ingenuity thousands of new products are produced by American industry each year. An environmentally safe disposal method outside of landfilling may not exist for some of these products which are socially desirable to produce. A safe method of disposal may have to be researched and developed. Environmentally safe disposal management practices should include research and development and grant assistance to ultimate waste disposers for these products.

Technology

Environmentally safe hazardous waste disposal management practices should be based on currently economically available technology where possible but these practices should include incentives (tax, direct finding, bond issues, etc.) to ultimate waste disposers to assist them in finding technical solutions to their problems. The use of such techniques as "waste exchange" (one manufacturers waste is anothers feedstock), recycle of wastes, energy recovery and application of technology transfer techniques should be promoted by incentives (tax, grants, etc.).

Cost/Benefit Consideration Where a Socially Desirable Product may Generate Hazardous Wastes Which may Present Disposal Problems

Environmentally safe hazardous waste disposal management practices should include, before banning a product from land disposal, the weighing of cost/benefit relationships including economic and social benefits as well as environmental impacts where the manufacture of a socially desirable product involves creating potentially hazardous solid waste which has no economically feasible alternative to land disposal as a means of ultimate disposal.

We urge your careful consideration of these recommendations.

Very truly yours,

C. P. Priesing
Director
Environmental Protection
Department

CPP:tp

Phone (OR) 503 752
(AK) 907 225

Beaver Buildings, Inc.

Fabricators and Erectors of STEEL SPAN Buildings

(X) P.O. Box 804
3410 S.E. Van Buren
Corvallis, Oregon 97

( ) P.O. Box 1271
Ketchikan, Alaska 9

November 25, 1975

Mr. Edward Tuerk, Assistant Administrator
Air & Waste Management
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Tuerk,

I am in receipt of your mailing of the Federal Register of 17 September, 1975, concerning hazardous waste management.

In as much as I am unable to attend the scheduled hearings, I must comment via this letter.

As we review the problems created by wastes and their "disposal" or lack of disposal, it would be appropriate to present a "financial impact statement" with the proposed disposal system.

Environmental, political and social impact statements in other areas are beneficial in allowing the appropriate agency to study, in more depth, the ultimate result of a given ruling or decision.

As we look for better systems of waste management each industry affected must accept the cost thereof, It then becomes obvious that these additional costs must be passed along to the consumer. Rather it be additional cost per quart of milk for the daryman; cost per tire for the tire manufacturer; cost per automobile for the steel manufacturer.

We have made voluntary improvement in automobile exhaust emissions; much to the approval of the general public. However; considering that we have nearly doubled the fuel consumption; can we as individuals or as a nation, really afford such a radical improvement?

My suggested financial impact statement would allow our consuming public to see the impact expressed in terms that are meaningful to each and every citizen.

I do appreciate you attention to my suggestion.

Sincerely,

1556

Don C. Davis

CENTRAL AND WEST BASIN
WATER REPLENISHMENT DISTRICT
7439 EAST FLORENCE AVENUE
DOWNEY, CALIFORNIA 90240
TELEPHONE 927-2611 • 773-5790

DIRECTORS
LLOYD C. LEEDOM, PRESIDENT
CHARLES D. BARKER, SECRETARY
D. W. FERGUSON, TREASURER
RUSSELL L. HARDY
IRIS A. CROCHET
JOHN G. JOHAM, JR., GENERAL MANAGER

January 16, 1976

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington, D. C. 20460

Subject: Hazardous Waste Management

The Central and West Basin Water Replenishment District is charged with the responsibility for management and protection of the ground water resources in the Central Basin and West Coast Basin in the Los Angeles, California area. These ground water basins provide a major portion of the supplies to approximately three million persons.

Our major concern with respect to hazardous wastes is that they be managed in a manner consistent with elimination of the risk of degradation of ground water resources. Accordingly, we believe that the following principles should be observed:

(1) Although all elements of the environment should be protected from possible damage from discharge of hazardous wastes in inland areas, the number one priority must be the protection of fresh ground water resources which are used as a source of domestic water.

(2) Under no circumstances should hazardous wastes be disposed of in a manner where they could reach usable ground water. In particular, no site should be considered for the land disposal of hazardous wastes unless engineering and geologic evidence has clearly demonstrated beyond a doubt that there is no possibility of hydraulic continuity between the disposal site and usable ground waters.

(3) Hazardous wastes should be excluded from any waste water system the effluent from which may contribute to ground water (either under a planned reclamation program or under conditions where incidental and unplanned recharge of ground water occurs).

We wish to express our appreciation for being provided the opportunity to present our views on this very important subject.

John G. Joham, Jr.
General Manager
JGJ:ab

CHAUTAUQUA COUNTY

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENVIRONMENT

Memo to: Mr. John P. Lehman

From: Kenneth Fladie KRF

Date: January 29,1976

Re to: Letter of January 23,1976.

- - - -

CHAUTAUQUA COUNTY

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENVIRONMENT
phone (716) 753-7111 Ext. 271

January 23,1976

Mr.John P. Lehman
Director, Harzardous Waste Mgm't Division
Office of Solid Waste Mgm't Programs (AM-565)
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lehman:

This letter is relatively short, not because of the lack of available content, but rather to concisely highlight the issue. I am an appointed administrator-engineer with the County and have been put in the dubious position of working out the industries' hazardous waste disposal problems. I speak from a knowledgable, non-emotional stance.

Prior to the environmental consciousness, the waste (paint thinner, waste wash solvents, paint sludges, cutting oils, grinding coblants, alkaline cleaner sludges, and trichloroethylene sludges) were disposed in the City of Jamestown landfill. Waste treatment sludges (metal hydroxides) were not yet on line. Now these are not allowed to be arbitrarely "dumped" at the landfill sites. The costs, controls and ambiguous or non-existent regulations for land disposal of these wastes make it difficult to go this route.

Hazardous Waste Management Facilities are available: however, for our non-metropolitan county, the nearest site is nearly 100 miles away,

and the average costs for disposal comes in the range of $15 to $20 per drum. This impalatable cost includes barrel costs, transportation and the facility cost. The reaction of industry is strong.

Thorough, practical research, which will render results, usable yesterday, is needed. Means of incorporating local, decentralized disposal, or/ and reuse sites should be included in this research. Therefore the PARAMETERS are COSTS, ENVIRONMENTAL CONTROL, and DECENTRALIZATION (to reduce costs).

Note: I have included a schematic of a potential system which might accomplish these aims. It is modular and simple, however; research into economics, markets of products and the ability of the clay to really lock in the heavy metals is needed.

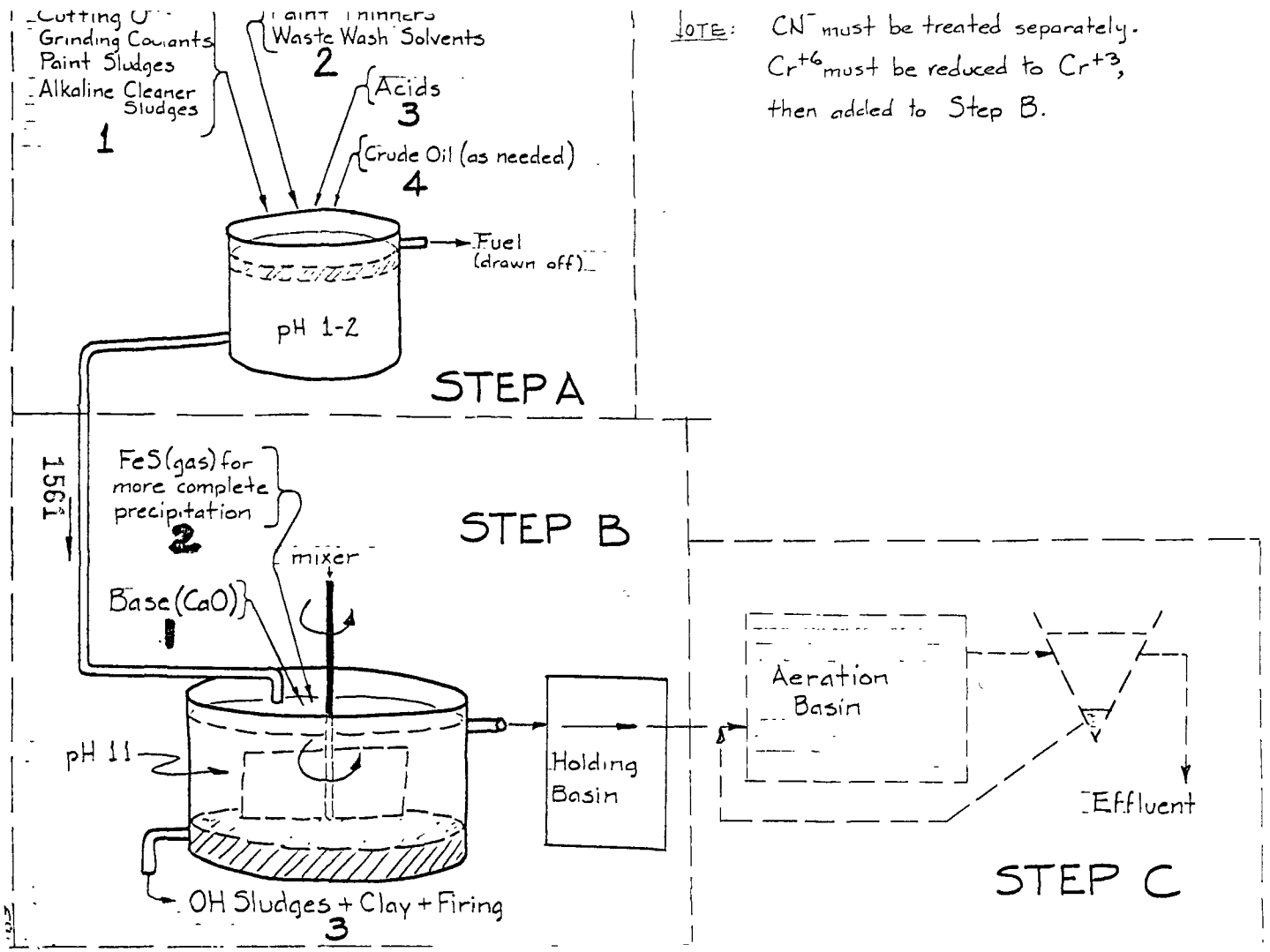
Respectfully Yours,

Kenneth Fladie

Kenneth Fladie
Director, Division of Environment
Department of Public Works

KF:beb

enc.


Cutting Oil
Grinding Coolants
Paint Sludges
Alkaline Cleaner Sludges
1
Paint Thinners
Waste Wash Solvents
2
Acids
3
Crude Oil (as needed)
4
Fuel (drawn off)
pH 1-2
STEP A
FeS(gas) for more complete precipitation
2
mixer
Base (CaO)
1
STEP B
pH 11
OH Sludges + Clay + Firing
3
Holding Basin
Aeration Basin
Effluent
STEP C
NOTE: CN^- must be treated separately. Cr^{+6} must be reduced to Cr^{+3}, then added to Step B.

CONSERVATION CHEMICAL COMPAN

215 W. PERSHING RD., SUITE
KANSAS CITY, MO. 6
Area Code 816-421-

December 29, 1975

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Program
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lehman:

Due to the pressures of operating my business, I could not personally attend the meeting held at O'Hare Airport on December 4, 1975. I wish to make a statement directed to some of the questions raised in your Notice of a Public Meeting, Federal Register, Volume 40, Number 181, Wednesday, September 17, 1975, page 42993.

Although small, our firm is well diversified in the field of environmental services. We treat hazardous wastes prior to landfilling, recycle wastes for return to commerce, manufacture and supply waste treating chemicals, operate in a number of states and regions, and have perhaps the longest history of waste detoxification of any other firm established in the United States. Economic pressures generated by the general decline in the economy, but principally due to severe competition from landfill operations, threaten the viability of our company. Based on my past experience of sixteen years in this field, I sincerely believe that the private sector cannot provide adequate facilities for landfilling of hazardous wastes. I believe a federally regulated and federally owned facility can best do this specific job. The facility could be operated under contract to a chemical firm specifically qualified for these functions. This is somewhat analogous to operation of ordinance plants by various private firms. I further suggest that there are many obsolete ordinance facilities throughout the country that have ample room for the construction of such regional hazardous landfills.

My reasons for reaching this conclusion follow:

1. Our competitive free-enterprize system is based on the principle that lowest priced contractor generally gets the business. Interpretation and enforcement of environmental laws for hazardous landfills from state to state vary substantially. The reality of what actually goes into the fill is such that the operator that cuts the most corners very often winds up with the most business. At one point, a regulatory official might pounce on excessive sulfates and at another location, all varieties of organics,

heavy metals, etc., are dropped into gravel beds and ravines. Even where regulation is fairly uniform, there is no provision in the financial structure of the landfill operator to secure the landfill after revenue ceases or provide burial custodial care after the landfill is "capped off". Is provision made if the property is abandoned? Should care be provided for 10 years, 50 years, 1,000 years?

2. The private landfill operator could wind up in control of all the waste business. Through discriminatory pricing, delays in acting on requests to receive materials generated by a recycler by requiring greater detail and assays, sampling, and pre-treatment; the recycle-oriented company is at the mercy of the landfill operator. Even discriminatory limited hours for access by outside vendors creates economic pressures.

3. Illegitimate disposal of highly toxic wastes is highly lucrative. Economic pressures or economic incentives are so great that localized policing is not effective. Wastes can be and are hauled across state lines. To my knowledge, once the material leaves a state, there is no accounting for it. I believe many of the laws and regulations were developed more for the garbage and domestic wastes which generally are short hauls. The handling of wastes are not fully delineated in regulation. In one Solid Waste Management Law, there is no mention of the word "liquid" nor a specific language or guideline for pre-treatment of liquids prior to disposal.

In your discussion topics, you have raised many good questions. Some of which I would like to make a contributory answer. However, economic survival of my company commands most all my energies. Until a regulatory climate prevails that will ensure survival of waste treatment operations (as opposed to only landfill operations), the questions you raised are irrelevant.

In addition to recommending federally owned and regulated regional hazardous landfill sites, I would like to make two other suggestions:

1. Regulatory officials apply a chemical engineering principle of mass balance in understanding the chemistry of a given region. That is, chemicals coming into a region can generally be determined, accounting for their usage and ultimate disposition should be done to a degree. This principle is used at a unit or plant level by professional engineers.

2. Supplementing an existing law, regulatory people should develop an index of priorities in tackling waste problems. Specifically, every waste has a specific relative toxicity to all other wastes. The mass of this specific component in a given environment can be determined. The cost to detoxify or remove the specific waste from the environment can be determined. A term, which I will call a "priority factor" is the product of the relative toxicity of the waste times its mass divided by the cost to treat. A waste with a high "priority factor" would be very toxic, there would be a lot of it, and it would not cost much to treat.

To illustrate what I mean, there is a community where unregulated dumping was permitted in ravines and gravel pits. One owner with good financial resources and a strong public consciousness removed toxic material down to fractions of parts per million. Meanwhile, years later, the owner across the road has done absolutely nothing and probably never will. We live in a society with a finite ability to meet its social obligations. Here is a very obvious face-to-face example where taking the very worst wastes that were easy to pick up should have been done on either side of the road. There are many examples in the country that are by no means as obvious.

I feel your forum will be constructive to achieving a higher quality of our environment. I have come to realize that I cannot achieve my own objectives by working only within my own company. Hence, I would be very glad to support your program in any way I can.

Yours very truly,

N B Hiersted

Norman B. Hiersted
Professional Engineer and President

gc

cc: Francis T. Mayo, Regional Administrator, Region 5
Kansas City Regional Office, Region 7

'AST COUNCIL FOR AGRICULTURAL SCIENCE AND TECHNOLOGY

erican College
/eterinary
ticologists
erican Forage and
ssland Council
erican Meteoro-
cal Society
erican Society for
'ticultural Science
erican Society
Agricultural
jineers
erican Society of
onomy
erican Society of
imal Science
ociation of Official
d Analysts
ncil on Soil Test-
and Plant Analysis
p Science
iety of America
ltry Science
ociation
'al Sociological
iety
iety of
natologists
l Science Society
America
uthern Weed
ence Society
ed Science Society
America

Agronomy Department
Iowa State University
Ames, Iowa 50011
Phone 515-294-2036

December 1, 1975

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

Dear Mr. Lehman:

This is in response to the announcement of the public meetings you will be holding on hazardous waste management.

The Council for Agricultural Science and Technology, which is an association of agricultural science societies, does not wish to present a prepared statement because the subject is so complex and extensive that a substantive statement on the total subject would necessarily be very long and involved.

We do, however, wish to call your attention to the fact that the problems you are considering are relevant to agriculture and soil science and that we have the capability of calling on all the scientific disciplines that can contribute factual information on which a reasoned decision can be based. When specific questions are under consideration, we hope you will call on us to respond.

Sincerely yours,

Charles A. Black

Charles A. Black
Executive Vice President

cc: M. Stelly
C. E. Howes
B. P. Cardon

dk

CITY OF DALLAS

December 18, 1975

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:

This statement is being submitted pursuant to my attendance at the public hearing on December 9, 1975, held at Houston, Texas, for the purpose of considering hazardous waste management regulations.

There was considerable testimony relating to the need to increase enforcement on generators and transporters which, to me, fails to address the key problem -- namely, the need to establish a suitable network of approved facilities to which the regulated wastes may be routed.

Until we unlock the problem of acquiring sites for safe and adequate disposal, efforts to increase pressure on generators and transporters -- illegal disposing -- will not, as a practical matter, be productive.

In my view, there must be at least moral support by EPA of state, regional, and local efforts to establish proper sites because much of the opposition to such sites comes from people who rather diligently follow EPA publications and informational releases. It is essential that minor imperfections or questions regarding site characteristics not be permitted to continue to frustrate efforts to establish adequate sites. Total perfection is an elusive goal -- we have not abandoned the automobile in American life although it is a deadly killer; however, we are instantly ready to condemn a site application over a minor flaw although the degree of hazard from the entire program has thus far been rather limited on its impact on American society. We must begin to make progress on this problem without further delay over minute objections based on relatively minor and emotional reasons

I think EPA must provide the national climate of understanding and reasonableness that will help temper opposition to adequate sites with a practical degree of tolerance that will allow a badly needed site network to be achievable.

Sincerely,

John Teipel

John A. Teipel
Director

lj

DEPARTMENT OF STREET AND SANITATION SERVICES 2721 MUNICIPAL STREET DALLAS, TEXAS 75215 TELEPHONE 214 / 748-9711

John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
Environmental Protection Agency (AW-55)
Washington, D. C. 20460

San Francisco Branch
FRIENDS OF THE EARTH
[illegible]
San Francisco, Ca. 94111

DEAR MR. LEHMAN: Pursuant to the hearings Thursday, December 11, 1975 in San Francisco, the following comments are for your information and consideration:

It is disconcerting that staff of this organization sustains substantial demoralization -- and from listening to serial discrepencies set forth in testimony one can understand why being able to do nothing takes its toll.

Strong reason exists to eliminate duplication of costs throughout all strata of responsibility regardless of locations, services, agencies.

The remarkable emphasis on "technology" more as ends in itself than as means to ends is disjointed on various counts: 1) Although they usually receive only scorn and disdain individual innovators could contribute substantially to this aspect of environmental management at costs vastly less than that farmed out to the proprietary biggies with their toes in the various federal doors -- as Lockheed heavily subsidized with mismanagement and bailed out for its contract failures represents; 2) Emphasis and support properly accrue to these individuals -- not with the idea of forcing them to give the government their patents or products but with the specific focus of getting the best equipment for the job in the most efficient fashion; 3) This could be done in the manner hearings were conducted and legal or other routine elements represented toward coordinate ends and implementation; 4)Eliminate impedimentia from business routines, for example, tax exempts deadweight legitimate business at the hazard of independent businesses and needs to be stopped; 5) Prevention needs attention and instrumentation with violations and enforcement costs placed with violators -- not people victimized and currently commandeered to subsidize what no body wants.

EPA frequently finds itself committed to proper action only to have an issue diluted or virtually removed from corrective or preventive action. How can presentation of indirect costs which take heavy costs, as an example, be used to reinforce such cases?

I find it disillusioning to see pork barrellers in action -- and wonder why a munitions cleaning operations especially for national operation isn't located where munitions manufacturers are. Why isn't this kind of activity billed to munitions makers who alone profit from that stuff?

I think it makes sense to do a forum dispersing such information about firms as Zero Waste Systems and studies such as that done in Berkeley a couple years ago called A Technical and Economic Study of Waste Oil Recovery.

Nothing is free -- and waste, hazard, degredation cost more than the sane options to prevent or to deal with them. This emphasis seems lost to convenience, status quo, let John do it, and other impossible-to-sustain mind sets.

How does anyone find out true extent -- in dollars, types, volume, and destruction -- hazardous wastes prevail? Often recitals not only seem but obviously are phoney. How could EPA use or coordinate such economic information as that composed by the Council on Economic Priorities in this domain? So much cost information maintains "our figures" devoid of either cogence or accuracy and out of context or tiny domains leave much to be desired. How can you emphasize that it pays to prevent, to not despoil, to not generate hazard?

1567 December 31, 1975

Robert Gartner
6319 Sheringham
Houston, Texas

January 16, 1976

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Environmental Protection Agency
Washington, D. C.

Dear Mr. Lehman:

As an employee of Houston City government in the Water Pollution Control Division of the Health Department, I feel I have certain possibly useful comments to offer on the subject of Hazardous Waste Management. I speak also with a knowledge of other local and statewide regulatory activities and existing lasw pertaining to waste control. Environmental concerns have long been my interest.

On this subject of Hazardous Waste Management I have strong feelings that existing incentive in the form of legislation is grossly minimal. Specifically, existing laws addressed to solid waste disposal seem insufficient. Officers to enforce these laws are in short supply. Our division employs only one person for supervising solid waste disposal activities both authorized and non-authorized for the City of Houston.

I see P. L. 92-500 creating violations to the earth. Our city has a sanitary sewer water discharge standard that roughly paralles Texas state standards. As enforcement toughens, many will obviously seek the evasive solution of dumping. I have witnessed two such places in Houston last month where a disposal tank truck drained it's liquid waste onto the ground. These wastes contained high quanties of oil and heavy metals.

It is my understanding that solid waste authorized landfill sites are classified as to what they can handle. In Houston, I see the possibility of many violations of landfill laws. Houston has fire breaking out nearly once a month at one landfill with which I'm familiar and that means air pollution!

As to solutions, I find it difficult to address myself to the list of questions for which you have so kindly solicited input in the September 17, 1975 issue of the Federal Register.

One solution for which I feel might be effective on some points is one which Texas recently adopted requiring "trip tickets" of companies involved with generation, transportation and disposal of wastes.

After hearing input at the public hearing you held at the Holiday Inn in Houston, December 9, 1975 I learned that private Companies who treat wastes indicated positiveness in their ability to detoxify various industrial liquid wastes. One concern of theirs was what to do with a small quantity of a product of detoxification as a marketable substance like methanol. These Companies also indicated that defining incoming wastes could be greatly simplified because very often the generating industry has a good knowledge about them. I feel this could be true.

As to your Question #3, I don't know enough about the various wastes and their characteristics, but I feel that all these alternatives you mentioned should be considered in dealing with a waste.

As to people who transport wastes I feel that they should be liscensed. This should include septic tank cleaning companies so to dissuade them from shipping other types of wastes to places other than an appropriate disposal sites.

I would like to add an opinion as a member of the Houston Group of the Sierra Club and say that the Club is concerned with the health aspects in all areas involving toxic waste substances.

If I can be of any further assistance please contact me.

Thank you again for the opportunity to participate in the analysis of the question of hazardors waste management.

Sincerely,

Robert Gartner

Robert Gartner

Environmental Activities Staff
General Motors Corporation
General Motors Technical Center
Warren, Michigan 48090

January 29, 1976

Mr. Walter Kovalick
Office of Solid Waste Management Programs
U.S. Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Kovalick:

Enclosed is a text of a presentation made by myself at a Hazardous Waste Conference sponsored by the Michigan Department of Natural Resources January 28, 1976. Basically, the text calls for rules and regulations which will encourage risk venture capital to enter the solid waste processing business, presenting waste generators a choice of vendors who will provide a level of service and cost choice to the generator.

I have been told that this text would be of value if submitted for the record as comments for the Public Meetings on Hazardous Wastes as announced in the September 17, 1975, Federal Register. This copy is submitted for that purpose.

Very truly yours,

Donald K. Van Zile

D. K. Van Zile, Manager
Power Systems & Resource Recovery
Plant & Environmental Engineering

DKV/rw

enc.

Michigan Department of Natural Resources
Hazardous Waste Seminar
January 28, 1976

Speaking Text

Good morning Ladies and Gentlemen. It is an honor to share the podium with such distinguished company, and I appreciate the opportunity to present the viewpoint of one industrial representative. I represent a generator of waste which may or may not be hazardous. These are my views:

In my home my wife prepares food and generates food wastes; my son pursues his photography hobby and generates chemical wastes; I fertilize the lawn and spray the trees and generate pesticide wastes; I paint the house and throw away the cans with paint residues. At home I generate maybe a ton of wastes a year, some of which may or may not be hazardous. These wastes are collected by a private firm in compactor trucks, and the wastes disappear and I never have to worry about them again. In truth, these wastes go to a landfill. The only processing is some compacting.

Then I go to work. The average worker in my company generates approximately ten tons of waste a year -- the byproduct of his efforts to earn a living. Should the photographic chemicals, the fertilizer and pesticides, and the paint residues from one industrial worker be treated any differently than the street collected residues from ten people at home? In many instances I believe there is a tendency to regulate the disposal of some industrial wastes solely because they

are easy to control when, in truth, these wastes could easily be landfilled with the similar wastes from street collections. Far better that we regulate the construction of landfills so they can safely accept most wastes. They should be sealed and then industry and commerce can dispose of many of their wastes along with the balance of the community. I maintain that only a small percentage of industrial wastes should be subjected to special controls.

I would like to discuss the special controls in use in General Motors plants. First, before we ever worry about hazardous waste disposal, we must back down the line to materials purchased and brought into the plant. The principles here apply to all industry, large and small. Prior to purchase of any new material, some basic questions should be asked:

> "Does this material represent any type of a hazard to my employes or to my facility?"

If the answer to that question is "yes," that material should be identified, if only on a little 3" X 5" file card. Verbal instructions and trusting to memory are inadequate procedures when your facility or your employes are endangered. Key employes get sick and take vacations. *Therefore, a written instruction however brief, is necessary for hazardous materials identifying

*Too often, after an accident, we hear that the employe making the mistake was new and inexperienced.

the material, the hazard, and proper procedures for handling, storage, use, and disposal.

Of course it makes sense that once you have identified a material as hazardous, you might want to consider a substitute that presents no hazard. Regarding substitutes, I'm reminded of a series of Burma Shave roadside signs I once saw:

SUBSTITUTES LIKE UNKNOWN BARTER
OFTEN MAKE ONE SAD BUT SMARTER

Hopefully, substitutes won't make you sad but smarter; but you should always evaluate a non-hazardous material for the first chosen material which is hazardous.

A second principle for industrial materials, hazardous or not:

Don't discard the residue.

If the difference between profit and loss to a butcher is to get everything out of the pig but the "oink," how can we indiscriminately waste materials? Over 50 percent of the waste from GM plants is recycled directly into another GM plant or sold for reuse by someone else. I've been told that in the early days, Henry Ford specified the size of the wooden packing crates his parts came in. Then he tore the crates

apart and used the wood for floor boards. Unique, cost savings, sure! And he didn't have a wood waste disposal problem either. Here in Detroit, in those same early days, the boilers at Fisher Body-Plant 21 were fired with wood left over from manufacturing wooden bodies. Later that plant took over the wooden die and pattern making responsibilities and the boilers continued to use wood as a fuel until very recently. Are equal cost savings measures available for solid waste that might be deemed hazardous? I believe so. Last year GM plants burned over 4 million gallons of oil and oily sludges; this waste was used as a fuel in our boilers. Our Chevrolet-Livonia plant uses waste pickle liquor for cleaning prior to some plating processes. There are some instances where ways can be found to utilize a waste to advantage; it is always worthwhile to look for that possibility. But recycling and resource recovery must be thought of as volume reduction methods. There is almost always some residue that must be disposed of.

We must never lose sight of the long-term advantages that accrue to volume reduction of waste. The same amount of waste in a smaller volume must be more highly concentrated. Thought of in terms of a raw material (or ore), the more concentrated the ore, the better chance it can be utilized in a material resource recovery scheme. I'm particularly concerned about liquids and chemical fixation processes. In most waste

liquids there is water and a contaminant. Where the water can be evaporated off, leaving a concentrated solid contaminant, that solid can be easily handled, stored, accumulated, and at some later date, reused. Chemical fixation processes add materials to pumpable liquids, utilize time, energy, costs, and raw materials to process one waste into a larger volume of waste, and preclude any future hope of materials reclamation. It is my belief that chemical fixation should never be required by regulation and that chemical fixation should be used only as an interim measure by waste generators and waste processors.

I've just introduced a new concept in this discussion -- Waste Processors! Who handles your waste? We are very fortunate in Michigan, and particularly here in the southeastern corner, to have a wide selection of firms that specialize in waste processing. Most regions of the U.S. are not that fortunate, and many wastes that should be specially treated are dumped elsewhere on the ground. Waste processing is a highly specialized industry that has received too little positive help from Government. Industrial firms with a conscience (plus industrial firms stomped on by regulatory agencies) are the bulk of the customers of these few firms that specialize in waste processing. Those private businessmen that have invested money in facilities to treat waste have ventured into a risky business, and they are generally in need

of help across the country today. They have too few customers, too high an operating cost when compared to just plain dumping, and too many complaints from neighbors because it is an unsightly business. Necessary -- but unsightly! To compound their problems, there is always the uncertainty of Government action. Would you be willing to gamble your livelihood on a business dependent upon industrial customers willing to patronize you at higher costs merely because of their conscience? You are dependent upon Government regulations to increase your business and bring in more customers, but fear that Government action may also go into direct competition with you or class your business as a polluter and shut you down. As I said, we are fortunate here in southeastern Michigan with several firms in the waste processing business. As one citizen concerned with the environment, I would like to see more incentive nationwide for others to go into the waste processing business. It has been said that the lawyer who defends himself in court has a fool for a client. He should hire professional, objective council. The waste generator likewise is often well advised to hire a professional, objective waste processor.

Government regulation of waste management is necessary. Too many people would foul their neighbor's nest if some form of regulations did not exist. Moreover, Government

regulation must not begin and end with street collected residential refuse. All refuse must be regulated: Residential, commercial, and industrial. And prior to regulation must come planning. In some states, New York State for example, industry is given no consideration in waste management planning. I've seen municipalities vote to align themselves with the NYS Environmental Facilities Corporation, an authority for waste management. The first action of the authority was to take over all local landfills and decree that due to limited life, no industrial waste would be accepted. Remember -- an employe generates more waste at work than when he is at home. It is not a very forward looking Government that fails to make provisions for a worker to earn a living. Solid waste planning must include all waste from all sources: Residential, commercial, and industrial. And it must include all wastes, including hazardous and toxic wastes.

Upon conclusion of the planning, there must be some action; and by action I mean regulations and policies. I surely wouldn't interpret action to mean direct Government operation of the solid waste processing plants. I would hope that as a result of the current planning in Michigan, there would be action which would encourage risk venture capital to enter the solid waste processing business. Those firms already

here should find encouragement to improve their operations, and I believe there is room for others to enter the business.* Equally important, all waste generators must be treated equally. There must be consistent regulation for everyone. A generator likes to see a selection of vendors, such that he can choose a level of service and cost. Please don't believe that because GM is big, we can afford to spend more for waste treatment than everyone else. Our GM plants are run each like a small business. Each plant manager is held accountable for his operation; he must produce a product and make a profit just like any other small businessman. And small business or large, quantity of waste does not change toxicity or hazard. What a difference -- ten pounds in one day or ten pounds in ten days? All I ask is consistent regulation for all waste generators; I believe that stability in regulatory action is required to protect the environment, particularly when considering hazardous and toxic wastes.

---

*(An example of the type of Government regulation of hazardous waste which would benefit generators and waste processors alike was cited today by John (Jack) Lehman of the Federal EPA. If, by regulation and law, the waste processor takes full title to the waste and full responsibility for the waste at the time he removes it from the generator's property, he has a selling point that will cause generators to utilize his services.) A waste generator who contracts with a processor licensed by the state should be able to depend upon the state licensing powers to guarantee that the waste processor is competent and qualified and that the generator will be relieved of any further legal liability. In today's climate, the generator is never fully relieved of liability, even after paying top dollar for treatment to a licensed processor. Generators should have regulatory incentives to utilize waste processors.

In general, when discussing hazardous wastes, it is essential that Government regulations cover the situation, that these Government regulations are uniformly enforced for everyone, and that the generator pay the true cost of environmental safe disposal. Further Government regulations must not be blind to total environmental impact. We can't have air pollution regulations that inhibit burning of waste, especially where there is heat recovery to help solve the energy shortage. And we can't have solid waste regulations that inhibit the scrubbing of power plant emissions where necessary to solve an air pollution problem. Picture Fred Kellow saying to Lee Jager: "You won't let my constituents burn their waste; I won't let yours dump their scrubber sludge!" And look who's caught in the middle -- the poor man trying to produce a product to make a living.

I divide hazardous wastes into three categories for my consideration: Liquids, sludges, and solids.

Liquids

I've already discussed liquids. I believe liquids should be reduced to minimum volume through concentration and/or incinerated where necessary. We have found in some cases that waste plating solutions can be so well concentrated they can be reused in the plating tank again. Thus the

liquid does not require disposal. Even if you can't reuse the liquid, concentration reduces it to a smaller volume for treatment prior to disposal. Some liquids such as PCB's must be incinerated. Again, the use of a professional, objective, well qualified waste processor is advisable.

Sludges

Sludges come in many forms. Some people define dirty dishwater as a sludge. I personally don't like to call a pumpable liquid a sludge. In a wastewater treatment plant, the sludge taken from the bottom of the clarifier is pumpable. All GM wastewater treatment plants installed since 1970 have installed thickeners, vacuum filters, centrifuges, or filter presses such that the sludge is reduced in volume to a shovelable solid. For manufacturing plants the most common wastewater treatment plant sludge is an oily sludge from the acid-alum treatment process. This sludge can be reduced in volume in a process redesign to polyelectrolyte treatment of the water. Last year GM plants recovered over 4 million gallons of oil from similar wastewater treatment operations. Another common wastewater treatment plant sludge is a metal hydroxide sludge. We are now leaning toward ponding of the sludges, using sludge drying beds, and atmospheric evaporation of the water from the sludge. This does take some acreage, and it's not new; such technology has been in use in the paper industry for years.

The plant can put in a drying lagoon with a sand covered tile field draining back to a sump. The vacuum filter can now be shut down and sludge pumped direct to the drying bed. In one location we have five separate drying beds and use a different one each day of the week. Instead of hauling 100 tons per day of sludge, we now accumulate sludge for six months, and the final product instead of being like vaseline is now more like a damp talcum powder cake. It is loaded into dump trucks with a front end loader for the trip to the landfill. As a future benefit, the metals are much more concentrated and, hopefully, we will find a practical recovery method to treat this ore for recovery of the metals -- a step that was never close to being practical with the old vaseline-like metal hydroxide sludge. Metals recovery is now being investigated; we have not yet found a way to do it.

Along with wastewater treatment plant sludges, we have air pollution control device residues to handle. Many pollutants that must be removed from the air or from the water are toxic or hazardous and disposal should be controlled. A particularly troublesome air pollution residue we are now generating is the sludge from SO_2 scrubbers at coal-burning power plants. Again, this sludge is mainly water; it comes off the vacuum filter with a slippery feel -- somewhat similar to vaseline -- and it comes in enormous quantities. The basic constituent is calcium sulfate and calcium sulfite --

the same materials found in dry wall plasterboard. We tried to sell the material or give it away for use in plasterboard, but we were not successful. Nobody wanted to use waste to build a product that retails for about $1.50 for a 4' X 8' sheet. To keep the economics right, wallboard manufacturers cannot work with many small sources of supply. What to us is a mountain of sludge is to a wallboard manufacturer a source of material too small to warrant processing! At the present time, we must landfill these sludges.

Another category of sludge is the industrial process sludge. Typical would be the material removed from the bottom of a water wall paint booth, from an industrial parts washing machine, or the blowdown material from backflushing a Diatomaceous Earth Oil Filter. These sludges must be dewatered and usually landfilled.

Dry Solids

The final category of toxic waste I will discuss is the dry solids. These include poisons, pesticides, and some other materials such as cyanide salts from hardening furnaces. Just as we neutralize the toxicity of liquids prior to disposal, it is quite common for us to put these solids into a liquid state, mix in the chemicals to neutralize the toxicity, then concentrate the material to minimum volume, and landfill

the residues. In most cases, I would not approve of direct burial of a toxic solid without first treating it to minimize the toxicity and hazard.

In summary, an industrial operation must of necessity bring into the plant some materials which may present a hazard to the facility, the employe, and to the environment if improperly handled. We must have written procedures to minimize the risk. We must have a place to send the residues for environmentally safe disposal. I believe that with proper Government planning, policies, and regulations, the private businessmen already in the waste processing business, with help from others who will enter the business, will be able to provide the necessary service. Since private venture capital will usually only enter a stable situation, we need to stabilize the business climate for solid waste processing. I believe we need consistent regulations for all generators of waste that require special processing with full realization that most industrial waste presents no special problems beyond that of street collected residential and commercial waste and is safe for disposal in sealed, properly operated landfills.

D. K. Van Zile, Manager
Power Systems & Resource Recovery
Plant & Environmental Engineering
Environmental Activities Staff
1/26/76

GODAX LABORATORIES INC. 6 VARICK STREET, NEW YORK, N.Y. 10013
CLINICAL AND RESEARCH INSTRUMENTS TEL. (212) CA6-2664

January 26,1976

Mr. John P. Lehman
Director, Hazardous Waste Management Division
Office of Solid Waste Management Programs AW565
Enviromental Protection Agency
Washington D.C. 20460

RE: HAZARDOUS WASTE MANAGEMENT. Comments on Discussion Topics.

Dear Mr. Chairman;

I want to call the panel's attention to the results of our research: the potentials of completely eliminating the pollution caused by the users of chromic acid and sulfuric acid mixtures, the socalled dichromates.

Dichromates are used to clean laboratory glassware in research, chemical and medical laboratory. Large organizations like pharmacutical and research facilities therefore are disposing significant amounts of dichromates into the sewer system, aggravating the pollution of the environment.

I would like to place the enclosed published article on the record. It deals with the above problem and presents a simple solution to eliminate entirely this particular source of pollution.

If requested we can name a significant number of privat and governement organizations which are already succesfully using this replacement material accomplishing the same desired result as with dichromates.

Respectfully,

George Goda

George Goda
President

6 Encl.
gg.

Reprinted From The December 1970 Issue

A new glass-cleaning solution

THE chemist who is personally and professionally aware of and concerned about the effects of water pollution on the environment may not be aware that his own chemistry laboratory is a source of pollution Even the chemist who is seeking remedies or preventives for water pollution or who is monitoring effluent water quality may inadvertently be complicating his own task by further polluting his polluted samples The pollutant in the laboratory is the seemingly harmless substance that has long been relied upon as a glass-cleaning solution, saturated sodium or potassium dichromate in concentrated sulfuric acid Chromium compounds are considered to be pollutants because they have a toxic effect on the bacteria used to decompose organic matter in sewage treatment, and because chromium remaining in treated water can be toxic to human beings A material that does not contain chromate or other metal salts has recently been developed by the Godax Laboratories It is hoped that the product, trademarked "Nochromix," can facilitate chemists' analysis of polluted waters by helping them to avoid contaminating their samples, be of use to biochemists working with microorganisms to which chromate may be toxic, as well as help all chemists reduce the pollution potential of the laboratory Nochromix is an inorganic oxidizer containing no metallic ions It is marketed as a white crystalline powder that is readily dissolved in a small amount of water and can then be mixed with concentrated sulfuric acid The resulting solution is a stronger oxidizer than dichromic acid, yet it rinses more freely from glass surfaces The solution is clear, facilitating the recovery of small objects from the bath It becomes orange as the oxidizer is used up

An impressive number of references can be cited concerning problems stemming from traces of chromium in chemical and biochemical work As early as 1934, Laug[1] reported that traces of chromium adhere strongly to Pyrex glass and are only removed by very extensive washing, and, therefore, may contaminate biologic materials that subsequently come in contact with the glass

Later, Henry and Smith[2] conducted a series of experiments using potassium or sodium dichromate for cleaning glassware and found that, even after repeated washings, sufficient dichromate remained on the glassware to be toxic to microorganisms Toxicity was determined by following the growth of two strains of *staphylococcus aureus* turbidimetrically, and was checked by duplicate pour-plate dilution counts Because of the extreme difficulty in ridding glassware of dichromate after cleaning in "cleaning solution" and because of its great toxicity for living cells and enzymes, it is believed highly advisable in laboratories dealing with such material to clean all glassware by another method Butler and Johnston[3] in 1954 reported that residual chromium may cause some errors in microanalytical methods.

Mattenheimer[4] states that chromosulfuric acid should be avoided with glassware used for enzyme work A current laboratory catalog[5] recommends that dichromic acid should not be employed on glassware used in electrolyte, PBI, or metallurgical studies because the solution leaves hard-to-remove chromium ions on the glass

The *Handbook of Analytical Chemistry*[6] urges that precautions be taken in chelometric titrations to assure that storage containers, titration vessels, stirrers, etc are not the source of metal contamination due either to their composition or to the presence of surface films or deposits

Koranyi[7] and the *U S Pharmacopeia* (15th Rev) stress the need for long rinsing of glass exposed to chromic acid Henry and Smith[8] ran extensive experiments to determine the amount of chromium remaining on a glass surface. Although four to six rinses removed most of the dichrom[illegible] some remained ev[illegible] after ten rinses: e.g., the tenth washing from a 5-ml pipet contained between 0.10 and 0 20 mg Richard[9] studied the effect of such small concentrations of dichromate on yeast and other microbial forms and found as little as 0 0001 mg/ml to be toxic in some cases.

There are several other cleaning solutions used as substitutes for chromium, such as nitric acid and sulfuric acid mixture Mathers[10] recommends hot sulfuric acid and a "little" nitric acid An effective cleaning mixture is suggested by Crawley[11] containing 5% hydrocloric acid, 33% nitric acid, 2% Teepol, and 60% water, but according to Holland[12] the solution removes some of the glass itself, as indicated by a flask of 100-ml capacity which increased in volume by 0 04 ml after a 5-min immersion in the reagent. Mattenheimer[4] recommends hot half-concentrated HNO_3 for enzyme work.

With regard to waste and sewage treatment, chromium is one of the heavy metals highly toxic to the bacteria that help degrade organic wastes[13,14] Moore et al[15] reported that anaerobic treatment became gradually less effective at chromium concentrations of 0 5 mg/1 At 50 mg/l less than 50% of the chromium was removed by the treatment, the remainder discharging with the effluent Hawkes[16] indicates that heavy metals are usually considered toxic above 1–3 ppm U S Public Health Service Drinking Water Standard limits chromium to 0 05 mg/1 Thus, despite his long familiarity with "cleaning solution," the chemist must maintain his respect for its potential danger to the accuracy of his work and to the environment

Chromium-free Nochromix has important applications in enzymology, tissue culture, trace metal [illegible] ceutical research, clinical chemistry, criminology, analytical work, etc.

Mr Goda is President, Godax Labora-[illegible]

References

1 LAUG, E P, *Industrial Eng Chem. Anal Ed 6*, 111 (1934)

2 *Clinical Laboratory Methods and Diagnosis*, 5th ed. (Gradwohl, 1956)

3 BUTLER, E G and JOHNSTON, W A, "Retention of chromium by glass following treatment with cleaning solution," *Science 120*, 543 (1954)

4 MATTENHEIMER, H, *Micromethods for the Clinical and Biochemical Laboratory* (Ann Arbor Publishers, Inc, 1970), p 33

5 "Cleaning laboratory glassware," Appendix 977 in *Scientific Products Catalogue* (Scientific Products, Evanston, Ill, 1961)

6 MEITES, L, Ed, *Handbook of Analytical Chemistry* (McGraw-Hill, New York), 1st Ed, pp. 3–30

7 KORANYI, G F, *Surface Properties of Silicate Glasses* (Akademiai Kiado, Hungary, 1963), pp 42–43

8 HENRY, R V and SMITH, E C, *Science 104*, 2705 (Nov 1946)

9 RICHARD, O W, *Phynol Zool 9*, 246 (1936)

10 MATHERS, F C, *The Chemist-Analyst, No 13*, 10 (1915)

11 CRAWLEY, R H A, *Chem and Ind 45*, 1205 (1953)

12 HOLLAND, L, *The Properties of Glass Surfaces* (Chapman and Hall, London, 1964)

13 INGOLS, R S and FETNER, R H, "Toxicity chromium compounds under aerobic conditions," *J Water Pollution Control Fed 33*, 366 (1961)

14 MC CARTY, P L, "Anaerobic treatment of soluble wastes," p 349 in *Advances in Water Quality Improvement*, edited by E F Gloyna and W W Eckenfelder, Jr (University of Texas, Austin, 1968)

15 MOORE, A W and MC DERMOTT, G N, "Effects of chromium on the activated sludge process," *J Water Pollution Control Fed 33*, (54) (1961)

16 HAWKES, H A, *Ecology of Waste Water Treatment* (Pergamon [illegible]

1047 Bush Street / Apartment Three San Francisco 94109 January 23, 1976

John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
Environmental Protection Agency (AW-55)
Washington, D. C. 20460

SENATORS Cranston Proxmire
Nelson Tunney
Dole Pearson
ADMINISTRATOR Russell Train
ADVISOR Rogers C. B. Morton

PURSUANT TO DECEMBER EPA HEARINGS IN SAN FRANCISCO, these comments and suggestions:

EPA might gather support and clout from "grass roots" elements never recognized if properly "briefed" -- something with more stamina and cogent information than press releases. Particulary important carriers include publications of Sierra Club and Friends of the Earth's NOT MAN APART, for example. For publications to do readers any service they must receive materials sufficiently ahead of time to 1) get published and 2) allow readers receiving them to act. Individuals could be useful too, but they must have sufficient lead time to act coherently. Many of us outside the streams of communication could participate effectively in small but concerted ways provided proper knowledge and time. Organizations run by war models almost unviersally refuse anything associated with many areas of your coverage, and refuse as well any but their own, frequently heavily loaded, figures. Such middle and upwardly mobile management prevails as they are almost exclusively recipient of this type information and can stop it at their pleasure.

Congress remains derelict and remiss to refuse removal of all [redacted] tax amenities by exemption, deduction, nonprofit to any and all entities, beginning with churches, and all their encumbering appendages and self-perpetuating proliferates, unions, all trade associations, "consultants", do-gooders and hangers-on generally. Inflationary deficits they inflict effectively preclude genuine citizen participation and assure costs of agency services and all other goods and services at levels persistently debtmaking. The net effect: no citizen representation or participation, as these people paying taxes (high percentages do not) remain outside even the possibility to conduct their own affairs, of which those of government and your operation are parts.

EPA properly makes no grants to any tax amenitied group or individual. Rather, the thrust of investigation and invention properly assigns to individuals. To my knowledge they are never sought. Those seeking meet holier-than-God and other we-must-see-that-the-people's-money-is-well-spent excuses to stand pat, put down, and get rid of legitimate inquiries and their makers. Congressional appropriateions need to center on competent individuals and design, as ZERO WASTE SYSTEMS representative clearly said. There could not possibly be greater cost than with such pathologies as Lockheed, any of the distemperate transportation episodes. Anyone could set up testing and buy data collection and elicit visibility with that kind of money. Unfortunately, tootsie remains the game, your agency looses face, and money buys only pretense and false advertising.

Furthermore, individuals and small firms must be paid in good order upon completion and acceptance of work contracted by government. One organization paid 14% at the bank to cover payroll while the government delayed some time in meeting its obligation on a few (small) thousands of dollars. It makes special legislation for the friendly friends of the friends.

If you don't know about these people, you should:

1. Project Eliminate Waste
   P O Box 24136
   San Francisco 94124
   (415) 648 4251

   Eagle Kashaya
   He, I understand, helped put Zero Waste Systems together, comes from business, and knows what he's about. This is a situation in which a nonprofit organization was the only way to go under status

2. Donald Aitken, Ph. D., Director
Environmental Studies Program
California State University
San Jose, California

Unfortunately another tax amenitied institution and restrictive to that extent. This astrophysicist with a range of contacts that include solar and other "it can't be done" energy modes that work now on efficient useful scales, participates in and coordinates applciations you should look at. PREVENT hazardous wastes!

3. Capt. Frank Cheek, Pilot
Eastern Airlines

SEE The National Observer
January 17, 1976

Jet Descent Nomograph, he invented to save jet fuel in landing, reported as incredibly simple -- considered the reason for slow acceptance. It's also not a mint or indebtedness and nobody commissioned it which relieves spurious credit!

4. Migma Fusion
Dr. Bogdan Maglich
Fusion Energy Corporation Laboratories
Princeton, New Jersey

A bona fide engineer out of the nuclear ranks who apparently got short shrift at the government's doors for reasons of professional interference -- another way to derail legitimate prospects worthy of consideration rather than put downs where imperatives of energy sources CLEAN and available arise.

5. HABITAT, the conference on human settlement in Vancouver, 1976, conducted by the United Nations

I am not personally convinced of the veracity of the official conference or its concerted exclusion of Western industry of merit; the unofficial conference: bravo!

This format, in the unofficial conference especially, properly includes individuals and their innovative, pertinent technology. Instead the State Department will conduct its usual glossy and useful ideas seem less than likely. I've had a great runaround. I did not contact State as I felt it an exercise in total futility for any serious purpose of exposure of individual performance, technology that performs as represented, or applies without outrageous price and peddling pressures.

6. William G. Webb
3640 Santa Rita Road
Pleasanton, California 94566
(415) 462 3642

VENTRA-VAC is equipment for its day, applies wherever water quality maintenance and control is at issue, and rather than obstructions and dredging in current marine constructions needs real consideration -- which when visibility overtures can be followed up may materialize. Removes no hazards, but circulates and aerates water in the manner of a fast moving stream, bringing oxygen to the systems, supporting them to completion, and aiding various marine situations coexisting. Descriptive information for your reference. Any questions contact me or Webb.

- About a year ago I contacted various individuals, groups, and legislators (with no proprietary assertions or embarrassemhh, as here) about an oil recycling system. I was informed by the Department of Agriculture that oil recycling in agriculture was outside their purvue. Dust abatement is a cheap shit refusal to deal -- and as my family farms and off-the-cuff figures I get astound: GET WITH IT.

John P. Lehman

8. I know someone working on absolutely clean, no way to pollute, energy. He is not ready to discuss either his ideas or make this generally known. When he is ready to work out his concept there should be revenue available sans hassle, as he is an individual of personal integrity and veracity, withou t, however, the trappings and lures of grantmanship, beholdenness, and institutionalized hanging-on. Until and unless he is ready to go public, I cannot name him. In the meantime it is greatly to be hoped that funding goes to get today's work done in good order, rather than in cost-no-object treatment after deficit spending has bought bungling and overruns and equipment that does not work and does not perform as represented. There are better ways to go.

Public briefings frequently advise only moguls of industry and business accustomed to talking with themselves. One such transaction plainly underscored this fact I already knew. I answered the telephone in a trade association office (tax exempt, tax deductible, nonprofit, membership service, limited public service), took a message for the executive director which I delivered, that the Department of Commerce as I recall, had a new research vessel in the SFO Bay aboard which a special "public information briefing" was being held and to which he was invited. I asked who was included in such presentations. I was told "business leaders and executives". I asked if such reputable groups as Sierra Club and Friends of the Earth were also invited. They were not important, this was for the public, I was told! This was PUBLIC information -- to brief the PUBLIC! As an entirely competent individual I greatly resent the absence of participation in such things to which wives universally pad the premises for the ego aggrandizement of those briefed!! I despise the attendant lies and deceit surrounding such overtures. At the same time I fully appreciate the infantileness some "environmental crusaders" exhibit and understand criticism properly attaches accordingly to disparaties among these ranks. They are the same stuff their counterparts exhibit in restricting audience and incestuousness derivitives

The fact I can handle information does not give me either time or money to participate, as one paying tribute ahead of all other costs sustains further pressurized abuses -- all extremely hazardous waste. Barricades that force me to pay full cost in any amount that provides freeloading deadbeats in tow for any reason for events or conferences must be eliminated. Public agencies are perfectly intractable and asinine on this score -- interfering with information dispersal rather than fostering it. Marriage licenses' elastic dollar value needs removal. Only identical per capita cost properly prevails. No cost for access on any but per capita makes the only sense. Anything else is oneupmanship, pure tribute to extensive, expansive, abuse. Hospitality commonly devises brutality and restriction via excessive displaced costs that clearly place information secondary to a "cheap" if not free woman (most such spouses are female) in hand.

What does this organization do to apprise candidates of things they do not want to hear? Of apprising constituents of realities? This area of your primary trust stands void to proper recognition and any action to get on with the business of retaining currency with the shrinking landscape and resources by whatever name, and emphasizing that best-run companies seem most environmentally sound and most profitable. Is it possible that the Council on Economic Priorities could reinforce EPA's position at complementary points? Why not? They do a second-to-nobody job. Why would they not be invited and utilized for their excellence and veracity? And maintain this position, rather than hire prostitutes in the service...?

I am sure some of the best-spent Federal advertising money is under EPA jurisdiction. Federal advertising generally, generally riddled with holes of caveat, leaves much to e desired and needs to be removed from such budgets. Among these energy has to be a highpowered bastard, and social security and AFDC which omits faces that tell truths.

Christina M. Groth

Christina M. Groth

GUAM ENVIRONMENTAL PROTECTION AGENCY
POST OFFICE BOX 2999
AGANA, GUAM 96910
TELEPHONE 749-9901, Ext. 372

OCT 16 1975

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

Dear Mr. Lehman:

I have noted your intention to hold a hazardous waste management seminar in San Francisco on December 11, 1975. I am enclosing earlier correspondence with the Region IX office concerning hazardous waste management. I hope some of these topics will be discussed at your meeting and any results produced filtered back to us for our information.

Sincerely yours,

JERRY L. WAGER
Head, Planning & Program
Development Division

Enclosures

"ALL LIVING THINGS OF THE EARTH ARE ONE"

Mr. Frank Covington
Director, Air and Hazardous
Materials Division
U.S. Environmental Protection Agency
100 California Street
San Francisco, California 94111

JUL 16 1975

Dear Mr. Covington:

Subject: Comments on Proposed Hazardous Wastes Study for the Pacific and Proposed Guidelines for Procurement of Products that Contain Recycled Materials.

Hazardous Wastes

We were asked by Mr. Chuck Bourns to provide some input on the scope of services for your proposed hazardous waste study for the Pacific Islands. It follows:

(1) Present current costs for (a) on-island transportation, (b) storage, (c) treatment (if any), (d) handling, (e) ocean transportation, (f) handling and transportation on the mainland, (g) disposal/treatment on the mainland for commonly encountered hazardous wastes. Recommend who should bear these costs. Who is the contact person/position regarding shipment of hazardous materials? What federal and local regulations already apply to shipment of these materials?

(2) Determine if port facilities in each island have sufficient area for storage, repackaging, containing spills, and handling these materials. Assess the individual personnel capability at each port to safely handle the wastes. If not, what training will be needed and who will accomplish it? What special equipment is needed in each area?

(3) Contact military facilities to do an in-depth analysis of the hazardous materials they generate and their local capability for handling, treatment, and disposal. Will they program into their budgets costs associated with hazardous waste disposal? Who is the contact person/position at each facility regarding hazardous wastes?

(4) How will local OSHA offices be involved in this study and subsequent disposal of wastes?

(5) What are existing shipping lines and their travel frequencies capable of handling hazardous wastes in the Pacific; what special requirements would have to be met by the shipper?

(6) What wastes are currently and can expected to be generated on each island by civilian and military facilities? What are the existing ways of handling hazardous wastes? What needs must be planned for (a) immediately (b) 2-5 years (c) 5 years+?

(7) What will be the major trans-shipment points in each area and what port improvements (both physical and personnel) will this require?

(8) Identify potential users of present and anticipated wastes in the islands so that disposal can be avoided if possible. If recovery techniques are already available for certain wastes, identify them. Recovery and reuse of these wastes should be paramount.

Guidelines for Procurement of Recycled Materials

We think the guidelines are good and certainly overdue. We have transmitted a copy of them to island Air Force and Naval Commands for their information with a copy of this letter. One item that has major impact on Guam, and that these guidelines do not appear to have relevance to, is the use of returnable beverage containers. Guam suffers from an abundance of nonreturnable containers causing severe litter problems and contributing to our vector control problems. Military exchanges generate nearly 70% of Guam's beverage containers, all of which are nonreturnable. The increasing reliance on one-way containers has also contributed to the closure of bottling operations on the island. If these guidelines cannot be used to stimulate the use of returnable bottles by federal facilities, what is the federal government doing to alleviate this problem?

Sincerely yours,

O V Natarajan

O. V. NATARAJAN, Ph.D.
Administrator

cc: Admiral, U.S. Navy
Air Force Base Commander
Governor's Office
Chief of Operations, Public Works

GUAM ENVIRONMENTAL PROTECTION AGENCY
POST OFFICE BOX 2999
AGANA, GUAM 96910
TELEPHONE: 749-9901, Ext. 372

Mr. Paul DeFalco, Jr.
Administrator, Region IX
U.S. Environmental Protection Agency
100 California Street
San Francisco, California 94111

AUG 18 1975

Dear Mr. DeFalco:

As you know, our Agency is engaged in building a comprehensive pesticide control program. The recent workshop here, sponsored by your Agency, did much to spread information about local pesticide programs and problems, as well as federal activities in this vital area. However, the portion of the workshop dealing with pesticide disposal regulations and programs highlighted what we consider to be a potential problem in federal program coordination.

Recently, we wrote to Mr. Frank Covington in response to a verbal request from your Agency for suggestions on the content for a scope of services to study hazardous waste disposal practicies in the Pacific area (copy enclosed).

The disposal of pesticides is a very obvious problem in this area, particularly in view of (1) the Yap pesticide incident in 1974, and (2) recent federal actions suspending registration of Aldrin, Dieldrin, Chlordane, and Heptachlor. We assumed that the proposed hazardous waste study for the Pacific would include an analysis of the impact of federal registration suspensions and how to solve the disposal problems they will create. Additionally, there are existing stocks of old pesticides, at least on Guam, for which there is no longer a foreseeable use.

Comments by federal officials at the recent workshop, in response to questions about evaluation of pesticide disposal problems, indicated that such subjects may not be included as part of the study. We think this would be a serious oversight.

I hope that the proposed study will indeed include pesticide disposal problems in its analysis and I am anxious to see how our earlier suggestions were incorporated into the final scope of services.

Sincerely yours,

O. V. Natarajan

O. V. NATARAJAN, Ph.D.
Administrator

Enclosure

cc: Governor's Office

1592

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
100 CALIFORNIA STREET
SAN FRANCISCO CALIFORNIA 94111

AUG 18 1975

Dr. O. V. Natarajan, Administrator
Guam Environmental Protection Agency
P.O. Box 2999
Agana Guam 96910

Dear Dr. Natarajan:

Thank you for your letter of July 16, 1975 in reference to the proposed "Hazardous Waste Study for the Pacific" and the "Guidelines for Procurement of Products that Contain Recycled Materials". Your comments concerning the proposed hazardous waste study will be taken into consideration in drafting the scope of work and procedure.

In regard to your questions concerning stimulating the use of returnable bottles at Federal facilities, the EPA has promulgated draft "Guidelines for Beverage Containers" and is now seeking comments from interested parties. We have attached a copy of the draft guidelines for your information, and you may send comments directly to the address shown in the Guidelines under the section Response Requested.

We have reviewed your "Beverage Container Report" of May 1974 and are aware of the acute beverage container litter problems that Guam experiences. The beverage container guidelines, as they are presently written, will require Federal Agencies to impose a minimum 5¢ deposit on all beverage containers sold at federal facilities. Though these containers are not necessarily refillable, it is anticipated that the minimum deposit will encourage people to return their empty containers and thereby alleviate the litter problems associated with them. In addition, it is hoped that secondary materials dealers will recycle the relatively uncontaminated, non-refillable containers back into the production cycle. Of course, the Guidelines urge use of refillable containers wherever possible.

We have also enclosed a news clipping quoting the Administrator of the Environmental Protection Agency which sets forth the position of the Agency on this subject.

Sincerely,

Frank Covington, Director
Air & Hazardous Materials Division

MARTIN M. SHEETS
1973 W. GRAY, RM 4
HOUSTON, TEXAS 77019
TELEPHONE: 523-1975

GEOLOGIST
PETROLEUM CONSULTANT

ENVIRONMENTALIST
ACTIVE SURFACE FAULTING

January 9, 1976

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
(A.W. 565)
Environmental Protection Agency
Washington, D.C. 20460

Dear Sir:

It was my pleasure to attend the hearing conducted by your group on December 9, 1975 at the Holiday Inn Medical Center, Houston, Texas. It was my feeling that the hearing and others on the same day and related days were very good and beneficial both to your agency and the public. I would like to compliment you on the meetings and the way in which they were conducted.

No statement was presented here by any geologist, to my knowledge, so I wish to present the enclosed statement for inclusion in the final report. I hope it will be a help. If I can be of any other assistance I'd be pleased to hear from you.

Yours sincerely,

Martin M. Sheets

Martin M. Sheets
Houston Geological Society
Environmental Committee

P.S. Would you please put me on your mailing list to receive notices of similar meetings in the future.

MMS/mm
Enclosure

STATEMENT to be included as part of the record of the E.P.A. Hearing on Hazardous Waste Management held at the Holiday Inn Medical Center, Houston, Texas, December 9, 1975.

Geologists of the Houston area are very concerned about the subject problems and feel that they can make a useful contribution to their solution. To that end, they submit the following statement:

Storage, general: As far as practical, storage of hazardous wastes should be confined to topographically undrained basins, so that any spills which occur could not find the way into the ocean. Such basins are common in the western U. S.

In areas such as the Gulf Coast and all other salt basins, salt deposits may provide the most versatile and safest medium of storage.

In order to immobilize wastes, it is suggested that, where useful and practical, the wastes be converted to pellets, heavy mud slurries, or mixed in cement.

Regarding siting: All plants where hazardous wastes are produced or stored should be located far away from streams, rivers and oceans because a spill into a major river or the ocean would be absolutely uncontrollable.

Geological Aspects, Subsidance and Active Surface Faulting: In the Gulf Coast, and no doubt many other areas, surface faults are actively moving. Such movement can cause rupture of pipelines, storage tanks and other surface handling facilities. It could also cause railroad derailments and perhaps damage to other modes of transportation.

Near sea level, subsidence of the land surface makes storage and handling facilities more vulnerable to damage from hurricanes and other storms. Such surface subsidenc is occurring in the Houston vicinity and many other areas and will continue to be a problem.

Such Geologic problems are not unique to the Gulf Coast and no doubt also apply to a greater or lesser degree in many other areas. It is recommended that consultation wit a thoroughly trained and experienced local geologist be made a mandatory part of ever project.

Disposal: We would agree with some others that, where practical, the best method of disposal should include detoxification and recycling.

Monitoring: All phases of hazardous waste management should be very carefully and continually monitored. Consideration should be given to making non radioactive wastes slightly but not dangerously radioactive to facilitate monitoring. It would seem that the transportation phase of the hazardous waste management problem is perhaps the most difficult to monitor and at the same time the area in which the greatest improvement is needed. Two truck transporters presented ideas at this hearing but no representatives of any railroad or barge company presented any statement. All such people should be pressed into service to help solve the problems. All present regulations regarding transportation should be rigorously enforced.

Penalties: Hazardous waste management is a very serious responsibility, in some cases involving great risks. It is extremely important that violations be eliminated and violators apprehended. To that end it is recommended that very severe penalties be imposed, perhaps scaled according to the severity of the hazard or the resulting possible damage. In this regard it is imperative that all persons involved be thoroughly educated as to the seriousness of the problem.

HOUSTON GEOLOGICAL SOCIETY
ENVIRONMENTAL COMMITTEE

Martin M. Sheets

Martin M. Sheets, Chairman

LEAGUE OF WOMEN VOTERS OF NEW JERSEY
460 BLOOMFIELD AVENUE, MONTCLAIR, NEW JERSEY 07042 TELEPHONE 746-1465 AREA CODE 201

HAZARDOUS WASTE MANAGEMENT

Comments on Discussion Topics of Public Meetings

Conducted by the Environmental Protection Agency. December 1975

Margaret Hoffman, Solid Waste Chairman
January 30, 1976

Thank you for this opportunity to comment upon the need for a better national perspective on needed guidance for the proper management of hazardous wastes. We in the League of Women Voters recognize that the generation of hazardous and extremely hazardou wastes is a constantly increasing and vexatious problem. In the past our concern for environmental integrity has been evidenced by our support of prohibitions on the disposal by incineration of such wastes, with its resultant pollution of the air, and of dumping into waterways and oceans with a potential for future degradation of disastrous proportions. The institution of more stringent controls upon air and water pollution, however, have affected past disposal practices at the price of a significant increase in disposal to the land.

In this time of mushrooming development in the field of new products, especially chemicals, the vast majority of consumers is unfamiliar with the composition of the greater part of the products they use, or with their potential for hazard in use or in disposal. At the same time we are constantly made aware of new dangers from chemicals, such as the recent Kepone incident in Virginia; danger from biologicals and mutations developed for warfare, some of which are reported to have no known antidote; danger from radioactive materials disposed of on sea and land in containers that will wear out long before their contents lose their power; dangers from the dumping of PCVs and acid wastes in shallow wells on industrial sites, with resultant contamination of ground waters -- a chilling list that grows with each new day. Such threats demand mor than compliance measures, or the good references of past performance, such as has been evident in the field of pathology. For the protection of present and future health and safety, regulations must be established to control the disposal of a wide spectrum of substances, both presently and potentially hazardous.

(more)

LWVNJ Comments on Hazardous Waste Management

Initially, a comprehensive definition of hazardous waste must be established, with guidelines for the inclusion of other substances, or combinations of substances, that are subsequently revealed to be hazardous in nature.

All materials that have a potential for hazard in disposal must be distinctly and uniformly identified, in the manner of the "skull and crossbones" emblem that is universally accepted as a symbol for poison.

Areas of responsibility for hazardous waste disposal must be clearly defined, from the initial inception of the product, through its manufacture, shipment, sale and use. This definition of responsibility would include the training and qualifications of all handlers of radioactive, pathogenic or chemical substances found to be hazardous in disposal, and a guarantee of compliance with regulations must, at all times, rest with a specified party.

Every effort should be made to withhold the use of products until there are measures available to alleviate any harmful effects from disposal of these products.

The successful execution of any hazardous waste management plan demands a nationwide, uniform code of regulations, adequately funded and policed to insure compliance. While some industries have instituted excellent procedures in disposal practices, many have shown a shocking irresponsibility toward the public good, and demonstrated the absolute necessity for scrupulous monitoring of any safeguards that are instituted.

While presently describing hazardous wastes as "the particularly dangerous discards of a highly industrialized, technology-based society," we must always recognize that, in fact, all wastes have the potential for hazard, at certain times, in certain concentrations and most especially in certain combinations.

The suggestion has been offered to designate suitable areas for the disposal of hazardous and radioactive wastes, but there is always the danger of such a plan encouraging the "out of sight, out of mind" climate. We must constantly assess every detoxificating method for existing wastes, including those that have been disposed of improperly by land or sea.

As we reap the benefits of our technologically blessed society, we must accept the moral responsibility for controlling its enormous potential for harm. We will leave a poor inheritance if we devour the fruits of our technology and bequeath the garbage detail to our children.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
P O BOX 2418, TERMINAL ANNEX
LOS ANGELES CALIFORNIA 90051
TELEPHONE 226-4101

A E BRUINGTON
CHIEF ENGINEER

HOWARD H HAILE
CHIEF DEPUTY ENGINEER

ASS T CHIEF DEPUTY ENGINEERS
OMER D HALL
CHESTER MAGNESS
JOHN M TETTEMER

ADMINISTRATIVE DEPUTY
JAMES R POLLEY

December 15, 1975

IN REPLY PLEASE REFER TO
FILE NO 2-19.07
Public Meeting of the
Environmental Protection Agency
Regarding Hazard Waste
Management Problems
December 11, 1975
San Francisco, California

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Program
U.S. Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lehman:

The Los Angeles County Flood Control District, although not represented at the public meeting, is very concerned with the hazardous waste management problem. As operators of a large drainage system and having experienced hazardous wastes in our system, we would like to present the following items for consideration in the preparation of your program:

1. Accidents or plant upsets can transform any hazardous material into a hazardous waste material. Once a material leaves its pipeline, tanker, storage tank, or other confinement, it becomes a waste product.

2. Surface discharges almost always enter existing storm drainage facilities and the local storm drainage agencies must be included in any inland waste management program. They alone have access to and are familiar with flow patterns in their system and are aware of the location of any men and equipment in the affected area. This is especially true when the drainage facilities are subsurface.

3. The waters in local drainage facilities which consist of natural flows, rainfall run-off, urban run-off, National Pollution Discharge Elimination System Permit waste discharges, sewage plant effluent, and all other gravity flows may travel miles in underground conduits. Only the local storm drainage agency has authority, jurisdiction, knowledge of, and the necessary men and equipment to safely work in its system.

1600

2250 ALCAZAR STREET LOS ANGELES

4. The local storm drainage agency is probably not a Federal or State agency and, therefore, has no guarantee of recovery for funds expended in the containment or removal of hazardous materials under existing legislation.

5. Once a hazardous material is in a local drainage system, it is difficult to recognize or identify the material so that appropriate precautions may be taken. It is at this time that the local agency needs maximum assistance and guidance.

We believe that an effective waste management program must include immediate notification of the local storm drainage agency and should have a 24-hour information service for consultation regarding safe procedures for identifying, containing, treating, removing, and disposing of hazardous wastes. Legislation should be enacted to authorize, assist, and protect the operators of local drainage facilities in their interaction with hazardous wastes.

This District has a program whereby experienced personnel and equipment are available 24 hours a day to respond to and assist in the location and handling of any waste material entering or tributary to our drainage system. The effectiveness of this program is due to the excellent cooperation of Federal, State, and local agencies and others who frequently interact with accidental waste discharges. We would appreciate any program which will provide for early notification and identification of a problem as well as the most up-to-date control and disposal technology.

We thank you for this opportunity to comment on the hazardous waste problem and, if we can be of assistance, please contact Mr. John K. Mitchell at (213) 226-4386.

Yours very truly,

A. E. Bruington

A. E. Bruington, Chief Engineer

DKC:gf

cc: Mr. Paul DeFalco, Director
Environmental Protection Agency, Region IX
100 California Street
San Francisco, CA 94111

Mr. Harry L. Hufford
Chief Administrative Officer
713 Hall of Administration
500 West Temple Street
Los Angeles, CA 90012

Mr. John H. Larson
County Counsel
648 Hall of Administration
500 West Temple Street
Los Angeles, CA 90012

F C Aldrich
Manager Environmental Control Division

Marathon Oil Company

Findlay Ohio 45840
Telephone 419/422 2121

January 8, 1976

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lehman:

Marathon Oil Company appreciates the opportunity to comment on Hazardous Waste Management Discussion Topics as defined in 40 FR 92993 September 17, 1975. Marathon's comments are directed to two points of concern: the disposal of biodegradable oily wastes which can be disposed of in an environmentally acceptable manner and therefore should not be considered along with and subject to the same rigorous controls as the disposal of toxic or dangerous wastes; and the potential liability to a waste generator for the actions of a waste treater and/or disposer.

Marathon production, transportation, and refining operations generate oily solids and oily sludges associated with the dewatering and storage of crude oil plus the treatment of refinery waste waters. Marathon has found as have many other oil companies that land farming of oily solids and oily sludges is a safe, environmentally acceptable, and non-energy intensive method of degrading the oil associated with these wastes through the activity of soil bacteria. Marathon believes that the disposal of such wastes are not hazardous, even by EPA criteria, when such disposal is by land farming. Because of this, Marathon believes that land farming of oily solids and oily sludges with adequate safeguards for adjacent surface waters and underground waters should not be subjected to the rigorous controls and reporting requirements applied to toxic or dangerous wastes.

Marathon Oil Company believes that the ultimate liability for the disposal of a hazardous waste should rest with the contractor treating and disposing of the waste so long as the generator of the waste has properly defined or identified it to the contractor

and so long as the generator of the waste has determined that the contractor is licensed to dispose of the hazardous waste in question in an approved disposal area.

Very truly yours,

F. C. Aldrich

F. C. Aldrich

FCA:sjs

NICHOLAS J. MELAS
PRESIDENT

Bart T. Lynam
General Superintendent
751-5722

BOARD OF TRUSTEES
JOANNE H. ALTER
JOAN G. ANDERSON
JEROME A. COSENTINO
VALENTINE JANICKI
WILLIAM A. JASKULA
JAMES C. KIRIE
CHESTER P. MAJEWSKI
NICHOLAS J. MELAS
JOHN W. ROGERS
445

January 30, 1976

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solids Waste Management Programs
AW-565, Environmental Protection Agency
Washington, D. C. 20460

Subject: HAZARDOUS WASTE MANAGEMENT

Dear Mr. Lehman:

In the Federal Register for Wednesday, September 17, 1975 at page 42993, a Notice was published inviting comments on the matter of hazardous waste management. We are informed that there is a possibility that sludge from municipal sewage treatment plants may be considered a hazardous waste. We feel strongly that such designation would be highly inappropriate and would place many municipal agencies at a disadvantage and under redundant regulation. Disposal of sludges from municipal sewage treatment plants is already under regulation by other Federal, State and Local programs.

Attached for your information is a statement which we would like you to include as part of the record which is in response to the above referenced Public Notice.

If you have any further questions, please contact this office.

Very truly yours,

B T Lynam

Bart T. Lynam
General Superintendent

BTL:CLH:RL:r
att.

STATEMENT ON HAZARDOUS WASTE MANAGEMENT
TO THE EPA

The Metropolitan Sanitary District of Greater Chicago (District) has prepared a statement concerning the United States Environmental Protection Agency request for information regarding Hazardous Waste Management published in the Federal Register (Vol. 40, No. 181, p. 42993) on September 17, 1975. In particular, the District has prepared a comprehensive document describing the utilization of municipal sewage sludge in the agricultural sector for fertilizer and reclamation of low fertility soils. Before beginning this statement, the District would like to address those specific topics in the Federal Register regarding Hazardous Waste Management which are in our area of expertise and relate to the Utilization of Municipal Sludge for fertilizing row crops and reclaiming soils. We will itemize the topic areas as they appear in the Federal Register.

No. 1. The question of "What is a hazardous waste?" as related to municipal sludge utilization is discussed in general in our comprehensive document which follows these specific comments on the topics in the Federal Register.

No. 2. The responsibility for waste management should rest with whoever has physical possession of the waste. The supplier has responsibility to inform receiver of the nature of the hazardous waste.

No. 3. As stated later in our presentation, it is the opinion of MSD that municipal sludge should not be considered as a hazardous waste.

No. 4. In the case of digested municipal sewage sludge, it is the opinion of MSD that anaerobic digestion for 10 days at 35°C followed by 60 days in a lagoon at 20°C or 120 days at 4°C will stabilize sewage sludge and reduce pathogens to a minute level. The soil serves as sink to inactivate many toxic metals. Research findings in Illinois indicate that 40 to 70% of the metals in sewage sludge are retained in the soil plow layer. The metals are thought to be precipitated or fixed to the colloidal fraction of the soil.

No. 6. Safety precautions at municipal sludge application sites should include limited access to the site and existing OSHA standards for employees working at sewage treatment facilities.

No. 7. In the case of using digested municipal sludge as a crop fertilizer, we recommend periodic chemical analyses of the sludge applied and if less than 15 dry tons per acre (34 mt/ha) applied no other monitoring is needed at the farm.

In the case of using digested municipal sewage sludge for land reclamation or soil improvement which results in high per acre application rates,

we recommend periodic monitoring of surface and groundwater in the area of sludge application.

No. 10. If digested municipal sludge is used as a crop fertilizer, the controlling constituent in the sludge should be nitrogen. The sludge application on crop land should be limited to the nitrogen required for optimum crop yields.

No. 11. With digested liquid municipal sludge, methane may be generated. Current Department of Transportation regulations are sufficient to handle this situation.

No. 12. The present regulations on labelling are acceptable to the MSD. Such regulations will naturally depend upon the agency which has jurisdiction.

No. 13. See comments made in topic area 6.

The following statement represents the major thrust of the District presentation regarding Hazardous Waste Management. In the following, the District will present an overview of the utilization of municipal sewage sludge in fertilizing crops and reclaiming soils.

The disposal of the solid residues from wastewater treatment has traditionally been the most difficult problem facing municipally and privately owned treatment facilities. In general, there exists sufficient technology to remove various pollutants from wastewater, but the disposal of the resulting solids has been a difficult technical as well as social problem.

Sludge Production

Dean (1973) has estimated that the actual national production of sludge in 1972 was approximately 10,000 dry tons (9,072 metric tons) per day. The estimate is probably low since it is based only upon the sewered population and includes the effect of process variations such as digestion and incineration. By 1990, he estimated that the quantity of sludge will increase to 13,000 tons (11,800 metric tons) per day.

Clearly, as the cities grow and reach for higher standards of living, while preserving the quality of the environment, there will be an increasing demand for more sophisticated and advanced wastewater treatment processes. Older waste treatment practices which produced little if any solids will soon give way to processes which, in general, will generate larger quantities of sludge. Also, traditional sludge disposal techniques such as lagooning will progressively lose social and economic acceptance and thus will require new and more innovative approaches to existing solids disposal techniques.

In addition, as the population of many states becomes more urbanized, it will become increasingly difficult to find locations in or around large cities where sufficient space can be allocated for solids disposal. That is, wastewater solids will become increasingly out of place in relation to their point of orgin.

Ultimate Sludge Disposal Alternatives

There are many combinations and variations of sludge disposal alternatives available to municipalities, but the basic processes are:

1) Land Spreading
2) Incineration and Ash Disposal
3) Ocean Disposal, and
4) Land Fill

Land Spreading

Land spreading of sludge has become a method which is being increasingly considered by many municipalities in the U.S. and indeed, throughout the world. It offers the advantage of recycling nutrients back to the land at low cost, and of reclaiming lands bespoiled by strip mining. Sludge is first stabilized by anaerobic digestion or other suitable means before application on land. Such stabilization eliminates obnoxious odors and vermin problems. Yields of grain and forage crops are increased by the nutrients and water supplied by irrigating with digested sludge. Digested sludge organic matter accumulates in and imparts favorable characteristics to soils because of its normally high humus content. The process of land spreading of sludge affords the opportunity for urban areas to recycle the fertilizer value of sludge to the farming areas from which much of the organic materials and nutrients originate. With the current shortage of fuels, and the high requirements for inorganic fertilizer production, sludge recycle for agricultural production offers a ready opportunity to reduce

the energy requirements of the agricultural sector. Also, since many municipalities can offer their sludge at practically no cost to the farmer, a significant cost savings is effected both for the farmer and the municipality which produces the sludge.

Incineration

The current fuel shortage and the high cost of clean stack emissions make this disposal method impractical. Many areas are also imposing local constraints on the operations of incinerators.

Ocean Disposal

Ocean disposal offers, to coastal cities, a readily available ultimate sink for sludge. This means of disposal is not available to inland cities. This method of disposal has come under increased governmental scrutiny and may soon be severly restricted. Costs are very low for this process and include only transportation costs although some cities are beginning to digest their sludge prior to ocen disposal.

Landfill Operations

Landfill operations are practiced by many cities and included under this general term is sludge lagooning. Landfill operations waste the organic content of sludge while considerable expense is involved in sludge dewatering either for lagoon decanting operations or prior to landfill operaitons. Disposal sites often are useless for other purposes following landfill and some are never returned to the tax rolls. Few sites can be used for 20 to 30 years after

being landfilled with municipal sludges. Oftentimes, such sites will produce methane gas which could cause a potentially dangerous situation for other land uses. Leachate collection and treatment may be required thus increasing the costs for this disposal method. Many sites are unsuitable due to problems with leachate capture.

SLUDGE PROPERTIES

Sewage sludge is derived from the organic and inorganic matter removed from wastewater at sewage treatment plants. The nature of sludge depends on the wastewater sources and the method of wastewater treatment. If waste solids are to be evaluated as a soil amendment or as a fertilizer, it is important to understand their chemical and biological properties. A comparison of sludge analyses from various treatment plants would be confounded by the individual treatment processes; therefore, some of the more common wastewater treatment methods will be described.

The first treatment process is usually gravity separation of solids from wastewater. This process is commonly known as primary settling or primary treatment. Secondary sewage treatment may be accomplished by physical-chemical or biological processes. The physical-chemical processes include chemical precipitation using lime, alum, or ferric chloride. Biological secondary treatment includes trickling filters or some variation of the activated sludge process where aerobic suspended bacteria treat primary treated wastewater. These biological processes result in nutrient consumption by microorganisms and the formation of biological flocs which are later settled out and subsequently pumped to concentration chambers for further processing.

The wastewater solids separated by these primary and secondary wastewater treatment processes may then be dried for marketing as a low analysis dry fertilizer, or subjected to various stabilization treatments. Some current sludge stabilization processes include: aerobic or anaerobic meso- or thermophilic digestion.

Following any of these latter processes the stabilized sludge may be further concentrated by drying beds, vacuum filtration, pressing, centrifuging, or decanting.

Some typical fertilizer values for sewage sludge from the District, the state of Illinois, and seven other states in the United States are presented in Table I.

The metal contents of sewage sludges from Chicago, seven states in the USA, and 42 locations in England and Wales (Berrow and Webber, 1972) are presented in Table 2.

TABLE 1

Major Plant Nutrients Present in Various Sewage Sludge Sources.

Constituent	% dry wt. basis					
	Chicago WSW		ILL.-24 cities		7 States in USA*	
	Range	Median	Range	Mean	Range	Mean
Total N	4.2-9.6	6.8	2.6-9.8	5.4	0.03-17.6	3.2
NH3-N	1.5-5.0	3.1	0.1-6.1	1.8	0.0005-6.7	0.7
P	1.1-8.1	2.8	0.7-4.9	2.4	0.04-6.1	1.8
S	0.35-1.3	0.98	-	-	-	-
K	0.2-0.8	0.4	-	-	0.008-1.9	0.3
Ca	0.3-4.8	2.1	-	-	0.1-25	5.1
Mg	0.6-1.7	1.1	-	-	0.03-2.0	0.5
Na	0.2-0.7	0.25	-	-	0.009-2.7	0.4

These data are from Agric Experiment Stations Committee on Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on Land and represent select cities in seven states

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT
F.J.K.&W.B. MARCH 1975

TABLE 2

Metal Content of Various Sewage Sludge Sources.

Metal	μg/g dry wt. basis					
	Chicago WSW		7 States in USA*		Great Britain**	
	Range	Median	Range	Mean	Range	Median
Ag					5-150	20
As			6-230	53		
B			4-757	114	15-1000	50
Ba			21-8980	618	150-4000	1500
Be					1-30	3
Bi					12-100	25
Cd	120-312	197			60-1500	–
Co			1-18	5.3	2-260	12
Cr	11-4120	2400	17-99000	3290	40-8800	250
Cu	680-2270	1380	84-10400	1260	200-8000	800
Fe	15400-49000	36300	400-90000	12900	6000-62000	21000
Ga					1-20	8
Hg	0.8-7.5	3.2			—	—

* Unpublished data from Agric. Expt. Stations Committee on Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on Land.

** Berrow and Webber, 1972. J Sci Fd Agric. 23:93-100

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT

F.J.K.&W.B. MARCH 1975

TABLE 2 (Continued)

Metal Content of Various Sewage Sludge Sources.

Metal	μg/g dry wt. basis					
	Chicago WSW		7 States in USA *		Great Britain **	
	Range	Median	Range	Mean	Range	Median
La					30-150	60
Li					10-150	40
Mn	120-550	370	18-7100	400	150-2500	400
Mo			5-39	27	2-30	5
Ni	186-840	355	10-3515	426	20-5300	80
Pb	304-1160	680	13-19700	1670	120-3000	700
Sc					2-15	5
Sn					40-700	120
Sr					80-2000	300
Ti					1000-4500	2000
V					20-400	60
Y					15-100	40
Zn	1670-4850	2770	13-27800	2900	700-49000	3000
Zr					30-3000	150

Unpublished data from Agric. Expt. Stations Committee on Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on Land.

Berrow and Webber, 1972. J Sci. Fd. Agric. 23:93-100

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT

SOIL AND CROP RESPONSES TO SLUDGE APPLICATION ON LAND

Sewage sludge when applied to soils provides a readily available source of plant nutrients and it is an effective soil amendment. The chemical quality of sewage sludges is dependent upon wastewater sources and the methods of wastewater treatment as discussed earlier. Sludges applied to land provide major plant nutrients such as N, P, K, micro plant nutrients such as Cu, Fe and Zn and organic matter for improving the soil structure (e.g., better aeration and water holding capacity). The effectiveness of sludge as a soil improving agent depends upon the composition of the sludge, the characterisitcs of the soil to which it is applied and the plant species to be grown (U.S.D.A., 1974).

The nutrient contents of municipal sludges vary considerably and nitrogen, phosphorus and potassium levels are about one-fifth of those found in typical chemical fertilizers (Table 1). Much of the N and P in sludge is in organic combination and it must be mineralized before becoming available to plants. The rate of mineralization for N and P is dependent upon local conditions such as soil type, temperature, soil pH, soil water and other soil chemical and physical characteristics.

Crop Responses

Crop responses to sewage sludge application have been evaluated by the Metropolitan Sanitary District of Greater Chicago for many years. To determine the environmental effects of sludge on

agricultural lands, experimental corn plots were developed from a 7-acre (2.8 ha) field at the Hanover Park Wastewater Reclamation Plant in 1968. The original experimental design was a randomized block with five replications and three sludge loading rates of 0, 1/4, and 1/2 inch (0, 6 and 12 mm) of sludge/week. Sludge was applied to the plots at weekly intervals in furrows between growing corn rows.

Corn yields from 1968 to 1973 are presented in Table 3. Sludge applications consistently produced yield increases for corn grown on the Drummer silty clay loam soil with poor natural drainage.

In another experiment on the Northeast Agronomy Research Center of the University of Illinois near Joliet, Illinois, digested sludge from wastewater treatment plants operated by the District has been applied at various rates each growing season on 20 X 44 ft. (6.1 by 12.2 m) plots on a Blount silt loam soil continuously planted to corn since 1968 (Hinesly et al., 1974). The maximum loading rate of sludge was 1 inch (2.54 cm) of liquid containing 2 to 4% solids applied by furrow irrigation as often as weather conditions and available labor permitted. Lesser amounts of sludge were applied on 1/2 and 1/4 maximum treated plots on the same day sludge was applied on the maximum treated plants. Each spring before plowing, the control plots received 300 lb/acre (333 kg/ha) of N and 100 lb/acr (111 kg/ha) of P as a broadcast application. All plots received an application of 100 lb/A(111 kg/ha) of K each spring before plowing until 1974 when the K fertilizer application was doubled. Limestone has been applied at rates calculated to maintain the

TABLE 3

Corn yields from 1968 through 1973 for the Hanover Park experimental corn plots which have received liquid sludge from 1968 through 1973.

Weekly Application Rate	Total Sludge Applied 1968 - 1973	Year					
		1968	1969	1970	1971	1972	1973
mm	Metric tons/ha of solids	Corn - Yield mectric tons/ha at 15.5% moisture					
Check	0	2.07	2.57	1.51	3.45	0.69	1.82
6	116	3.95	8.72	2.89	5.33	4.33	4.89
12	182	4.01	8.91	2.95	6.08	4.95	6.21

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO

ENGINEERING DEPARTMENT

M.V.&W.B MARCH 1975

soil pH between values of 6 to 6.5. The four treatments were replicated four times in a randomized block design.

The amounts of sludge applied each year on maximum treated plots are shown in Table 4.

Corn grain yields in response to sludge applications are shown in Table 5. Grain yields were significantly increased by sludge treatment over those obtained from heavily fertilized control plots in only 1970 and 1973, when total applied sludge solids on maximum treated plots amounted to 118 and 139 ton/acre (52.7 and 62.6 mT/ha) in each of the respective years.

Since 1969 a similar experiment has been conducted with digested sludge on the Blount silt loam using soybeans (Hinesly, et al., 1974). Soybean yield responses were compared with respect to applications of phosphorus 105 lbs/A/yr. (118 kg/ha/yr.), and water and sludge applied at the rates shown in Table 6. Yield responses of soybeans to sludge, phosphate and water treatments are shown in Table 7.

Soybean yields in Table 7 were shown to have been increased significantly by sludge application during each of the five years. However, in 1972, the response to maximum sludge treatment was negative. Annual applications of superphosphate did not affect soybean yields even though the site soil, a silt loam was somewhat deficient in available phosphorus. In 1972 when sludge applications had a significant negative affect on soybean yields, the plant toxicity symptoms observed may be attributed to phosphorus toxicity, a soil-plant salt interaction, or both.

Total maximum annual applications of digested sludge by furrow irrigation during and following corn growing season. Maximum rate per application was 25.4 mm. Appropriately lesser amounts were applied on the same day on 0.25- and 0.5-maximum treated plots (Unpublished Data, Hinesly, et al).

Year	Liquid Sludge	Average Solids Content	Annual Sludge Solids	Accumulative Sludge Solids
	mm	percent	Mt/ha (T/A)	Mt/ha (T/A)
1968	171.45	3.01	51.52 (23)	51.52 (23)
1969	254.00	1.91	48.31 (21.5)	99.83 (44.5)
1970	228.60	2.31	52.67 (23.5)	152.50 (68)
1971	254.00	3.99	100.97 (45)	253.47 (113)
	127.00[a]	2.16	27.40 (12.2)	280.87 (125)
1972	127.00	2.02	25.61 (11.4)	306.48 (136.7)
1973	279.40	2.23	62.15 (27.7)	368.63 (164.4)

[a] Applied after corn harvest

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT
D.F.M.&W.B. MARCH 1975

TABLE 5

Continuous corn grain yields during 6 years with various rates of digested sludge irrigation on Blount silt loam (Unpublished Data, Hinesly, et al).

Year	Rate of Application			
	0	1/4 Max	1/2 Max	Max
	Metric tons per hectare			
1968	4.16	6.03	7.16	7.02
1969	8.96	9.34	9.42	9.44
1970 **	5.53	7.48	7.62	8.63
1971	6.06	6.50	6.92	7.88
1972	8.94	8.62	8.99	8.82
1973 **	4.00	6.05	6.72	7.63
Average	6.28	7.34	7.81	8.24

**Treatment effects are significant at 1 percent level.
LSD for 1970 and 1973 is 1.84 and 1.88 Mt/ha, respectively.

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT
D.E. & W.R. MARCH 1975

TABLE 6

Total maximum annual applications of digested sludge by furrow irrigation during and following soybean growing season. Maximum rate per application was 25.4 mm. Appropriately lesser amounts were applied on the same days on 0.25- and 0.5-maximum treated plots (Unpublished Data, Hinesly, et al).

Year	Liquid Sludge	Average Solids Content	Annual Sludge Solids	Accumulative Sludge Solids
	mm	percent	Mt/ha (T/A)	Mt/ha (T/A)
1969	203.2	2.11	42.76 (19)	--
1970	228.6	2.60	59.28 (26)	102.4 (45.7)
1971	254.0	4.31	109.19 (49)	--
	76.2 a/	3.38	25.69 (11)	236.92 (105.7)
1972	25.4	1.90	4.81 (21)	241.73 (107.8)
1973	50.8 b/	2.70	13.68 (6.1)	255.41 (113.9)

a/ Applied after soybean harvest

b/ Applied on P-amended plots only after soybean harvest

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO

ENGINEERING DEPARTMENT

R.J.O.&W.B. MARCH 1975

TA 3 7

Soybean yield responses to phosphorus, sludge and water applications (Unpublished data, Hinesly, et al).

Year	P Kg/ha	Rate of Sludge Application				Water[a/]
		0 mm	6.4 mm	12.7 mm	25.0 mm	
		Yield (Metric ton per hectare)				
1969	0	2.28	3.02	3.24	3.36	2.92
	118	2.53	3.00	3.16	3.50	3.48
1970	0	1.93	2.76	2.98	2.84	2.57
	118	1.89	2.57	2.84	3.19	2.59
1971	0	1.77	1.93	2.10	2.13	1.50
	118	1.53	1.87	2.08	2.12	1.74
1972	0	2.04	2.55	2.31	0.93	1.64
	118	2.27	2.65	2.84	0.21	1.98
1973	0	1.68	1.90	2.00	2.11	1.10
	118	1.49	1.64	2.08	1.97	1.22

a/ Water application rates were the same as the maximum sludge rate and were applied on the same day.

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT

R.J.O.&M.V. MARCH 1975

Metal Translocation

The implication in the proposed Hazardous Waste Management Regulation is that some heavy metals cannot be safely disposed of on crop land. The best contradiction to this claim lies with the Werribee Farm. Melbourne has operated a sewage farm since 1897 at Werribee, Australia. Johnson, et al. (1974) analyzed tissue from selected sites on the farm and they concluded that in regard to food chain effects, forage contained neither excessive nor deficient amounts of trace elements. These results are very significant for helping to determine the long-term effects of sludge application to land.

The Agronomy Department of the University of Illinois has been conducting, for 7 years, experiments to evaluate the environmental effects of sludge application to land as mentioned previously. Metal uptake by agronomic plants in these experiments has been studied. Table 8 shows the element concentration in the tissues of mature corn receiving sludge at the rate described in Table 4.

The Zn and Cd contents in corn leaf, grain, and mature plant residues were increased by greater annual applications of sludge. However, metal concentrations in corn plant tissues were not elevated by increasing years of sludge application at the high rates used in this experiment. Concentration levels of Zn and Cd reached a fairly constant value in corn plant tissue and these levels were not changed by increasing accumulative amounts of sludge applied in subsequent years. With respect to Cu and Ni concentrations in the corn plant tissues, there was in some years little apparent relationship with the amount of sludge applied.

For example, in 1971, the Cu levels in corn grain were significantly reduced by increasingly greater application rates of digested sludge. There is evidence that the Cd, Cu, Ni and Zn levels in tissue do not reflect the accumulative amounts of digested sludge applied during the experiment.

Table 9 shows the element concentration in the tissue of soybeans receiving sludge at the rate described in Table 6. An examination of the data shows that Zn, Ni, and Cd contents of soybean tissues were increased by different sludge application rates. Compared to the amounts in plants from control plots, the Cu concentration in plant tissues either remained the same or decreased. The greatest increase in metal concentration occurred in 1972 when the phosphorus or salt interaction occurred. With respect to the treatments the data suggest that plant metal levels remain nearly the same each year and they do not reflect the accumulative yearly applications of sewage sludge.

The corn and soybean data presented in Tables 8 and 9 show that under the local soil, climatic and experimental conditions during the seven year study (1968 - 1974) that no phytotoxic conditions or abnormal metal concentrations resulted from heavy metal translocation in a Blount silt soil receiving up to 164 tons/acre (369 mT/ha) of sludge on continuous corn and up to 114 tons/acre (255 mt/ha) on continuous soybeans.

TABLE 8

Average contents of several chemical elements in tissues of corn continuously grown and annually fertilized with various loading rates of digested sludge. Values are ppm dry weight of plant tissues (Unpublished Data, Hinesly, et al).

Year	Leaf				Grain				Mature Plant Residues			
	Ck	¼ Max	½ Max	Max	Ck	¼ Max	½ Max	Max	Ck	¼ Max	½ Max	Max
ZINC ppm												
1970	53	85	138	212**	32	40	50	65**				
1971	28	95	158	259**	24	36	36	53**				
1972	56	139	253	381**	22	29	40	50**	43	133	237	340**
1973	60	113	223	328**	29	37	51	58**	39	94	193	337**
COPPER ppm												
1970	8.9	9.0	10.2	8.7	2.5	3.6	2.9	4.2*				
1971	10.4	9.2	9.5	5.6	2.4	2.6	2.2	2.0*				
1972	12.4	13.6	14.3	15.4	2.8	3.0	2.9	3.1	10.0	8.2	8.5	7.8
1973	7.4	7.8	6.6	7.2	2.4	2.6	2.6	2.0	2.3	2.3	2.7	3.0
NICKEL ppm												
1970		1.1	2.6	4.3	2.3	3.0	2.2	3.1*				
1971	1.5	1.9	2.3	2.6	0.8	0.8	1.2	3.5**				
1972	1.5	1.5	1.9	2.4**	0.6	0.8	1.3	2.2**	1.4	1.2	1.6	2.0
1973	3.5	2.9	1.7	3.0	1.2	0.9	1.3	1.7	0.7	0.7	0.7	1.4*
CADMIUM ppm												
1970	0.9	3.0	5.3	11.6*	0.30	0.60	0.79	1.00**				
1971	0.2	3.4	7.5	10.3**	0.14	0.70	0.65	0.92**				
1972	1.1	9.0	18.8	22.2**	0.14	0.45	0.83	1.10**	0.4	4.8	8.9	13.2**
1973	0.4	2.3	6.9	13.7**	0.08	0.15	0.35	0.61**	0.3	0.8	4.2	12.9**
IRON ppm												
1970	107	84	101	112								
1971	98	93	98	90	36	33	34	36				
1972	159	160	154	144	19	16	20	19	211	231	286	166
1973	126	118	124	118	30	30	32	35	90	99	82	61
MANGANESE ppm												
1970	81	83	92	116*								
1971	59	57	79	151**	6.0	6.0	5.5	8.2**				
1972	64	60	126	180**	3.4	2.4	3.1	4.6**	35	38	47	72*
1973	64	40	44	54**	8.2	6.8	6.8	6.6**	29	31	38	36

* Significant at 5% level.

* Significant at 1% level

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT
D.F.M. & W.B. MARCH 1975

TABLE 8 (Continued)

Average contents of several chemical elements in tissues of corn continuously grown and annually fertilized with various loading rates of digested sludge. Values are ppm dry weight of plant tissues (Unpublished data, Hinesly, et al).

LSD's:	Leaf	Grain	Plant Residues
	ZINC		
	1970 = 82 1971 = 42 1972 = 136 1973 = 77	1971 = 10 1972 = 13 1973 = 6	1972 = 72 1973 = 60
	COPPER		
	1970 = n.s. 1971 = n.s. 1972 = 1.3 1973 = n.s.	1970 = 1971 = 0.4 1972 = n.s. 1973 = n.s.	1972 = n.s. 1973 = n.s.
	NICKEL		
	1970 = 1971 = n.s. 1972 = 0.7 1973 = n.s.	1970 = n.s. 1971 = 1972 = 0.4 1973 = 0.4	1972 = n.s. 1973 = 0.6

Leaf	Grain	Plant Residues
CADMIUM		
1970 = 6.6 1971 = 4.2 1972 = 7.4 1973 = 5.8	1970 = 0.20 1971 = 0.40 1972 = 0.52 1973 = 0.06	
IRON		
1970 = n.s. 1971 = n.s. 1972 = n.s. 1973 = n.s.	1970 = 1971 = n.s. 1972 = n.s. 1973 = n.s.	1972 = n.s. 1973 = n.s.
MANGANESE		
1970 = 22 1971 = 36 1972 = 76 1973 = 14	1970 = 1971 = 2.1 1972 = 0.8 1973 = 0.9	1972 = 23 1973 = n.s.

n.s - not significant

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO

ENGINEERING DEPARTMENT

R I O S .V. MARCH 1975

TABLE 9

Average contents of several chemical elements in tissues of soybeans fertilized with various loading rates of digested sludge. Values are ppm dry weight of plant tissue (Unpublished Data, Hinesly, et al).

Year	Leaf and Petiole					Seed				
	H_2O	Ck	¼ Max	½ Max	Max	H_2O	Ck	¼ Max	½ Max	Max
					ZINC ppm					
1970	29	--	80	--	180	59	58	68	73	83
1971	77	49	107	162	203	57	58	72	81	85
1972	45	50	146	222	444	50	51	72	82	94
1973	42	41	82	122	191	49	53	69	77	85
					COPPER ppm					
1970	4.9	--	5.7	--	4.1	13.1	14.0	14.9	12.5	12.2
1971	6.6	5.9	6.6	6.7	5.9	10.8	11.4	10.7	9.6	9.5
1972	8.9	8.4	8.6	8.0	9.0	13.0	13.0	12.0	13.0	14.0
1973	7.5	6.6	7.5	7.8	6.3	14.0	14.0	13.0	11.0	14.0
					NICKEL ppm					
1970	3.5	--	4.7	--	4.3	6.1	10.1	9.4	10.5	10.5
1971	2.7	3.0	4.5	5.2	5.5	7.4	11.7	13.4	15.7	17.8
1972	3.0	2.0	5.1	6.3	10.9	4.2	6.5	9.9	10.2	16.5
1973	3.4	3.7	4.5	6.3	5.4	5.3	8.6	8.4	9.9	10.6
					CADMIUM ppm					
970	0.42	--	1.70	--	10.3	0.12	0.12	0.38	0.60	1.08
971	0.26	0.30	0.90	3.16	7.0	0.35	0.33	0.47	0.96	1.61
972	0.38	0.54	2.14	4.46	13.9	0.19	0.35	0.55	1.00	3.06
973	0.50	0.47	1.10	2.00	4.2	0.20	0.25	0.36	0.59	0.79

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT
D.F.M.&W.B. MARCH 1975

Animal Responses

Of concern to some individuals regarding the use of sludge fertilized forage for animal feed is the possibility of problems with animal health. Naturally, the grazing animals will have direct contact with the sludge while they are grazing. This is not to say that grazing animals should come into contact with municipal sludge immediately following application. On the contrary, it is advisable to allow an 8 to 10 day resting period following sludge application to pastureland or alternatively that the applied sludge be allowed to dry before resuming grazing.

The Board of Works Sewage Farm at Werribee, Australia was established in 1897 as a sewage farm serving the City of Melbourne, Australia which has a population of about 2.5 million people (Johnson et al., 1974). The daily amounts of raw sewage arriving at the farm vary but the average flow in 1973 was 144 MGD (546,000 m^3/day). This farm is about 10,376 acres (4,200 ha) and is a raw sewage irrigated pastureland. The irrigated pastures are sown with a mixture of grasses and legumes to provide balanced production. Raw sewage is applied in a flood irrigation method to a depth of 4 inches (10 mm). Just before irrigation, the grazing animals are removed and the surface is allowed to dry one week before they are returned.

Despite the fact that the pasture is irrigated with essentially raw sewage, the health of the animals bred at the farm is excellent and there is no prohibition of the sale of the animals for human consumption. Between July 1946 and June 1972, out of a total of

116,266 animals marketed there were only 29 rejections or 0.025%. In an Australian area where pastureland is used with no sewage products, namely, Victoria and Tasmania, a rejection rate of .041% was recorded based on examination of 506,625 animals and 208 rejections.

Clearly, the Australian data indicates that if there is no difficulty in the rejection rate of animals foraging on pastures fertilized with raw sewage, one can conclude that there should be no difficulty with the use of digested sewage sludge.

Fitzgerald and Jolly (1974) studied the possibility of transmission of parasitic organisms from digested sludges sprinkled on Sudax grass to cows and/or calves. In this study, 91 pregnant Hereford-Angus-Charolais cows were released on municipal sludge fertilized Sudax pasture. The sludge was liquid digested sludge from the Metropolitan Sanitary District of Greater Chicago. A control herd of 19 pregnant cows were pastured on Sudax in a land area not receiving digested sludge.

At monthly or shorter intervals fresh individual or random fecal samples were examined to determine the species and relative abundance of parasites of each herd. In addition, frequent visual observations of the animals were made. A comparison was made of the parasite species present, egg and oocyst discharge quantity, and visual clinical signs between the 2 groups of animals to determine the effects of sludge on the health related factors in the pasture environment.

After the examination of 614 fecal samples from the cattle foraging on the sludge fertilized pasture and 255 samples from the

control herd, it was found that there was no significant difference between the two groups. In Figure I is plotted the nematode egg discharge during 14 months of the study. Generally, the test and control herds followed a similar pattern with levels of nematodes remarkably similar. The average discharge of coccidian oocysts seen in Figure II was actually higher in the control than the test animals over a 14-month period.

Fitzgerald and Jolly (1974) concluded from this study that sludge irrigation had not introduced unusual or additional common bovine pathogens to the pasture environment, nor otherwise increased the incidence of common bovine disease. Digested sludge in the pasture environment has not influenced the normal parasitic load of the herd.

The available evidence indicates that the use of municipal sludge as a fertilizer for pastureland is a practice without hazard to the health of the grazing animals. There is no available evidence to suggest that the health of grazing cattle would be affected. It would appear that many countries in the world would wish to pursue the use of municipal sludge in growing forages for cattle production. As the demand for meat increases among the nations of the world, and with the increasing problems of obtaining fuel for producing sufficient nitrogen fertilizer, it would seem that municipal sludges would be a useful product in increasing the productivity of the pastureland.

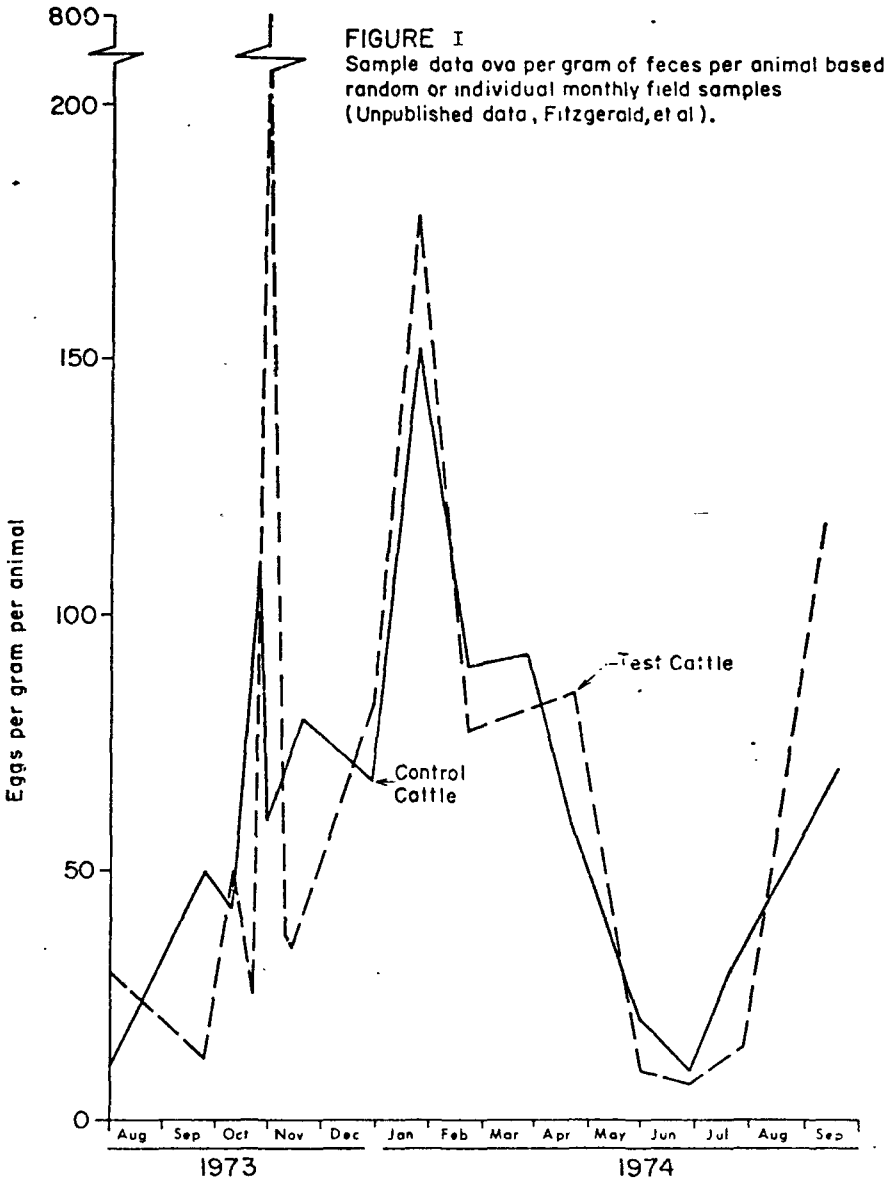


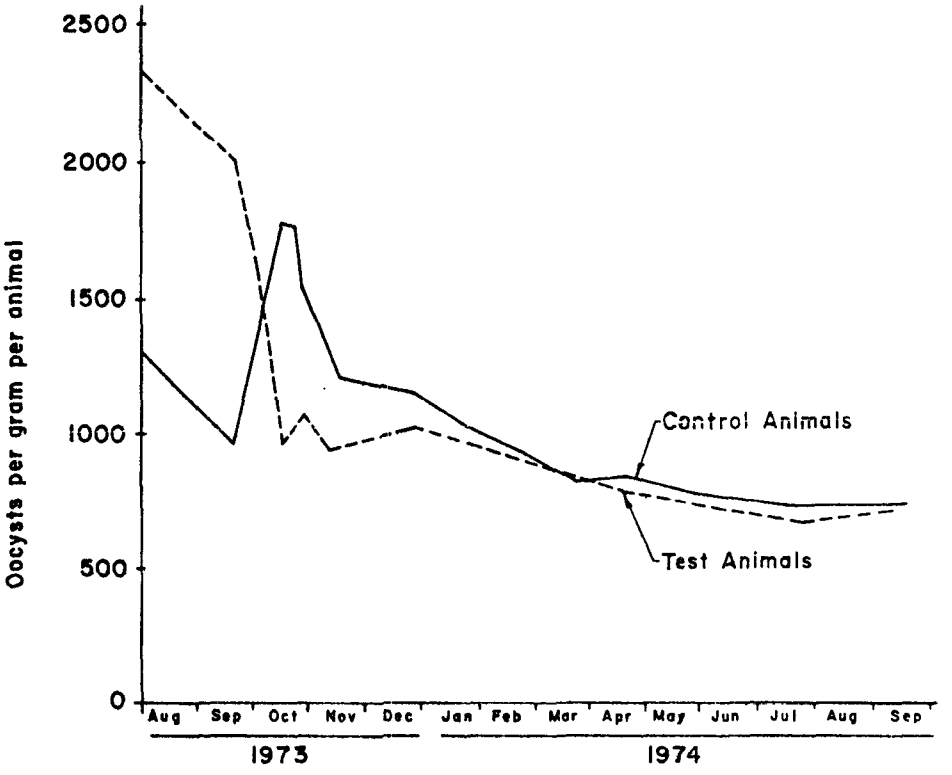
FIGURE I
Sample data ova per gram of feces per animal based on random or individual monthly field samples (Unpublished data, Fitzgerald, et al).

THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT

D.F.M. MAR, 1975

FIGURE II

Cumulative total coccidian oocysts per gram of feces per animal based on random or individual monthly field samples (Unpublished Data, Fitzgerald, et al).



THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
ENGINEERING DEPARTMENT

W.B. MAR. 1975

SUMMARY

The District is very concerned that the EPA does not make unnecessary and inoperable regulations on the disposal of municipal sewage sludge. The potential problems of disposing of ca. 10,000 dry tons of sludge per day in the United States by some exotic method could result in some astronomical difficulties.

Research findings indicate that land utilization of municipal sewage sludge is the best available method of handling massive quantities of these materials with the least insult to the environment.

It is our recommendation that municipal sewage sludge not be considered as a hazardous waste.

LITERATURE CITED

1. Berrow, N. L., and J. Webber. 1972. Trace elements in sewage sludges. J. Sci. Fd. Agric. 23:92 - 100.

2. Dean, R. B. 1973. Disposal and reuse of sludge and sewage. In Proc. of Conf. on Land Disposal of Municipal Effluents and Sludges, Rutgers Univ., New Jersey, "Mar."

3. Fitzgerald, P. R., and W. R. Jolly. 1974. The use of sewage sludge in pasture reclamation: parasitology, nutrition and the occurrence of metals and polychlorinated byphenyls. Unpublished report to the Metropolitan Sanitary District of Greater Chicago from the College of Veterinary Medicine, University of Illinois, Urbana.

4. Hinesly, T. L., O. C. Braids, R. I. Dick, R. L. Jones, and J. A. E. Molina. 1974. Agricultural benefits and environmental changes resulting from the use of digested sludge on field crops. Report from the University of Illinois, Urbana, to the Metropolitan Sanitary District of Greater Chicago, unpublished.

5. Johnson, R. D., R. L. Jones, T. L. Hinesly, D. J. David. 1974. Selected chemical characteristics of soils, forages and drainage water from the sewage farm serving Melbourne, Australia. Department of the Army, Corps of Engineers.

6. United States Environmental Protection Agency. 1974. Technical bulletin on evaluation of land application systems. Office of Water Programs Operations, Washington, D. C. 20460.

NATURAL RESOURCES COMMISSION
CARL T JOHNSON
I LAITALA
DEAN PRIDGEON
HILARY F. SNELL
HARRY H WHITELEY
JOAN L. WOLFE
CHARLES G YOUNGLOVE

STATE OF MICHIGAN

WILLIAM G MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

January 30, 1976

U.S. Environmental Protection Agency
Office of Solid Waste Management Programs (AW 565)
Washington, D. C. 20460

Attention: Mr. John P. Lehman, Director
Hazardous Waste Management Division

Dear Mr. Lehman:

This letter is in response to Federal Register, Vol. 4, No. 181, Wednesday, September 17, 1975 Notice of Invitation to submit comments on hazardous waste management. It is being submitted by the Hazardous Waste Disposal Committee in Michigan. This committee was formed by the Environmental Protection Branch of the Michigan Department of Natural Resources. It consists of representatives of various state agencies, (Oil and Hazardous Materials Control, Solid Waste Management, Water Quality Appraisal, Public Health), universities and industries. The committee was charged with the responsibility of preparing recommendations regarding the definition of hazardous wastes, environmentally acceptable disposal methods and prepare proposed regulations to supplement existing laws. As a result, this group has spent considerable time studying many of the matters which you listed in your discussion topics.

We urge that you consider the use of a decision model in defining a hazardous waste. There is considerable risk in the use of lists of compounds. Principally, lists of compounds are often incomplete, become large and difficult to use as a tool to solve a problem.

Our committee has specifically addressed several questions listed in the subject register.

We believe that the generator is responsible for ultimate environmentally safe disposal of hazardous wastes. In Michigan, however, the licensing of liquid industrial wastehaulers lifts some of the burden of responsibility. It becomes necessary that the generator utilize a hauler licensed and approved to transport the particular type of waste to an approved disposal facility. The cost should be borne by the generator but will ultimately be reflected in product cost.

MICHIGAN
THE GREAT LAKES STATE
R1026-1 1/75

Recovery and reuse programs should be directed most vigorously at non-renewable resources, particularly those in short supply. Incineration should be used to destroy difficult to handle wastes (PCB's, PBB's, etc.). Research in effective heat recovery methods should be encouraged. Land emplacement of hazardous wastes should be permitted only when adequate safeguards for groundwater are provided and an ongoing monitoring program is required.

We believe that reports should be prepared by the generator, transporter and disposer of hazardous waste. These records should be available to regulatory agencies to assure that safe disposal has occurred. These records should include volume and such analytical data as necessary to determine the level of risk posed by the wastes.

In 1970, the year Michigan implemented its Liquid Industrial Waste Haulers licensing act (Act 136, P.A. 1969) insurance companies were very reluctant to provide the necessary surety bond. The risk was undetermined. Presently, bonds as required by statute, are readily available.

We urge that any federal programs which may be implemented would be an overview approach for states which presently have hazardous waste management programs. Regulations or guidelines should provide a uniform national approach to hazardous waste management.

Sincerely,

David M. Dennis

David M. Dennis, Chief
Oil & Hazardous Materials Control
Section

DMD:ns

The Mid-Ohio Health Planning Federation

POST OFFICE BOX 2289 COLUMBUS, OHIO 43216

Office
1666 EAST BROAD STREET
Telephone
614-253-5545

September 24, 1975

Mr. John P. Lehman, Director
Hazardous Waste Management Director
Office of Solid Waste Management Programs
AW-565
U.S. Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lehman:

I read with great interest the announcement of the Hazardous Waste Management Public Meetings in the September 17, 1975, issue of the Federal Register. My Agency has for some time had great interest and activity in one category of hazardous waste, that is waste emanating from health care institutions. I would like to share with you some of our findings and guidelines.

Attached are two items of correspondence which represent the culmination of our studies and activities in the disposal of solid waste. One is a letter from the Ohio EPA describing those components of hospital solid waste which might be considered hazardous. I would like to mention that these six named components, by our studies, represent roughly only 3% of the waste generated by a general community hospital in Columbus.

The second letter is an agreement by the City of Columbus to accept all our hospital solid waste (30 tons a day), less the hazardous components, and consider it normal municipal waste.

I hope our findings and actions will be useful to you. I feel too often hospitals are considered large generators of hazardous waste, which they definitely are not. If you have any questions about our studies and activities in this area, please do not hesitate to let us know.

Yours truly,

THE MID-OHIO HEALTH PLANNING FEDERATION

Charles A. Turner, III
Director
Extended Care Systems Planning

CAT/djb

Attachments

October 30, 1974

Mr. Charles A. Turner, III
Director
Environmental Health Planning
Mid-Ohio Health Planning Federation
P.O. Box 2239
Columbus, Ohio 43216

OhioEPA

John J. Gilligan
Governor
Dr. Ira L. Whitman
Director

Dear Mr. Turner:

This letter is in response to your letter of October 16, 1974, concerning the Ohio Environmental Protection Agency's position on the disposal of hospital solid waste.

This Agency realizes that the amount of wastes generated in hospitals have increased tremendously over the years and that an efficient and economical method of disposal of this waste needs to be found. This Agency also recognizes that the composition of hospital waste has changed due to the increasing use of disposables and the improved methods of isolating pathogen contaminated waste from the main waste stream.

Hospital waste can contain several potentially hazardous components, namely:

1. Human wastes emanating from pathology, surgery or autopsy
2. Experimental animal tissue waste
3. Contaminated wastes emanating from care for patients which are presently in isolation either because of a diagnosed communicable disease or prior to diagnosis when a prognosis of such communicable disease has been made, and
4. Radioactive wastes.
5. Used needles, syringes, and other such implements.
6. Waste drugs and medicines.

If the above hospital solid waste components are kept out of the solid waste stream the remaining hospital solid waste should have the same environmental and health hazard impact as municipal refuse. These materials could be landfilled, incinerated, pulverized, utilized in energy or material recovery processes, or disposed by any other normal disposal method. The Ohio Environmental Protection Agency would not require any special handling of disposal methods for the wastes. The Agency would still require that all precautions be taken to properly dispose of the remaining potentially hazardous wastes.

I hope this has explained the Ohio Environmental Protection Agency's position on the disposal of hospital waste. If you have any further questions or if we can be of assistance to you in any way, please contact me.

Yours truly,

Donald E. Day

DONALD E. DAY
Assistant Chief
Division of Waste Management
and Engineering

DED:WK:pd

TOM MOODY
MAYOR
RICHARD D. JACKSON, P.E.
DIRECTOR

CITY OF COLUMBUS
OHIO

JAMES E. RICHARDS
DEPUTY DIRECTOR
ROBERT C. PARKINSON
ASSISTANT DIRECTOR

DEPARTMENT OF PUBLIC SERVICE
ZIP CODE: 43215

November 15, 1974

The Mid-Ohio Health Planning Federation
Mr. Charles A. Turner, III
Director
Environmental Health Planning
P. O. Box 2239
Columbus, Ohio 43216

Dear Mr. Turner:

I wish to acknowledge and thank you for your letter dated November 13, 1974. I have arranged for Mr. Hunt to attend your meeting on November 26, 1974.

In response to your two (2) questions, the following information is provided:

1. It is correct to conclude that if the hospitals of Franklin County separate the specific materials cited by the Ohio EPA from their solid waste, then the remainder will be acceptable in any municipal refuse system the City of Columbus may operate in the foreseeable future.

2. We do not presently have firm figures on disposal fees, however, we do estimate the charge of $6-8 per ton.

Very truly yours,

DEPARTMENT OF PUBLIC SERVICE

Richard D. Jackson

Richard D. Jackson, P.E.
Director

RDJ:RJH:bab

1642

LAND OF QUALITY FOODS

STATE OF MINNESOTA

DEPARTMENT OF AGRICULTURE
STATE OFFICE BUILDING
SAINT PAUL, MINN. 55155

December 1, 1975

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:

In accordance with Federal Register Notice, Volume 40, No. 181, dated Wednesday, September 17, 1975, the Minnesota Department of Agriculture requests that the following statement be included in the record on Hazardous Waste Management.

The Minnesota Department of Agriculture sees hazardous waste management at this time and for this purpose as involving the management of excess or unwanted pesticide materials and pesticide containers. It suggests that the pesticide area should further be considered when hazardous waste management regulations or guidelines are being developed as having both obsolete highly toxic materials and also having those materials that are less toxic and which have just recently been cancelled or suspended.

The Department sees as a source of such materials--agriculture, the home owner, industrial or manufacturing firms, and public organizations such as utilities and hospitals.

It is suggested that at least the following considerations must receive substantial attention in the development of procedures for disposing of such materials:

1. What is the toxicity-hazard to man and the environment both immediately and in the long run?

2. What are the practical problems for handling such materials?

3. What are the economic factors and considerations, that is total cost, and who is responsible for assuming these costs?

4. What are the transportation problems and what is the available means of transportation?

ENJOY THE HIGH QUALITY AND INFINITE VARIETY OF MINNESOTA FOODS

EQUAL OPPORTUNITY EMPLOYER

Disposal, a major consideration, has not been included in the above because we see this as a separate item. The first item relating to disposal is the collection of the products referred to in paragraph one. Collection can be accomplished; however, collection alone is not disposal and we will comment further on this. Open burning of the less toxic materials and the paper containers is one means of disposal that is, in many areas, relatively adequate for the agricultural community. It is not as practical for the other sources.

Burying of excess materials and containers is a further means of disposal. This is a possible solution for all sources, however, much more appropriate for small amounts such as the home owner might have. Disposal by burying in a landfill is a means that is appropriate for all sources, however, we suggest that it, too, should be limited to small amounts, probably those from the home owner and not from other sources.

Incineration is certainly the most desirable means to dispose of excess materials and containers; however, relatively few areas of the country have adequate incineration facilities. Therefore, we must include with incineration the problems of handling transportation and the costs associated with these.

Reprocessing of all appropriate materials that can be returned to the manufacturer is another means of disposal. Here, too, there may well be a problem of transportation because of the regulations presently in effect under the Department of Transportation.

One means of disposal not looked upon with favor by many individuals and organizations is to continue the use of the product in accordance with label directions until it is all gone. This reduces transportation problems, reduces costs, and when used according to label directions, should not create undue hazard to man or the environment.

The Minnesota Department of Agriculture has had no difficulty in arranging to collect excess materials and containers and has also forwarded a suggested experimental plan for collection to the Environmental Protection Agency. However, collection, as we have indicated, is not a problem but disposal after collection becomes an even greater problem than before because agencies or firms have larger amounts concentrated in one location. This, in turn, creates greater problems of handling and transportation as well as possible hazard to man and the environment. Unless research agencies and regulatory agencies, both at the federal and state level, arrive at practical suggestions for disposal, collection alone is not the answer. Minnesota has several examples of this. One relates to the finding of arsenic buried in the 1930's and recently contaminating a well. The well was contaminated because it happened to be placed through the spot where the arsenic was buried. Some several hundred cubic yards of sand and earth could have been removed and spread over several hundred acres of land or other means of reducing the

possible movement of the arsenic in the soil could have been taken, however, federal and state agencies could not agree. We still suggest that the best means to handle this situation would have been to dilute the effect by spreading the material as indicated. A further solution would have been to cover the area with an impervious material so that surface water would no longer assist in moving the material in the soil.

We also have in Minnesota a situation where some excess material was buried in a landfill, and the public is now concerned that this material may eventually contaminate some water supplies. As a result, they are requiring that some $80,000 to $100,000 be expended just to locate the material to say nothing of disposing of it.

As shown with the two examples given, we again suggest that disposal of such materials is a critical problem and one which the Minnesota Department of Agriculture and other state agencies are well aware of. It is also one which no agencies have addressed adequately and unless addressed along the lines of practicality for the considerations listed, will continue to be a problem regardless of any other actions taken by state or federal regulatory agencies. This is an area that we have long felt and indicated to many should have been addressed even before the classification of such products was considered.

Should you wish further suggestions or comments please contact us.

Sincerely,

MINNESOTA DEPARTMENT OF AGRICULTURE

Rollin M. Dennistoun, Ph.D.
Department Administrator

RMD:hk

cc: Emery Lazar, EPA, Washington, D.C.
Charles Lincoln, EPA, Chicago

National Solid Wastes Management Association

1730 RHODE ISLAND AVENUE N.W. • SUITE 800 • WASHINGTON, D.C. 20036
TELEPHONE (202) 659-4613

EUGENE J. WINGERTER
EXECUTIVE DIRECTOR

January 26, 1975

Mr. John P. Lehman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lehman:

We would like to clarify that our letter on hazardous waste management, dated December 23, 1975, was in response to the public hearings held in December, 1974. Please accept our statement as part of the public record.

Sincerely,

Warren T. Gregory
Director, Legislative Affairs

cc. Allen Coorson

1646

• INSTITUTE OF WASTE TECHNOLOGY
  • CHEMICAL WASTE COMMITTEE
  • NATIONAL SANITARY LANDFILL COMMITTEE
  • RESOURCE RECOVERY COMMITTEE
• WASTE EQUIPMENT MANUFACTURERS INSTITUTE

National Solid Wastes Management Association

1730 RHODE ISLAND AVENUE N.W. • SUITE 800 • WASHINGTON, D.C. 20036
TELEPHONE (202) 659-4613

EUGENE J. WINGERTER
EXECUTIVE DIRECTOR

December 29, 1975

Mr. John P. Lehman
Director
Hazardous Waste Management
Division
Office of Solid Waste Management
Programs
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Lehman:

The National Solid Wastes Management Association on behalf of the wastes management/resource recovery industry is pleased to submit its comments on establishing a Federal hazardous waste management program.

Several state governments at this time are establishing hazardous waste regulatory programs to control the handling, treatment, and disposal of hazardous and toxic wastes. The Association believes that a coordinated program, implemented by the states and coordinated through the Federal government for hazardous waste management, would better assure uniformity of standards and regulatory procedures affecting the handling treatment and disposal of these wastes. We believe it important that a Federal program reflect the ongoing efforts of state governments and have the flexibility to defer responsibility to those states that have demonstrated adequate hazardous waste regulatory expertise to continue to administer their own programs in conformance with standards established by the Federal government. Federal guidelines should preempt state laws which fail to meet minimum Federal requirements.

NSWMA's Chemical Waste Committee has been reviewing proposed legislation and standards for hazardous waste management being developed by state governments and has formulated guidelines for a statewide hazardous waste regulatory program. Although this guide essentially results in a model bill (which commences a statewide program), it can also be thought of as a framework within which a state's existing legislation authority can be implemented. Therefore, we would like to address our comments to the major issues focused upon by NSWMA's Chemical Waste Committee for establishing a statewide hazardous management program.

The state should be responsible for designating one department to administer the hazardous waste program. In establishing a regulatory program the state should assure proper identification, handling, processing and disposal of hazardous wastes through a statewide permit and enforcement program. The responsibilities of the hazardous waste generator, hauler, processor and disposer should be clearly delineated. While the title to ownership may

• INSTITUTE OF WASTE TECHNOLOGY
  • CHEMICAL WASTE COMMITTEE
  • NATIONAL SANITARY LANDFILL COMMITTEE
  • RESOURCE RECOVERY COMMITTEE
• WASTE EQUIPMENT MANUFACTURERS INSTITUTE

transfer at the time of each transaction, the responsibilities and hence liability should remain a shared liability between the generator and disposer of the wastes. The responsible agency should be required to develop a system of recordkeeping to tabulate the nature, volume and location of hazardous wastes generated and/or disposed of within the state. The Association has recommended that the recordkeeping consist of a manifest form. The manifest should identify the amount of the waste, the general chemical, physical and mineral composition of such waste identified by probable maximum and minimum percentages; as well as, information on antidotes, first aid and safety measures. The person transporting or handling the hazardous waste would be required to have the manifest in his possession while transporting or handling the hazardous waste. The manifest is then transferred to the person responsible for processing or disposal of the waste at the time of delivery.

The generator should be responsible for identifying on the manifest the origin and destination of the waste. He should also be required to insure that the wastes are properly labeled, that they are processed and/or disposed of at permitted sites and maintain records at the point of generation. The transporter of hazardous wastes should be responsible for completing the manifest form in conjunction with the generator of the hazardous wastes, insure that all hazardous wastes are brought to a permitted hazardous waste processing and/or disposal site and maintain his copy of those records. The hazardous waste processor and/or disposal site operator should be required to acknowledge receipt of the hazardous wastes accompanied by the manifest form, assure that all hazardous wastes accepted are processed and/or disposed in accordance with the applicable regulations, standards and guidelines promulgated by the Department, and maintain records of all hazardous wastes treated and/or disposed. In addition, responsible state agency procedures should be developed to insure that trade secrets used by a person regarding methods for generation, handling, processing and disposal of hazardous waste, which are disclosed to the Department, be kept confidential and not otherwise disclosed without the consent of the person involved.

A critical element of any hazardous waste program is the development of a definition of hazardous wastes. Defining hazardous wastes becomes more complex than defining a hazardous material since wastes are a mixture of different materials not pure chemical components, and often these materials cannot be readily identified. A general definition of hazardous wastes should focus upon five basic questions:

> Hazardous to What? Injury or harm can be sustained by a variety of entities: humans, animal life, vegetation, property, and the environment. Primary concern has typically been associated with human health and property. More recently, attention has also turned to

other living organisms and the environment. The final term is somewhat of a catch-all which, if taken literally, includes the previous three. Whereas in years past, general legislative definitions could easily have been restricted to human health; current thinking calls for consideration of all potential receivers, both human and non-human.

Hazardous for What Reason? Once the injured entities have been defined, it is necessary to delineate the attributes of hazards that are to be considered. Candidate attributes include: Ability to bioconcentrate; toxicity (Via all Routes); flammability; explosiveness; reactivity; irritation, or sensitization potential: and coorosivity. Radioactivity, genetic change potential, and etiology, need not be considered since a large body of law and supporting regulations exist to deal with these materials. Radioactivity may also be considered as a subset of toxicity, as can genetic change potential. Genetic change potential and etiology are often grouped in a more general category such as "otherwise damaging" because of vagueness in defining them. Specification of which of these attributes are of concern in the definition of hazardous wastes, clearly identifies the types of criteria to be applied in designating specific wastes.

Hazardous to What Degree? In dealing with hazardous wastes, it must be recognized that a hazard is not an either/or situation, but a matter of degree. That is, hazard for any given material is a continuous function dependent on the level and conditions of exposure. Therefore, some sense of threshold must be established to identify the point at which hazard becomes significant enough to warrant regulation. This can be dealt with qualitatively for definitions which are destined to be included in a legislative definition through use of terms like "substantial" or "significant". A more quantitative treatment is required for a truly working definition as discussed in succeeding sections.

Hazardous at What Times? A working definition of hazardous wastes should also address the question of when the hazard is existent. This can be viewed in a functional manner, e.g., during handling, transportation, treatment, storage, and/or disposal; or it can be viewed in a time-related sense, e.g., present hazard or potential future hazard. The two views are not completely independent. Handling, transportation, and treatment activities are concerned almost exclusively with present hazards. Storage and disposal activities may involve both present and potential future hazards. Many

documented incidents involving damage or injury from improper hazardous wastes management surfaced some time after storage or disposal was effected. Since damage is not minimized by the nature of the activity under way at the time, the time-related view, using present or potential future to delineate at what times a waste is hazardous, is appropriate.

Hazardous Under What Conditions? It is finally important to note the conditions under which the hazard is evidenced. Pertinent factors include quantity, concentration, form, and the presence of other materials which may add to or detract from the hazard. These factors are very complicated and consequently difficult to deal with in any but a general manner in the context of a legislative general definition.

To insure proper implementation of the general definition, hazardous wastes should be further defined by specific, quantitative criteria developed by the regulatory agency. In formulating a criteria emphasis should be focused upon the waste itself rather than the individual constituents in the waste. If the focus is placed on the individual constituents a waste could incorrectly be declared hazardous because it contains a substance such as mercury or phenol which is considered hazardous. This fails to account for the fact that dilution, neutralization, chemical reaction, or the presence of interacting materials can mitigate the potential hazard associated with hazardous component in wastes. Therefore, the criteria should be applied to the waste itself to insure proper consideration to the degree and conditions of the hazard involved. When issuing permits the Department should also be allowed to adopt varying guidelines and standards for different areas of the state depending upon population density, climate, geology and other factors relevent to hazardous waste management. In formulating a criteria for identifying hazardous waste we suggest consideration be given to the following:

Does the waste contain radioactive constituents greater than a maximum permissible concentration level?

Is the waste subject to bioconcentration?

Is the waste flammable in NFPA Category 4?

Is the waste reactive in NFPA Category 4?

Does the waste have an oral lethal dose less than a certain amount?

What are the measures of the inhalation toxicity of the waste as a gas, mist or dust?

Is the dermal penetration toxicity less than a certain level?

Is the dermal irritation reaction less than a certain level?

How does the waste behave in an aquatic environment?

Is the waste phytotoxic?

Does the waste cause genetic changes?

To insure proper implementation of a hazardous waste program and continuity of existing operations the Association recommends that existing processing facilities and disposal sites be granted a permit variance subsequent to sufficient evidence being presented at a hearing to assure that the facility is or will be within a reasonable period of time, in compliance with the regulations, guidelines or standards. NSWMA also recommends, to avoid costly duplication of existing services and facilities, that the Department encourage the utilization of private enterprise to the maximum extent in the planning, design and management of hazardous waste management facilities.

In summary, the Federal role in hazardous waste management should involve establishing guidelines for the regulation of the handling and disposal of hazardous wastes. The guidelines should establish minimum performance levels to be obtained by all hazardous waste management practices necessary to protect public health and welfare. The Federal government should also provide technical assistance and provide the necessary coordination and dissemination of information on technology and ongoing hazardous waste management practices.

Each state should be responsible for developing a statewide hazardous waste management program. A specific agency should be charged with establishing regulations and standards necessary to comply with the Federal guidelines. Regulations should specify general requirements for the handling, processing and disposal of hazardous wastes. Standards should be based upon performance-oriented goals, rather than procedure oriented approaches. Finally, it is critically important that Congress accurately recognize the proper balance of responsibilities between the private and public sectors. The private sector currently handles over 90% of the industrial waste. We believe Federal policy and legislation should recognize the roles and responsibility of this industry and should provide for the maximum encouragement and full utilization of the resources and capabilities of the organizations in this industry.

Sincerely,

W. T. Gregory

Warren T. Gregory
Director of Legislative Affairs

WTG/dam

Capitol Complex
STATE OF NEVADA
DEPARTMENT OF HUMAN RESOURCES
DIVISION OF HEALTH
CARSON CITY, NEVADA 89710

November 18, 1975

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:

Thank you for bringing to our attention the public meetings you are holding on Hazardous Waste Management (FRL 432-5). While this office will be unable to attend you meetings in person, we wish to submit this as our position for the record.

It is our opinion that the regulations on Hazardous Wastes and their Management are not only necessary, but overdue. Several accidents and near accidents in this State have served to further point out this need.

The Discussion Topics (Federal Register 40:181) about which we are most concerned, are 6, 11, 12, 15 and 16. In this State we have a special problem since we have several active Federal Facilities: e.g., Nellis A.F.B., Fallon N.A.S., Tonopah Test Range, and the Energy Research and Development Administration's Nuclear Test Site. In addition, because of the geography of this State, hazardous wastes must be transported over long distances. In these areas of the State, it is especially important that local emergency response personnel be trained to handle hazardous waste accidents, since outside help is not readily available.

It is our opinion that any program dealing with the management of Hazardous Wastes should include specialized training for first line emergency responders. This training would include management of the incident, proper care of such victims and preventative measures.

Sincerely,

James P. Hawke

JAMES P. HAWKE
Chief, EMS Planning Section

CC: Reba L. Chappell
Chief, EMS Section

Dr. William Edwards
Chief, Community Health Services

JPH:sjb

ew York State Department of Environmental Conservation
0 Wolf Road, Albany, New York 12233

Ogden Reid,
Commissioner

January 21, 1976

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

Dear Mr. Lehman:

Herein are comments directed towards selected discussion topics of hazardous waste management as published in the Federal Register, dated 17 September 1975. Discussion topics responded to are those involved within the program areas of the Division of Pure Waters.

Topic 1 - A definition of a hazardous material from an engineering standpoint would include; an element or compound which when discharged in any quantity into or upon waters of the State or adjoining shorelines, presents an imminent and substantial danger to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, shorelines, and beaches. In other words, any material which causes contravention of surface and/or groundwater standards (see attachment #1) is a hazardous substance. From a biological viewpoint a hazardous material is any substance in sufficient quantity that causes a kill of fish or aquatic life or causes excessive stress on aquatic organisms. For collection and analytic/laboratory methods, the latest edition of Standard Methods for the Examination of Water and Wastewater is used (see attachment #1).

Topic 2 - The generator must retain ultimate responsibility for proper handling, treatment, and/or disposal. The liability for these functions must rest with the individuals involved during their period of successive possession. The owner/operator of the disposal area must bear the cost of assuring environmentally safe disposal.

Topic 3 - A specific treatment for each waste must be considered individually, but generally;

a) Recovery and reuse is preferred whenever possible.

b) Incineration may be necessary for substances such as PCB's or other organic materials which contain fractions toxic to biological processes and requiring a structural breakdown before discharge.

c) Chemical treatment can be used to solubilize leachable toxic pollutants.

d) Physical treatment is useful in separation processes.

e) Biological treatment may be required to destroy organic material in order to avoid odors or reduce discharges of high BOD substances to the environment.

f) Land emplacement is not a favorable method of disposal and will require containment and treatment of polluted leachate.

Each of the above must be prohibited if discharges cannot meet State and/or Federal Standards.

Topic 13 - This question can be answered with a self explanitory list: DDT, Phenols, Mercury, Nutrients, Vinyl Chloride, PCB's, Cadmium, etc., etc.

Very truly yours,

Eugene F. Seebald, P.E.
Director
Division of Pure Waters

Att. # 1

EFFECTIVE DATE
MARCH 27, 1974

REVISED
10/20/74

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

CLASSIFICATIONS AND STANDARDS GOVERNING

THE QUALITY AND PURITY OF WATERS OF NEW YORK STATE

(PARTS 700, 701, and 702, TITLE 6,
OFFICIAL COMPILATION OF CODES, RULES AND REGULATIONS)

PART 700

TESTS OR ANALYTICAL DETERMINATIONS

(STATUTORY AUTHORITY: ENVIRONMENTAL CONSERVATION LAW, SECTION 17-0303)

Section

700.1 Collection of Samples
700.2 Tests or analytical determinations

Section 700.1 COLLECTION OF SAMPLES. In making any tests of analytical determinations to determine compliance or non-compliance of sewage, industrial wastes or other waste discharges with established standards, samples shall be collected in such manner and at such locations as are approved by the Commissioner. In approving such locations the Commissioner shall be guided by the fact that (1) there must be prompt mixing of the discharge with the receiving waters; (2) that the mixing will not interfere with biological communities to a degree which is damaging to the eco-system; (3) that the mixing will not diminish other beneficial uses disproportionately.

Section 700.2 TESTS OR ANALYTICAL DETERMINATIONS. Tests or analytical determinations to determine compliance or non-compliance with standards shall be made in accordance with the latest edition of (1) Standard Methods for the Examination of Water and Wastewater prepared by American Public Health Association (APHA), American Water Works Association (AWWA), and Water Pollution Control Federation (WPCF); (2) Methods for Chemical Analysis of Water and Wastes prepared by Environmental Protection Agency (EPA); (3) Water Standards of the American Society for Testing and Materials (ASTM); or (4) by other methods approved by the Commissioner and the Administrator as giving results equal to or superior to methods listed in any of the other documents.

PART 701

CLASSIFICATIONS AND STANDARDS OF QUALITY AND PURITY
(STATUTORY AUTHORITY: ENVIRONMENTAL CONSERVATION LAW, SECTION 15-0313 AND SECTION 17-0301)

Section

701.1 Definitions
701.2 Conditions applying to all classifications and standards
701.3 Class N
701.4 Classes and standards for fresh surface waters
701.5 Classes and standards for saline surface waters

Section 701.1 DEFINITIONS. The terms, words or phrases used in Part 700, 701, 702 and 704 shall have the following meaning.

(a) "Commissioner" shall mean the Commissioner of the Department of Environmental Conservation.

(b) "Administrator" shall mean the Administrator of the United States Environmental Protection Agency.

(c) "Best usage of waters" as specified for each class shall be those uses as determined by the Commissioner and the Administrator in accordance with the considerations prescribed by the Environmental Conservation Law and Public Law 92-500.

(d) "Approved treatment" as applied to water supplies shall mean treatment accepted as satisfactory by the authorities responsible for exercising supervision over the sanitary quality of water supplies.

(e) "Source of water supply for drinking, culinary or food processing purposes" shall mean any source, either public or private. the waters from which are used for domestic consumption or used in connection with the processing of milk, beverages or foods. (When water is taken for public drinking, culinary or food processing purposes, refer to New York State Department of Health regulations 10 NYCRR 170).

(f) "Primary contact recreation" shall mean recreational activities where the human body may come in direct contact with raw water to the point of complete body submergence.

Such uses include swimming, diving, water skiing, skin diving and surfing.

(g) "Secondary contact recreation" shall mean recreational activities where contact with the water is minimal and where ingestion of the water is not probable. Such uses include but are not limited to fishing and boating.

(h) "Saline surface waters" shall mean all waters which are so designated by the Commissioner.

(i) "International boundary waters" shall mean those waters to which the water quality standards developed and adopted pursuant to the Boundary Water Treaty of 1909 and the Great Lakes Quality Agreement of 1972 apply.

(j) "Sewage", "industrial waste" and "other wastes" shall have the meanings given in Section 17-0105 of the Environmental Conservation Law.

(k) "Estuary" shall mean the tidal portion of a river or stream.

(l) A "thermal discharge" is one which results or would result in a temperature change of the receiving water.

(m) "Heat of artificial origin" shall mean all heat from other than natural sources including, but not limited to, cumulative effects of multiple and proximate thermal discharges.

(n) "Coastal waters" shall mean those marine waters within the territorial limits of the state other than estuaries and enclosed bays. Long Island Sound is designated as coastal waters for the purposes of thermal discharges.

(o) "Enclosed bays" shall mean those marine waters within the territorial limits of New York State, other than coastal waters or estuaries, in which exchange of sea water is severely limited by barrier beaches. For the purposes of thermal discharges, the following are designated as enclosed bays: Jamaica Bay, Hempstead Bay, Great South Bay, Moriches Bay, Shinnecock Bay and Mecox Bay.

Section 701.2 CONDITIONS APPLYING TO ALL CLASSIFICATIONS AND STANDARDS.

(a) In any case where the waters into which sewage, industrial wastes or other wastes effluents discharge are assigned a different classification than the waters into which such receiving waters flow, the standards applicable to the waters which receive such sewage or wastes effluents shall be supplemented by the following: "The quality of any waters receiving sewage, industrial wastes or other wastes discharges shall be such that no impairment to the best usage of waters in any other class shall occur by reason of such sewage, industrial wastes or other wastes discharges."

(b) Natural waters may on occasion have characteristics outside of the limits established by the standards. The standards adopted herein relate to the condition of waters as affected by the discharge of sewage, industrial wastes or other wastes.

Section 701.3 CLASS N

Best usage of waters. Enjoyment of water in its natural condition and where compatible, as source of water for drinking or culinary purposes, bathing, fishing and fish propagation, recreation and any other usages except for the discharge of sewage, industrial wastes or other wastes or any sewage or waste effluent.

Quality Standards for Class "N" Waters

Items	Specifications
1. Sewage, industrial wastes, or other wastes, waste effluents or any sewage effluents not having had filtration resulting from at least 200 feet* of lateral travel through unconsolidated earth.	None
2. Deleterious substances, hydrocarbons, substances which would contribute to eutrophication or surface runoff containing any of such substances.	None

* A greater distance may be required if an inspection shows that due to peculiar geological conditions this distance is inadequate to protect the water from pollution.

Section 701.4 CLASSES AND STANDARDS FOR FRESH SURFACE WATERS

The following items and specifications shall be the standards applicable to all New York fresh waters which are assigned the classification of AA, A, B, C, or D, in addition to the specific standards which are found in this Part under the heading of each such classification.

Quality Standards for Fresh Surface Waters

Items	Specifications
1. Turbidity	No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.
2. Color	None from man-made sources that will be detrimental to anticipated best usage of waters.
3. Suspended, colloidal or settleable solids.	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to each class.
4. Oil and floating substances.	No residue attributable to sewage, industrial wastes or other wastes nor visible oil film nor globules of grease.
5. Taste and odor-producing substances, toxic wastes and deleterious substances.	None in amounts that will be injurious to fishlife or which in any manner shall adversely affect the flavor, color or odor thereof, or impair the waters for any best usage as determined for the specific waters which are assigned to each class.

6. Thermal discharges (See PART 704 of this Title.)

CLASS "AA"

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes and any other usages.

Conditions related to best usage of waters. The waters, if subjected to approved disinfection treatment, with additional treatment if necessary to remove naturally present impurities, will meet New York State Department of Health drinking water standards and will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class "AA" Waters

Items	Specifications
1. Coliform	The monthly median coliform value for one hundred ml of sample shall not exceed fifty (50) from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of two hundred forty (240) for one hundred ml of sample.
. pH	Shall be between 6.5 and 8.5
. Total Dissolved Solids	Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.

Items	Specifications
4. Dissolved Oxygen	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shal not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.
5. Phenolic compounds	Shall not be greater than 0.001 milligrams per liter (Phenol).
6. Radioactivity	
a. Gross Beta	Shall not exceed 1,000 picocuries per liter in the absence of Sr^{90} and alpha emitters.
b. Radium 226	Shall not exceed 3 picocuries per liter.
c. Strontium 90	Shall not exceed 10 picocuries per liter.

Note 1: With reference to certain toxic substances affecting fishlife, the establishment of any single numerical standard for waters of New York State would be too restrictive. There are many waters, which because of poor buffering capacity and composition will require special study to determine safe concentrations of toxic substances. However, most of the non-trout waters near industrial areas in this state will have an alkalinity of 80 milligrams per liter or above. Without considering increased or decreased toxicity from possible combinations, the following may be considered as safe stream concentrations for certain substances to comply with the above standard for this type of water. Waters of lower alkalinity must be specifically considered since the toxic effect of most pollutants will be greatly increased.

Note 1 Cont'd

Ammonia or Ammonium Compounds	Not greater than 2.0 milligrams per liter expressed as NH_3 at pH of 8.0 or above.
Cyanide	Not greater than 0.1 milligrams per liter expressed as CN.
Ferro-or Ferricyanide	Not greater than 0.4 milligrams per liter expressed as Fe(CN)6.
Copper	Not greater than 0.2 milligrams per liter expressed as Cu.
Zinc	Not greater than 0.3 milligrams per liter expressed as Zn.
Cadmium	Not greater than 0.3 milligrams per liter expressed as Cd.

CLASS "A"

Best Usage of waters. Source of water supply for drinking, culinary or food processing purposes and any other usages.

Conditions related to best usage of waters. The waters, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities will meet New York State Department of Health drinking water standards and will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class "A" Waters

Items	Specifications
1. Coliform	The monthly median coliform value for one hundred ml of sample shall not exceed five thousand from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of twenty thousand for one hundred ml of sample and the monthly geometric mean fecal coliform value for one hundred ml of sample shall not exceed two hundred (200) from a minimum of five examinations.

2.	pH	Shall be between 6.5 and 8.5.
3.	Total Dissolved Solids	Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.
4.	Dissolved Oxygen	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.
5.	Phenolic Compounds	Shall not be greater than 0.005 milligrams per liter (Phenol).
6.	Radioactivity	
	a. Gross Beta	Shall not exceed 1,000 picocuries per liter in the absence of Sr^{90} and alpha emitters.
	b. Radium 226	Shall not exceed 3 picocuries per liter.
	c. Strontium 90	Shall not exceed 10 picocuries per liter.

Note 1: Refer to note 1 under Class "AA" which is also applicable to Class "A" standards.

CLASS "B"

Best usage of waters. Primary contact recreation and any other uses except as a source of water supply for drinking, culinary or food processing purposes.

Quality Standards for Class "B" Waters

Items	Specifications
1. Coliform	The monthly median coliform value for one hundred ml of sample shall not exceed two thousand four hundred from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of five thousand for one hundred ml of sample and the monthly geometric mean fecal coliform value for one hundred ml of sample shall not exceed two hundred (200) from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. pH	Shall be between 6.5 and 8.5
3. Total Dissolved Solids	None at concentrations which will be detrimental to the growth and propagation of aquatic life. Waters having present levels less than 500 milligrams per liter shall be kept below this limit.
4. Dissolved Oxygen	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

Note 1: Refer to note 1 under Class "AA" which is also applicable to Class "B" standards.

CLASS "C"

lest usage of waters. Suitable for fishing and all other uses except is a source of water supply for drinking, culinary or food processing purposes and primary contact recreation.

Quality Standards for Class "C" Waters

Items	Specifications
1. Coliform	The monthly geometric mean total coliform value for one hundred ml of sample shall not exceed ten thousand and the monthly geometric mean fecal coliform value for one hundred ml of sample shall not exceed two thousand from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. pH	Shall be between 6.5 and 8.5.
3. Total Dissolved Solids	None at concentrations which will be detrimental to the growth and propagation of aquatic life. Waters having present levels less than 500 milligrams per liter shall be kept below this limit.
4. Dissolved Oxygen	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

Note 1: Refer to note 1 under Class "AA" which is also applicable to Class "C" standards.

CLASS "D"

Best usage of waters. These waters are suitable for secondary contact recreation, but due to such natural conditions as intermittency of flow, water conditions not conducive to propagation of game fishery or stream bed conditions, the waters will not support the propagation of fish.

Conditions related to best usage of waters. The waters must be suitable for fish survival.

Quality Standards for Class "D" Waters

Items	Specifications
1. pH	Shall be between 6.0 and 9.5.
2. Dissolved Oxygen	Shall not be less than 3 milligrams per liter at any time.

Note: Refer to note 1 under Class "AA" which is also applicable to Class "D" standards.

701.5 CLASSES AND STANDARDS FOR SALINE SURFACE WATERS

The following items and specifications shall be the standards applicable to all New York Saline Surface Waters which are assigned the classification of SA, SB, SC or SD, in addition to the specific standards which are found in this Part under the heading of each such classification.

Quality Standards for Saline Surface Waters

Items	Specifications
1. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the marine district as defined by Environmental Conservation Law (§ 17-0105).
2. pH	The normal range shall not be extended by more than one-tenth (0.1) pH unit.
3. Turbidity	No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.
4. Color	None from man-made sources that will be detrimental to anticipated best usage of waters.
5. Suspended, colloidal or settleable solids.	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to each class.
6. Oil and floating substances.	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.

7. Thermal discharges (See PART 704 of this Title.)

CLASS "SA"

Best usage of waters. The waters shall be suitable for shellfishing for market purposes and primary and secondary contact recreation.

Quality Standards for Class "SA" Waters

Items	Specifications
1. Coliform	The median MPN value in any series of samples representative of waters in the shellfish growing area shall not be in excess of seventy (70) per one hundred ml.
2. Dissolved Oxygen	Shall not be less than 5.0 mg/l at any time.
3. Toxic wastes and deleterious substances.	None in amounts that will interfere with use for primary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS "SB"

Best usage of waters. The waters shall be suitable for primary and secondary contact recreation and any other use except for the taking of shellfish for market purposes.

Quality Standards for Class "SB" Waters

Items	Specifications
1. Coliform	The monthly median coliform value for one hundred ml of sample shall not exceed two thousand four hundred from a minimum of five examinations and provided that not more than twenty percent of the samples shall exceed a coliform value of five thousand for one hundred ml of sample and the monthly geometric mean fecal coliform value for one hundred ml of sample shall not exceed two hundred (200) from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. Dissolved Oxygen	Shall not be less than 5.0 mg/l at any time.
3. Toxic Wastes and deleterious substances.	None in amounts that will interfere with use for primary contact recreatio or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS "SC"

Best usage of waters. The waters shall be suitable for fishing and all other uses except for primary contact recreation and for the taking of shellfish for market purposes.

Quality Standards for Class "SC" Waters

Items	Specifications
1. Coliform	The monthly geometric mean total coliform value for one hundred ml of sample shall not exceed ten thousand and the monthly geometric mean fecal coliform value for one hundred ml of sample shall not exceed two thousand from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. Dissolved Oxygen	Shall not be less than 5.0 mg/l at any time.
3. Toxic wastes and deleterious substances.	None in amounts that will interfere with use for secondary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS "SD"

Best usage of waters. All waters not primarily for recreational purposes, shellfish culture or the development of fishlife and because of natural or man-made conditions cannot meet the requirements of these uses.

Quality Standards for Class "SD" Waters

Items	Specifications
1. Dissolved Oxygen	Shall not be less than 3.0 mg/l at any time.
2. Toxic wastes and deleterious substances.	None alone or in combination with other substances or wastes in sufficient amounts to prevent survival of fish life or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

PART 702

SPECIAL CLASSIFICATIONS AND STANDARDS

(STATUTORY AUTHORITY: ENVIRONMENTAL CONSERVATION LAW, SECTION 15-0313 AND SECTION 17-0301)

Section

702.1 Class A-SPECIAL (International boundary waters)
702.2 Class AA-SPECIAL (Lake Champlain drainage basin)
702.3 Special classes and standards for the lower Hudson River Arthur Kill, Kill Van Kull, Harlem River, Raritan Bay and Lower East River drainage basin, New York Bay area, Nassau County including Long Island Sound, Suffolk County, Upper East River, Long Island Sound drainage basins within Queens, Bronx, and Westchester counties, and Jamaica Bay drainage basin within Kings and Queens counties including a certain portion of Rockaway Inlet.
702.4 Class AA-SPECIAL (Upper Hudson River drainage basin)

Section 702.1 CLASS A-SPECIAL (INTERNATIONAL BOUNDARY WATERS)

(GREAT LAKES WATER QUALITY AGREEMENT OF 1972)

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes, primary contact recreation and any other usages. Conditions related to best usage. The waters, if subjected to approved treatment, equal to coagulation, sedimentation, filtration and disinfection with additional treatment, if necessary, to reduce naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class A-Special Waters

(International Boundary Waters)

ITEMS	SPECIFICATIONS
1. Coliform	The geometric mean of not less than five samples taken over not more than a thirty-day period should not exceed 1,000 per 100 ml total coliform nor 200 per 100 ml fecal coliform

ITEMS	SPECIFICATIONS
2. Dissolved Oxygen	In the rivers and upper waters of the lakes not less than 6.0 mg/l at any time. In hypolimnetic waters, it should be not less than necessary for the support of fishlife, particularly cold water species.
3. Total Dissolved Solids	Should not exceed 200 milligrams per liter
4. pH	Should not be outside the range of 6.7 to 8.5.
5. Iron	Should not exceed 0.3 milligrams per liter as Fe.
6. Phosphorus	Concentrations should be limited to the extent necessary to prevent nuisance growths of algae, weeds and slimes that are or may become injurious to any beneficial water use.
7. Radioactivity	Should be kept at the lowest practicable levels and in any event should be controlled to the extent necessary to prevent harmful effects on health.
8. Taste and odor-producing substances, toxic wastes and deleterious substances	None in amounts that will interfere with use for primary contact recreation or thatwill be injurious to the growth and propagation of fish, or which in any manner shall adversely affect the flavor, color or odor thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.
9. Suspended, colloidal or settleable solids	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to this class.

Items	Specifications
10. Oil and floating substances	No residue attributable to sewage, industrial wastes or other wastes nor visible oil film nor globules of grease.
11. Thermal Discharges	(See PART 704 of this Title.)

To meet the water quality objectives referred to in the "Great Lakes Water Quality Agreement of 1972," the standards listed above shall be subject to revision from time to time after further hearings on due notice.

Note: Refer to note 1 under Class "AA" which is also applicable to Class A-Special (International Boundary Waters) standards.

Section 702.2 CLASS AA-SPECIAL (LAKE CHAMPLAIN DRAINAGE BASIN)

CLASS AA-SPECIAL

Best usage of waters. Any usage except for disposal of sewage, industrial wastes or other wastes.

Quality Standards for Class AA-Special Waters (Lake Champlain Drainage Basin)

Items	Specifications
1. Floating solids; settleable solids; oil; sludge deposits; toxic wastes; deleterious substances; colored or other wastes or heated liquids.	None attributable to sewage, industrial waste or other wastes.
2. Sewage or waste effluents.	None into waters of this class.

Section 702.3 Special Classes and Standards for the Lower Hudson River, Arthur Kill, Kill Van Kull, Harlem River, Raritan Bay and Lower East River Drainage Basins, New York Bay area, Nassau County including Long Island Sound, Suffolk County, Upper East River, Long Island Sound Drainage Basins, within Queens, Bronx and Westchester counties and Jamaica Bay Drainage Basin within Kings and Queens counties including a certain portion of Rockaway Inlet.

a. This section applies to the waters within the following areas, which constitute the Interstate Sanitation District:

1. The drainage basin of the Lower Hudson River from the mouth to northern Westchester-Rockland county lines, except Saw Mill River and Sparkill Creek drainage basins.

2. The drainage basins of Arthur Kill, Kill Van Kull, and Harlem River, and Raritan Bay.

3. The drainage basin of Lower East River from the mouth to a line across East River north of Wards Island between Stony Point in Bronx County and Lawrence Point in Queens County.

4. New York Bay including Gravesend Bay, Coney Island Creek, Atlantic Basin, Erie Basin, Gowanus Bay, Gowanus Canal. The Narrows and Atlantic Ocean waters off Coney Island lying westerly of a north-south line from Light Inlet at the southeasterly tip of Coney Island Peninsula to the south tip of Rockaway Point, thence along the jetty to Rockaway jetty light, thence due south to the New York-New Jersey boundary line.

5. Nassau County including the waters of Long Island Sound between Nassau-Queens and Nassau-Suffolk county lines and the waters of Atlantic Ocean to the three mile limit between said county lines.

6. The area within Suffolk County lying west of a north-south topographical limit line and its extensions to a point in Long Island Sound at the New York-Connecticut State boundary line due north of Miller Place Beach and to Blue Point on the south mainland thence southward across Great South Bay to Water Island, thence three miles due south to a point in the Atlantic Ocean at the south State boundary line.

7. Certain tidal waters which are within the Upper East River and Long Island Sound drainage basins within Queens, Bronx, and Westchester counties.

8. Jamaica Bay drainage basin within Kings and Queens counties and including Rockaway Inlet east of a north-south line drawn from Light Inlet at the south easterly tip of Coney Island peninsula near Manhattan Beach to the westerly shoreline west of Lookout Tower on Rockaway Point.

). Said classes and standards of quality and purity applicable thereto are set forth hereinafter and designated Class I and Class II.

CLASS "I"

est usage of waters. The waters shall be suitable for secondary ontact recreation and any other usage except for primary contact ecreation and shellfishing for market purposes.

Quality Standards for Class "I" Waters

tems	Specifications
. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the marine district as defined by Environmental Conservation Law (§17-0105).
. Coliform	The monthly geometric mean total coliform value for one hundred ml of sample shall not exceed ten thousand and the monthly geometric mean fecal coliform value for one hundred ml of sample shall not exceed two thousand from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
Dissolved Oxygen	Shall not be less than 4.0 mg/l at any time.
pH	The normal range shall not be extended by more than one-tenth (0.1) pH unit.

5.	Turbidity	No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.
6.	Color	None from man-made sources that will be detrimental to anticipated best usage of waters.
7.	Taste and odor-producing substances, toxic wastes and deleterious substances.	None in amounts that will interfere with use for secondary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary conditions thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.
8.	Suspended, colloidal or settleable solids.	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to this class.
9.	Oil and floating substances.	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
10.	Thermal Discharges	(See PART 704 of this Title.)

Section 702.4 CLASS AA-SPECIAL (UPPER HUDSON RIVER DRAINAGE BASIN)

CLASS AA-SPECIAL

Best usage of waters. Any usage except for disposal of sewage, industrial waste or other waste.

Quality Standards for Class AA-Special Waters

(Upper Hudson River Drainage Basin)

ITEMS	SPECIFICATIONS
1. Floating solids, settleable solids, oil, sludge deposits, toxic wastes, deleterious substances, colored or other wastes or heated liquids	None attributable to sewage, industrial wastes or other wastes.
2. Sewage or waste effluents	None into waters of this class.

CLASS "II"

Best usage of waters. All waters not primarily for recreational purposes, shellfish culture or the development of fishlife.

Quality Standards for Class "II" Waters

ITEMS	SPECIFICATIONS
1. Floating solids, settleable solids, sludge deposits	None which are readily visible and attributable to sewage, industrial wastes or other wastes or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.
2. Garbage, cinders, ashes, oils, sludge or other refuse	None in any waters of the marine district as defined by Environmental Conservation Law (§17-0105).
3. Dissolved Oxygen	An average of not less than 30 per cent saturation during any week of the year, provided such saturation levels insure adequate oxygen to support fish and shellfish life at all times.
4. Toxic wastes, oil, deleterious substances, colored or other wastes, or thermal discharges	None alone or in combination with other substances or wastes in sufficient amounts to be injurious to edible fish and shellfish, or the culture or propagation thereof, or which shall in any manner affect the flavor, color, odor or sanitary condition of such fish or shellfish so as to injuriously affect the sale therof, or which shall cause any injury to the public and private shellfisheries of this State. See Part 704 for thermal discharges.

Penn

Pennsylvania Separator Corporation
P.O. BOX 340 BROOKVILLE, PA. 15825 · TEL. 814/849-7328

November 18, 1975

Mr. Edward Tuerk
Assistant Administrator
for Air and Waste Management
c/o Federal Register
Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Dear Mr. Tuerk:

This letter to you results from our receiving a copy of the Federal Register in today's mail. Enclosed you will find a catalog containing literature covering our product line on flash economizers, silencers, exhaust heads, inlines, blowdown separators, and accessories. I thought the literature on the flash economizer and silencer might be of particular interest to you and the Environmental Protection Agency because of your concern under point three of Discussion Topics in the Federal Register. If you desire any additional information and/or literature, please feel free to write or call us.

Thank you for taking the time to read this letter and our literature.

Very truly yours,
Penn Separator Corp.

John A. McNeil
Sales Manager

JAMcN/pjm
Enclosure: 1

BROCHURE DETACHED AND RETAINED
IN SOLID WASTE MANAGEMENT FILES

PROJECT SURVIVAL
366 California Ave., Palo Alto, California 94306
(415) 329-0450

8 December 1975

Mr. John P. Lehman, Director
Hazardous Waste Management Division
U. S. Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Lehman:

Recent developments make it impossible for us to appear on December 11 at the Hazardous Waste Management meeting in San Francisco.

We are especially concerned with disposal of wastes from nuclear power plants and other facilities within the nuclear fuel cycle.

Because we can't come, we are submitting the following comments:

1. Low-level wastes: These wastes have already begun to leak into the environment at Maxey Flats, Kentucky, West Valley, New York, and Hanford, Washington (trench wastes). Projected amounts of plutonium in low-level wastes generated in the future from nuclear power plants will equal or exceed the amount of plutonium in the high-level waste stream from the reprocessing plant. We urge you to study the adequacy of present methods of disposal of low-level wastes and set standards appropriate to the long storage time and toxicity of plutonium and other transuranics in low-level wastes.

2. Mines and Mills: Leaks have already resulted in contamination of drinking and irrigation water in New Mexico and Colorado. We urge you to set strict standards to prevent future contamination of water supplies from this source.

3. Mill tailings: Abandoned mill tailings pose a substantial threat to human health due to the decay of uranium into daughter products such as radon gas. Because millions will die over the next 80,000 years as a result of this source, we urge you to set strict standards requiring stabilization and disposal of mill tailings in such a way that radioactivity will not be released into the environment from this source. We further urge that a determination be made quickly as to who should bear the expense and responsibility of disposing of mill tailings, both at the 22 abandoned sites in the U.S.

and at presently operating mills.

4. High-level wastes: We are especially concerned at the present state of affairs with regard to management of high level wastes. Security is inadequate to prevent sabotage of spent fuel storage ponds at reactor sites. Continued storage of large quantities of spent fuel at reactors around the country poses a threat to our health and our security. We are appalled that more radioactive wastes are being generated despite the fact that there is no proven means to safely dispose of these materials. We urge a moratorium on further construction of nuclear power plants pending the solution of this matter to the satisfaction of a majority of society.

We would be happy to answer any questions and present further information on this subject.

Sincerely,

James E. Burch
President
PROJECT SURVIVAL

JEB/hl
cc: Dr. Leslie Grimm

SOLVENTS RECOVERY SERVICE OF NEW JERSEY, INC.

1200 SYLVAN STREET LINDEN, N J 07036

PHONE (201) 925-8600

December 9, 1975

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

Dear Mr. Lehman:

We would like to present as part of the EPA's Public Hearing on Hazardous Waste Management the following comments for the record SRS is probably one of the largest and oldest resource recovery operations in the United States. We have been recovering solvents fr waste streams for the paints and coatings industries for nearly forty years and, as such, have developed a tremendous amount of technology in the resource recovery of flammable and nonflammable solvents. We were extremely disappointed with your program and meeting in Newark which we attended in that we noted that not enough attention was presented to the resource recovery field. We feel that proposing a program to solve hazardous waste disposal through use of landfills or deep well disposal techniques can only be considered a stopgap measure in that it only provides a storage facility for such problem wastes for hopeful solutions in the futur

1. In regard to proper methods for collection and analysis of waste samples, we would propose that the generator of the waste be responsible to provide the recipient of hazardous waste with an appropriate analysis of the waste, sufficient enough to allo the waste disposer or recoverer to handle it in a safe manner. Sampling of hazardous waste presents a tremendous problem, particularly when handling drum lots of material.

2. We feel the responsibility and liabilities for the solid wastes should rest with the generator of the wastes until such time as the material has been properly transferred to a registered or licensed disposal or resource recovery corporation. Both the generator and the processor of the hazardous wastes should approve the method of disposal and, at the same time, it should be sanctioned by the State and/or Federal Government. This is the only way which will alleviate the possibility that lawsuits can be brought by third parties and/or the Federal Government against a generator and processor of solid wastes as a result of any future problems which might occur.

3. A major incentive should be provided for any process which involves resource recovery and/or reuse of materials, as this process is the only process which does not merely store the hazardous material for future generations or create a real or potential air pollution or water pollution problem. We feel that all incentives should be provided and a firm requirement made to utilize resource recovery for all hydrocarbon or waste by-product streams. We have been successful in utilizing resource recovery techniques on almost all classes of solvents, that is, esters, ethers, fluorocarbons, general purpose hydrocarbons, toluenes, alcohols, amines, aromatics and chlorinated solvents. We have provided this service to the paints and coatings industries, the pharmaceutical, general purpose chemicals, printing, electronic, metalworking, magnetic tape, and many other industries. We feel an incentive is required in that this method sometimes can be more costly than other disposal techniques, such as landfill, but when you review the overall benefits to a long range environmental protection plan many limited incentives in this area will have tremendous future returns.

4. Many hazardous wastes can be rendered harmless through removal of recyclable materials which many times result in a general solid waste by-product which can be landfilled in regular landfills.

5. We have a tremendous amount of cost data available as a result of our nearly forty years in the resource recovery operation. The generalized cost data, however, cannot be issued in that each individual case or stream must stand on its own from an economic viewpoint.

6. The minimum safety and security precautions for transportation of solid wastes are covered in enough detail in the existing DOT regulations and covered basically at disposal sites under existing OSHA regulations.

7. In regard to recordkeeping and site monitoring, we feel that the program set up by the State of New Jersey is an excellent basic program in this regard.

8. We feel that the Federal Government and/or State Government should also be empowered to provide financial assistance either in the form of grants and/or long term financing to any resource recovery operations which will serve as an alternate to other

less desirable hazardous disposal programs, such as land-filling or incineration. We also feel that hazardous waste legislation should be made country-wide so as to make it desirable to operate a hazardous waste generating business or a hazardous waste disposal or recovery business in any part of our country.

I would like to thank you very much for taking the time to enter the above into the record. If we can be of any further service to you, please let us know.

Very truly yours,

John P. O'Connell

JPOC:bjk

SOUTHERN METHODIST UNIVERSITY

ARCHAEOLOGY RESEARCH PROGRAM
Department of Anthropology
DALLAS, TEXAS 75275

November 21, 1975

Mr. John P. Lehman
Director, Hazardous Waste Management Division
Office of Solid Waste Management (AW-565)
Environmental Protection Agency
Washington, D. C.

Dear Mr. Lehman:

I wish to file the following comments with your office in response to the EPA's notice of public meetings to be held in December 1975, concerning the management of hazardous wastes. Since I will be unable to attend any of the meetings, I would appreciate having my comments placed on the meeting record.

Discussion topic two touches on the problem of defining the liabilities and responsibilities of waste generators, treaters, and disposers. It is my concern that the EPA consider the effects on cultural resources resulting from various hazardous waste management practices. In particular, it is important to have an accurate and detailed field derived inventory and evaluation of the cultural resources in any area where land surface modifications are planned, so that the adverse effect of the modification on the resource base can be minimized and controlled. Cultural resources can be narrowly defined here to mean all prehistoric and historic archaeological remains.

The decision as to who should bear the costs of this inventory, evaluation, and possible mitigation is not within the realm of this archaeologist's expertise. It is my belief, though, that this resource base must be recognized and that its protection must be considered in the planning of facilities for the handling of hazardous wastes in the future.

Sincerely,

Joe G. Gallagher
Research Archaeologist

JGG/cd

1667

SYSTEC

environmental specialists ■ engineering consultants ■ systems designers & fabr
SYSTEMS TECHNOLOGY CORPORA
3131 Encrete Lane . Dayton, Ohio
Area Code 513/29

30 January 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

Subject: Hazardous Waste Management

Dear Mr. Lehman:

Systems Technology Corporation is submitting this letter in response to the request for comments regarding "Hazardous Waste Management" published by the U.S.E.P.A. in the September 17, 1975 Federal Register.

As you know, Systems Technology Corporation specializes in environmental technology. We operate three Systech Waste Treatment Centers that provide disposal services for industrial liquid wastes. Furthermore, our firm is engaged in many environmental consulting and research projects. The comments submitted below are based on the extensive experience that we have gained in the subject area.

The management of Systems Technology Corporation is of the opinion that there is a serious need for legislation to provide a more positive control over hazardous waste disposal practices. There are many reasons for this need but the most compelling one is that existing regulations are at best inconsistent throughout the Country. As such they are inadequate for protecting the public health and welfare from the immediate and long term risks associated with the highly technical, highly complex, and highly mobile materials categorized as "Hazardous Wastes." The need for hazardous waste legislation parallels the needs that led to the legislation regarding air and water quality standards. Improper disposal of hazardous wastes threatens all of the earths media and has the potential of long term pollution of land and ground water. The only difference is that hazardous wastes tend to be in smaller more easily transported quantities. Thus, the pollution effects are more isolated and less visable. Nevertheless, the many studies of the U.S.E.P.A. demonstrate the risk potential associated with the disposal of these materials.

A Subsidiary of Systems Research Laboratories, Inc.

In our opinion there are at least three major objectives to be accomplished by Federal legislation regarding "Hazardous Waste Management."

1) The first objective is to establish a technically strong and uniformly applied requirement for the proper and environmentally sound disposal of hazardous wastes. Without such a requirement waste generators will not commit the extra expense needed to properly treat these wastes and the development of a hazardous waste disposal industry will be stunted. In addition, there will be a tendency to transport wastes from one area to another in order to escape strict disposal requirements.

2) The second objective should be to establish minimum treatment/disposal standards for the various generic types of wastes considered to be hazardous wastes. The intent here is to establish the minimum treatment/disposal results that are acceptable and not to dictate specific treatment techniques.

3) The third objective should be to establish a method to insure that contract hazardous waste processors have the resources necessary to meet the minimum treatment requirements. This could be accomplished through a licensing or permit program. Such a mechanism is necessary because the highly mobile nature of the waste makes circumvention of treatment standards more likely. Furthermore, a licensing program would provide the waste generator with a reasonable assurance that his wastes are being properly handled.

The problem of Hazardous Waste Management is a highly technical problem that is National in scope. As such it requires the application of the Nations best technical resources. Typically, these technical resources are beyond the reach of state and local agencies that are currently administering the disposal of these materials. Because of this we stongly support the promulgation of Federal legislation to meet the objectives outlined above. However, as a practical matter it may be desirable to have the states implement the enforcement as they do for air and water programs.

We recommend that those preparing recommendations for legislation consider some of the following problem areas.

1) The definition of Hazardous Wastes is particularly difficult. The name itself causes some people to think of only "high-risk" materials such as explosives, unstable materials, extremely toxic materials radioactive materials etc. At the public hearings in Chicago one speaker implied that oily wastes, acids, caustics, etc. did not need treatment and were suitable for land disposal. We strongly disagree with that position. We believe that all industrial wastes should be pretreated to the best level practical prior to returning them to the environment. Pretreatment minimizes the volume of wastes requiring disposal and minimizes the risk associated with returning these materials to the environment. The problem here would be for the legislation to establish the best practical level of treatment required prior to final disposal.

2) Circumvention of regulations is one problem that may be significant and should be considered in the preparation of legislation. Circumvention is more of a problem for hazardous wastes because they can be readily transported by trucks. Consider for example, the use of waste oils for dust control on rural roads. In Michigan road oilers are not bound by the regulations controlling industrial waste haulers of processors even though the waste oils come from industrial sources. As a result it is easy for generators to mix other wastes with oily wasts. This mixture would then be widely disposed over the roads. This type of circumvention could lead to more cases like the Missouri Horse Arena Poisoning incident.

   Any new legislation should insure that there is good accountability required on the part of the waste generator, the waste transporter and the waste processor.

3) The problem of properly identifying and transporting waste also needs significant attention. Existing regulations by the Department of Transportation may already adequately provide the mechanism for accomplishing this control. Yet, there is a need for developing specific identification standards for hazardous wastes. It would be desirable for the EPA to work closely with the DOT on this matter.

The above comments are of a general nature and do not relate to the technical specifics. The objective of this letter is to demonstrate the need for strong, technically sound legislation to provide positive control for "Hazardous Waste Management." The management of Systems Technology Corporation strongly supports the activities of the U.S. E.P.A. in this matter.

Sincerely,

SYSTEMS TECHNOLOGY CORPORATION

Thomas J. Wittmann, P.E.
President

TJW/ds

UTD

THE UNIVERSITY OF TEXAS AT DALLAS

INSTITUTE FOR
ENVIRONMENTAL SCIENCES

January 5, 1976

John Lehman
Director, Hazardous Waste Program
Environmental Protection Agency
Office of Solid Waste Management (AW-565)
Washington, D. C. 20460

Dear Mr. Lehman:

Please find enclosed a statement that I would like to have introduced into the record of the US EPA public meeting that was held in Houston concerned with hazardous chemical wastes. I would be pleased to discuss with you or with any of your staff any of the comments made in the attached statement.

Sincerely yours,

G. Fred Lee
Director

GFL:sp

Enclosure

1652

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

214 690-2238 BOX 688 RICHARDSON, TEXAS 75080

STATEMENT FOR PUBLIC MEETING ON HAZARDOUS WASTE MANAGEMENT
US EPA, HOUSTON, TEXAS - DECEMBER, 1975

By
G. Fred Lee, Director
Center for Environmental Studies
University of Texas at Dallas, Richardson, Texas 75080

Increasing emphasis has been placed during the past few years on control of air and water pollution at the Federal, state, and local level. This situation has given increased attention to land disposal of municipal and industrial wastes. While land disposal of waste is often relatively simple to practice, and inexpensive where cheap land is readily available, it is not without significant potential environmental problems, the most important of which is ground water contamination. In many parts of the U.S., the states' water pollution control regulations do not provide adequate power to the water pollution control authorities to enable adequate protection of ground water resources.

It is my opinion that protection of the quality of ground water resources of the U.S. has been a grossly neglected area which needs immediate attention. The passage of the December, 1974 "Drinking Water Act" provides the legislation necessary to protect the ground water resources of the U.S. from contamination by the disposal of various types of waste on land; however, it appears to be the mood of the Federal and State governments to curtail spending and as a result, the funds needed to properly implement the protection of the nation's ground water resources have not been, nor will they likely be, forthcoming in the near future. In light of this situation, it is imperative that the limited research funds made available for control of ground water contamination be focused on the most important potential problems. It is my opinion that one of the areas that deserves the highest priority for funding is studies designed to determine the fate of chemical contaminants in

on-land disposal. Particular emphasis should be given to organic contaminants arising from industrial processes. The essential complete prohibition of ocean dumping in the U.S. coupled with the high cost of fuel and air pollution control equipment have caused increased interest on the part of industry in land disposal of processing-manufacturing chemical wastes. Further, the stricter controls on air and water pollution have generated large amounts of solid or semi-solid wastes associated with waste treatment processes which today are being disposed of on land. Many of these industrial wastes are highly toxic to plants, animals, and man, and will likely, when placed in pits or in a landfill or disposal system will migrate through the sub-surface strata and eventually contaminate ground waters.

While soils have a capacity to remove certain types of contaminants, this capacity is, in most cases, finite. Once exceeded the contaminants will move through the soil system and eventually cause water quality problems. One of the aspects of ground water contamination which is significantly different from that of surface water contamination is that usually the contamination does not show up as a water quality problem for many years after the time the contaminants are added to the land disposal system. Further of great significance is the fact that once ground water contamination has occurred, it is virtually impossible to eliminate the contamination. In surface water systems, contaminated waters will usually recover rapidly after the source of the contaminant is controlled. For ground waters, this is rarely the case and usually it can be expected that the ground water resource will be more or less permanently destroyed under conditions of severe contamination.

During the past several years, there has been a major shift from water disposal to land disposal of waste. This is in the eyes of some thought to be more ecologically sound; however, this is not necessarily the case, and in fact,

the opposite may be true. A prime example of situations where land disposal may actually be more injurious to the environment than previously practiced open-water disposal is with respect to sediments dredged from U.S. waterways. It is becoming increasingly clear today that there are situations where land disposal of grossly contaminated dredged sediment may, in fact, be more damaging to environmental quality than previously adopted open-water disposal methods.

It is my opinion that the process being utilized today at the federal and state levels are often not adequate to properly protect ground waters from contamination from both municipal and industrial disposal of liquid and solid wastes on land.

There are sufficient number of incidents of ground water contamination from land disposal of waste to warrant, under the auspices of the December, 1974 "Drinking Water Act", the initiation of strict guidelines governing all such disposal including the industrial disposal on their own property. These guidelines should describe a general approach that must be followed to develop suitable land disposal systems, and most importantly develop the general approach that must be followed by private individuals, municipalities and industry to monitor land disposal of waste practices to insure that such practices do not lead to surface or ground water contamination. I believe every major installation, being utilized for land disposal of waste must be ringed with a series of monitoring wells and that at no less than quarterly initially, and then after about a year, bi-annually and possibly ultimately annually, samples be taken for detection of significant movement of contaminant from the disposal site into the surrounding strata.

One of the major goals of the US EPA's program to protect the ground water resources of the U.S. must be the development of a testing procedure that can be utilized to

screen potentially hazardous waste for the potential for migration through any liners that may be employed in the disposal site area and through the sub-surface strata of the region. Ultimately these tests would be employed on a routine basis in order to provide the regulatory agencies and the individuals responsible for disposal of waste with a tool that could give a "go" or "no go" information for a particular type of waste in a particular land disposal system.

It is imperative that work begin immediately on developing procedures which can be used to evaluate whether certain types of municipal and industrial waste may safely be disposed of in landfills and other on-land or sub-surface disposal systems. These procedures should be relatively simple tests which could be used by industry and water pollution regulatory agencies to ascertain whether the contaminant, once added to a particular land disposal system, would remain at the disposal site or would, in time, tend to be transported from the disposal site to ground water in the region.

Sidney B. Tuwiner, Ph. D.
Consulting Engineer
52 Vanderbilt Avenue
New York, N. Y. 10017
212 OR 9-6499

December 30, 1975

Mr. John P. Lehman
Director, Hazardous Waste Management Div.
Office of Solid Waste Programs (AW565)
Environmental Protection Agency
Washington, D. C. 20460

Dear Sir:

The attached comments are those of the undersigned, a consultant of Phelps Dodge Refining Corporation, and they are in agreement with the opinions and position of this Company.

We wish in particular to take exception to the inclusion of copper among the parameters to be monitored and reported in solid waste as we believe that copper is in no way harmful to the environment as a constituent of waste in landfill.

Very truly yours,

S. B. Tuwiner

SBT:ss
Enclosure

January 2, 1976

COMMENTS:

SENATE BILL S. 2150
"THE SOLID WASTE UTILIZATION ACT OF 1975"

Control technology presently mandated for control of emissions and discharges now results in generation of solid waste which requires on-land disposal. Certain of these solid wastes may be regarded as hazardous because of danger to public safety or environment. These comments are directed solely to disposal of a class of wastes consisting largely of gypsum and heavy metal compounds from the treatment of metal-containing wastewater with lime.

The presumed danger resulting from on-land disposal of these wastes is solely from the potential discharge of the metals into ground and surface water. It is proposed that there should be provided under a permit system a procedure called Standard Leaching Test (SLT) to determine if the waste is hazardous by agitating with an acid to determine if inorganics, specifically metals, are leachable. There would also be provided a Standard Attenuation Procedure (SAP) to simulate the transport of the elements from the on-land waste to the soil and aquifer.

The EPA has recommended that where there is a danger of attenuation of harmful elements from the on-land waste that liners shall be used in the disposal areas to hold these elements in place.

It is a fact that most of the solid waste generated by the metal and metal finishing industries is in the form of sludges with comparatively low solids content with gel-like properties of thixotropy. There is very little risk that in such sludges there will be a leaching action of water penetrating the solid waste and flowing out into the ground.

The real problem in almost all instances is that rain water will raise the level of the sludge due to its impenetrability and finally overflow carrying solids. The correct engineering solution of this problem is to provide a basin with correctly graded subsoil to retain the solids while permitting a controlled percolation of water. This would accomplish a thickening and dewatering of the sludge and provide greater solids retention per unit area with reduced risk of breakthrough.

There is available a sufficiency of knowledge of soil science for the design of grading specifications for subsoil to provide a complete range of penetrability from that of gravel to almost zero permeability in aggregate combinations similar to those used in earth dams with greater reliability and lower cost than for membrane liners in most cases.

Cement liners, which are highly recommended, are unsuited for holding large volumes unless they are provided with expansion joints and footings at prohibitive cost.

For the large number of owners with individually small volumes of sludge for disposal, there should be a simplification of requirements for reporting. For those cases of small volumes of marginally toxic waste, there should be an easing to permit disposal as ordinary landfill. This is recommended especially for metal-containing sludge in which the metal contents are comparable with those of domestic solid waste disposal of which in ordinary sanitary landfill is current practice.

There is no logical reason ecologically or in justice for requiring greater stringency in disposal of solid waste by industry than in the disposal of domestic waste which presently contains substantial amounts of the heavy metals. The same requirements should be imposed for wells around the disposal site to detect leaching from sanitary landfill into ground water.

Just as the domestic homeowner is relieved of responsibility for waste after it is collected by a scavenger, the same relief should be afforded to industries generating small volumes of solid waste from wastewater treatment, provided that the scavenger is properly authorized or licensed.

While acknowledging that heavy metals, such as arsenic and lead, occurring in solid waste generated by the copper refining industry, are potentially harmful and toxic, we wish to maintain that copper should not be included among the metals to be reported and monitored as it is biodegradable in the true sense of that term and ecologically benign.

S. B. Tuwiner

IN REPLY REFER TO:

United States Department of the Interior

2912 (322)

BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240

Mr. John P. Lehman
Director, Hazardous Waste
Management Division
Environmental Protection Agency
Washington, D.C. 20460

JAN 27 1976

Dear Mr. Lehman:

This is in response to your Federal Register announcement requesting comments on the environmentally safe management of hazardous wastes. Our particular interest is the potential use of national resource land for disposal of hazardous wastes.

Briefly, our position is that the private sector should be encouraged to dispose of hazardous wastes in an environmentally safe manner, but that Federal Government subsidies in the form of cheap land for disposal sites should not be allowed.

We advocate the use of privately acquired sites, but we recognize that in some cases federally owned lands may be the most suitable sites for disposal facilities. However, we do not feel that under existing authorities it would be proper to lease national resource lands (Bureau of Land Management administered lands) for the disposal of long-term hazardous wastes. In case of noncompliance by the lessees, our only recourse would be to terminate the leases, but then the Bureau of Land Management (BLM) would be left with contaminated sites and we have neither the authority nor the capability to manage them.

We feel that consideration should be given to authorizing a single Federal Agency to administer federally owned lands for this use with the consent of the holding Agency, and to provide the long-term maintenance necessary to monitor these sites. We do not feel that the private sector can be depended upon to assume long-term responsibility for them.

All leases should be made at fair market value with a bond sufficient to insure compliance with the stipulations of the lease. In addition, the future projected costs to the public of maintaining the site should be discounted to the present time and paid by the lessee.

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

1700

We have issued instructions to our field Offices prohibiting the disposal of long-term hazardous wastes on national resource lands, and we intend to maintain this policy until we receive Congressional authorization to proceed otherwise.

Sincerely yours,

George L. Turcott

Associate Director

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

OFFICE OF THE DIRECTOR

JAN 30 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:

We are submitting the following comments on hazardous waste management in response to your agency's notice in the Federal Register of September 17, 1975.

In general, we believe that the sixteen discussion topics mentioned in the Federal Register are pertinent but that they fail to include the essential matter of geologic and hydrologic characteristics of disposal sites. It should be recognized that some sites should be rejected because of geologic or hydrologic considerations, regardless of such protective measures as linings, concrete, or other engineered works. Attention needs to be given to the probability that some hazardous material will escape eventually from any engineered disposal site. In fact, the Geological Survey and the EPA Office of Radiation Programs are actively studying current problems of this kind at Maxey Flats, Kentucky and West Valley, New York.

Solid radioactive wastes in general.

Pertinent references include Geological Survey open-file report IDO-22053 and Professional Paper 717. The latter illustrates (p. 39-48) some of the kinds of problems concerned with shallow-land burial and disposal of radioactive wastes, while the open-file report illustrates the development of a model for predicting the fate of some liquid radioactive materials discharged to ground water.

With regard to the general principles which should be used in the management of radioactive wastes, we believe that the guiding principle should be that there is no such thing as a harmless dose of radiation, in view of the presen incomplete state of knowledge on risks to humans from exposure to radiation.

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

We note that the National Council on Radiation Protection has reiterated from its predecessor, the National Committee on Radiation Protection, that "there may be some degree of risk at any level of exposure," and that "it is not unreasonable to follow the assumption of a linear relationship between dose and effect in the low dose regions." The International Commission on Radiological Protection has stated that: (1) "it has been assumed that even the smallest doses involve a proportionately small risk of induction of malignancies;" (2) "the Commission sees no practical alternative, for the purposes of radiological protection, to assuming a linear relationship between dose and effect, and that doses act cumulatively;" and (3) "this assumption implies that there is no wholly 'safe' dose of radiation." The National Academy of Sciences has also stated that "the linear, nonthreshold hypothesis warrants use in determining public policy on radiation protection." All of the foregoing quotes are from AEC's draft environmental statement for Management of Commercial High Level and Transuranium-Contaminated Radioactive Waste (WASH-1539, dated approximately September 1974, pages A.1-14 to A.1-19).

"Low-level" or "other than high-level" solid radioactive wastes.

These wastes, produced by the commercial nuclear power industry, are currently being disposed mainly by shallow, "sanitary land-fill" methods at six commercial disposal facilities in the United States. The Geological Survey's concerns about the management of commercial radioactive solid wastes have been expressed in Department of the Interior NEPA-related reviews of Nuclear Regulatory Commission (NRC) draft environmental statements for power reactors and other nuclear facilities. Our comments and NRC (formerly AEC) replies have been published in a large number of final environmental statements.

Our concerns may be summarized generally as follows. The disposal of radioactive wastes is common to every aspect of nuclear energy use. The wastes are currently being produced in a bewildering variety of solid, liquid, and gaseous forms, are being treated in complex ways, and are currently being stored or disposed of by a variety of methods. Decisions related to disposal and storage are complex because of the great ranges in concentrations of various radionuclides in various wastes and the great ranges of their biological hazard potentials. Decisions concerning the methods and sites for disposal are complicated by the fact that hydrologic and geologic environments vary greatly from place to place. For these reasons, the disposal of the "low-level" and "other than high-level" wastes that are being produced and that will be produced by operating light-water reactors and fast-breeder reactors as well as from the fabrication and reprocessing of fuels present an environmental impact of nuclear-energy use that should be carefully evaluated, not only for specific facilities, but also in its totality.

In various of our NEPA-related reviews, the Geological Survey has recommended that environmental statements for commercial nuclear facilities should include sections on radioactive wastes specifying the kinds of radionuclides in the wastes, their physical states, their concentrations in the wastes, and the estimated total volumes of wastes for the expected operating life of the facility. Additionally, we have recommended that the environmental statement for each facility should include an evaluation to determine the suitability of a proposed disposal site for the particular wastes generated by the facility.

We have recommended that environmental statements should be prepared for the disposal sites themselves. Such statements should include discussions of Federal and State licensing provisions, criteria, and responsibilities in connection with: (1) determination of the hydrogeologic suitability of the site to isolate specific wastes from the biosphere for specific periods of time; (2) current and continuing surveillance and monitoring of the site; and (3) any remedial or regulatory actions that might be necessary throughout the specific period of time in which the wastes will be hazardous. The ultimate size and radionuclide inventory of the site and the future land use also should be considered.

A basic requirement of burial sites for low-level or other-than-high-level wastes is that the site must have geological, hydrological and climatological characteristics that will ensure that the radioactive constituents of the buried waste will not migrate into water supplies or become available for ingestion or inhalation by man. For these wastes, the original containers are generally not depended upon for containment, but instead geologic and hydrologic factors of the burial site, particularly the ion-exchange properties of the underlying materials, are relied upon. We believe that quantitative definitions of critical limits to these factors are required in order to permit selection of naturally suitable sites, or in order to determine what construction procedures are required to create artificially those conditions that are lacking in the natural environment. For example, the critical values of ion exchange capacity of underlying materials should be specified, such that if lesser values existed naturally this unsuitable material would be excavated and backfilled with suitable materials. We are particularly concerned with recent announcements that, of the six commercial land burial facilities authorized to receive and bury other-than-high-level wastes, two burial grounds are under reevaluation because of findings of trace levels of radioactivity through the environmental monitoring program or because of concern as to control of precipitation (ERDA's draft environmental statement for U.S. Nuclear Power Export Activities, dated approximately September 1975, p. 3-238).

The above-cited environmental statement predicts that by the year 2000 nuclear power-related exports by the United States may reach $250 billion annually, or about 3.6 percent of anticipated U.S. export revenues at that time. Although the United States is not engaged in the storage of radioactive wastes from the use or recycling of U.S.-exported nuclear materials, these exported materials and the fission products generated from them could have potential adverse environmental impacts on world populations for extremely long periods (thousands of years) unless ultimately disposed of according to standards at least as high as those accepted for management of domestic radioactive wastes. It should not be assumed that the radioactive wastes will be safely managed by all countries, particularly in view of the fact that two of the six commercial land burial facilities authorized to receive and bury other-than-high-level wastes in the United States are under reevaluation, as noted above. We support the conclusion, expressed in ERDA's recent environmental statement, that establishment of regional waste repositories, on a world-wide basis, needs to be given more attention than has been the case to date (p. 3-236).

High-level and transuranium-contaminated radioactive wastes.

New regulations require transfer of commercial high-level radioactive wastes, after solidification, to Federal custody as soon as practicable, or within five years after generation, and require transfer of transuranium-contaminated commercial waste containing more than a specified number of nanocuries of transuranium activity per gram of waste. Previously, transuranium-contaminated commercial waste has been disposed of at the six commercial burial grounds, which in 1972 were estimated to contain a total of about 80 kilograms of plutonium and 480 kilograms of enriched uranium. It has been predicted that by the year 2010, the custody will occupy 75,000 canisters measuring about one foot in diameter by ten feet long, and will contain 50 billion curies of fission products and one billion curies of actinides (i.e., transuranium nuclides).

The favored plan for storage of the high-level wastes is evidently retrievable storage of canisters in artificially-cooled water basins, in what is termed a Retrievable Surface Storage Facility (RSSF), while the transuranium-contaminated wastes would be held in a shallow landfill with about three feet of earth cover, also designed for easy retrieval (information from AEC's draft environmental statement for Management of Commercial High Level and Transuranium-Contaminated Radioactive Waste, WASH-1539, dated approximately September 1974).

Our concerns with the proposed plan for management of high-level and transuranium-contaminated radioactive wastes include: (1) the ultimate disposition of the transuranium-contaminated waste already buried in the six commercial burial grounds; (2) the methods by which transuranium-contaminated wastes will be segregated from those not so contaminated,

and by which compliance will be monitored, in view of the low penetration characteristics of alpha radiation and infeasibility of measuring such activity from outside a waste container; (3) concerns relating to the environmental characteristics of the landfill disposal site or sites, similar to those expressed above in regard to commercial low-level burial sites; (4) methods to be used for inventory of radioactive wastes or other means for detecting losses; (5) method of solidification of liquid high-level wastes prior to their transfer to Federal custody; (6) waste-management activities, including solidification of liquid wastes, at major Federal facilities such as Hanford Reservation in Washington, Oak Ridge National Laboratory in Tennessee, and Savannah River Plant in South Carolina; and (7) the need for an ultimate long-term plan for disposal of all such radioactive wastes.

Nonradioactive hazardous wastes.

Some of the problems encountered in disposal of hazardous wastes at sanitary landfill sites are exemplified by the West Contra Costa Sanitary Landfill Project, situated 1.2 miles from the edge of residential North Richmond at the southeast edge of San Pablo Bay, California. This is one of four sites in the San Francisco Bay region that accepts Class I (hazardous) wastes, and is the only Class I general purpose solid-waste disposal site in the region. The landfill site is designated for ultimate use as a park and shoreline recreation area. Class I waste is confined to a separate section of the site. During a three-month period of 1974, the site received three million gallons of chemicals and 7,422 55-gallon drums. Only about 60 percent of customers contacted provided information that was requested concerning liquid waste dumped at the site.

Fifty-six known fires have occurred at the site from 1961-1973, 17 of them since October 1972, and at least three have occurred at the Class I disposal area. On two known occasions in the last five years, chemical drums have ruptured and/or exploded, causing fires and fumigation, one instance prompting criminal action against the landfill operators. It is also noteworthy that the accident frequency rate among disposal-site operators is one of the highest in all industries and municipal activities. (Foregoing information was obtained from the Corps of Engineers' draft environmental statement for West Contra Costa Sanitary Landfill Project, regulatory permit application, Contra Costa County, California, dated approximately June 1975).

Among the concerns that should be given further consideration in management of hazardous wastes at this and similar disposal sites are: (1) detailed provisions for segregation of noncompatible wastes; (2) possibility that radioactive chemical wastes might have been dumped at the sites; (3) provisions to protect workers and the public from sealed containers of skin-contact poisons or other hazardous materials that may be buried and that

might rupture at some future date if the sites were graded for use as parks, recreation areas, or other uses; and (4) need for long-term water-level and chemical monitoring in the vicinity of the disposal areas by means of one or more wells tapping underlying aquifer(s).

Comments on specific Discussion Topics.

Item 6. -- Environmentally sound management of hazardous waste storage and disposal sites will require assurance of containment when one considers the natural processes such as wind, surface and subsurface erosion, surface transport and subsurface transport.

All waste management sites must be in environments where the hydrogeological regimen is fully understood. The site must be amenable to solute transport modeling. It is economically impossible to construct and engineer any site into one of complete containment. It should, however, be possible to identify sites which will provide containment for X number of years and thereby allow for disposal of specific waste with reasonable assurance of containment.

Item 7. -- To adequately monitor a disposal site, one must be able to construct a digital solute transport model of the area. To adequately model the site, one must have hydrogeological parameters for hydrologic model plus geochemical and geophysical parameters for the solute model. These latter include a complete knowledge of the chemistry of the waste material, the mineralogy of the aquifer materials, and the chemistry of the natural occurring waters. If one has these data, then meaningful monitoring of wells can be installed and sampling procedures can be designed to detect and follow waste movements.

Item 9. -- The monitoring program outlined above should provide adequate control for operating as well as decommissioned burial sites. An adequate monitoring program should provide data on waste movement prior to the time when something must be done to protect the biosphere. With advance warning, engineering techniques will have to be developed for handling the problem. When a site is selected, the monitoring system must be designed and then monitoring will have to be continued into the future.

We appreciate the opportunity to comment on this important topic.

Sincerely yours,

Henry W. Coulter

Acting Director

1107

DEPARTMENT OF TRANSPORTATION
MATERIALS TRANSPORTATION BUREAU
WASHINGTON, D.C 20590

8 MAR 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:

This refers to the September 17, 1975 Federal Register Notice (FRL 432-5), concerning a series of public meetings held by your agency on Hazardous Waste Management. As you are aware, this Office has had several discussions with your Office during the past year regarding the regulation of hazardous wastes during transportation, and has been cooperating with you on the NATO/CCMS Subproject on transport of hazardous wastes.

The following comments are offered with respect to items 11 and 12 of the discussion topics listed in the September 17, 1975 Notice:

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

At present, the transport safety regulations for hazardous materials do not provide specifically for any classification or designation of "hazardous wastes" by name. Instead, the general methodology of most transport regulations worldwide, including the USA, is to categorize "hazardous materials" into a limited number of "generic" classifications, i.e., explosives, flammable compressed gases, nonflammable compressed gases, flammable liquids, combustible liquids, flammable solids, oxidizing materials, toxic materials (poisons), etiologic agents, radioactive materials, and corrosive materials.

Specific hazardous materials may then be listed by name as being in a designated classification or, as in the USA when not listed by name, may be regulated as an "n.o.s." (not otherwise specified) material. The regulations then provide quantative or qualitative classification criteria which enables a shipper to determine if his material is subject to the regulations as a hazardous material for purposes of transport. A number of complications are presented when one tries to correlate such a scheme to the broad context of "hazardous wastes." Specifically, hazardous wastes may be of very low concentration with respect to the "active ingredient" and, therefore, may not be subject to our regulations during transportation. Secondly, a waste material may contain in its matrix, a mixture of different "active ingredients" having differing hazard characteristics, i.e., flammability and toxicity.

It is extremely important to also recognize the philosophy on which the hazardous materials transport regulations are principally based at the current time. Containment during transport is aimed at protecting the transport worker and general public from the acute hazard due to intermittent or one-time short duration exposures. With hazardous wastes, however, the chronic long-term low-level exposure or environmental degradation aspects would appear to be a dominant consideration.

These regulations for hazardous materials are further typically structured so as to prescribe specific packaging requirements, generally as detailed engineering design standards, performance-oriented criteria, or a combination of both. Such prescriptions generally relate the degree of packaging integrity under normal conditions of transport so as to provide the required degree of containment.

Recent legislation, i.e., the Transportation Safety Act of 1974 (P.L. 93-633), has established a new definition for "hazardous material." In § 103(2) of the Act, a hazardous material means "a substance or material in a quantity or form which may pose an unreasonable risk to health and safety or property when transported in commerce" (emphasis added). In view of this new definition, we are presently reconsidering the issue of whether the existing philosophy of regulating hazardous materials in transportation only, on the basis of their acute hazard to safety, is still appropriate.

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?

The required degree of labeling and placarding of waste shipments, as well as their packaging, are the basic parameters that would have to be established should a determination be made to regulate hazardous materials (including hazardous wastes) on a basis other than acute safety hazards, as discussed in # 11 above.

Should a decision be made to include hazardous wastes into the regulatory framework for hazardous materials, the initial task will be to establish the proper shipping name descriptors. To this end we would look to your agency for guidance and recommendations. Going further from that, the required degree of labeling and identification needs to be established, and then the packaging. Of all the parameters, the communications requirements, i.e., labels and placards, appear to be the most important for early consideration. We are not aware of any major problems in the packaging area and it appears that the presently required degree of packaging would be adequate to contain the hazardous wastes for purposes of transportation and handling.

Sincerely,

Alan I. Roberts
Director
Office of Hazardous Materials
Operations

cc: W. J. Burns

VENTURA REGIONAL COUNTY SANITATION DISTRICT

JOHN A. LAMBIE
CHIEF ENGINEER
GENERAL MANAGER

December 22, 1975

MEMBER AGENCIES

VENTURA COUNTY

CITIES

Camarillo
Fillmore
Ojai
Oxnard
Port Hueneme
San Buenaventura
Santa Paula
Simi Valley
Thousand Oaks

SPECIAL DISTRICTS

Camarillo Sanitary
Camrosa County Water
Chan Islands Coun Water
Memers Oaks Sanitary
Montalvo Municipal Improvement
Moorpark County Sanitation
Oak View Sanitary
Saticoy Sanitary
Simi Valley County Sanitation
South Coast County Sanitation
South Coast County Sewer Maintenance
Triunfo County Sanitation
Ventura Avenue Sanitary
Ventura County Waterworks Districts Nos 1, 8 and 16

Environmental Protection Agency
Office of Solid Waste Management Programs
AW-565
Washington, D. C. 20460

Attention Mr. John P. Lehman, Director
Hazardous Waste Management Division

Dear Mr. Lehman:

Hazardous Waste Management

Your office, as indicated in the Federal Register, Volume 40, No. 181, September 17, 1975, has solicited comments on the subject topic.

This Regional District, the only one of its kind in California, is responsible for meeting the disposal needs of 440,000 persons in a 1,900-square-mile area. Our Class I sanitary landfill located at Simi Valley is one of eleven operating sites in this state.

The biggest problem facing both governmental agencies and private industry involved in hazardous waste disposal is in obtaining replacement sites. There is no question that tightening of air and water controls will markedly increase quantities of material now being sequestered in sanitary landfills. It is also true that this disposal method, if done properly, is the most cost effective solution to a crucial problem.

We have tried on two separate occasions to obtain replacement Class I sites only to be turned back by the tide of public opinion. The politicians could not cope with the onslaught of aroused citizenry and further consideration was stopped at the Environmental Impact Report stage. People seem to realize there is a need for such a facility, but say "don't put it here." With the capacity of our remaining site due to expire in 1983, positive action must begin now.

Mailing Address P.O BOX AB 93001 • VENTURA, CALIFORNIA • 181 S ASH STREET • (805) 648-2717

What part can the federal government play in solving this problem? In California, the approach should be to work through the State Health Department, Vector Control Section, and the State Solid Waste Management Board according to the following strategy:

1. A detailed statewide inventory of all hazardous and potentially hazardous wastes. (Work has already started in two counties: Ventura and Alameda)

2. Determine the number and location of Class I sites to meet the state's projected needs. Consider use of federally owned lands where applicable. Consider regional transfer station for more sparsely populated areas.

3. Fund Class I site acquisition and start-up costs similar to the State's Clean Water Bond Act program now in effect. (12-1/2% local, 12-1/2% state, 75% federal funding)

Local government should be required to face the responsibility of providing suitable disposal methods or sites for hazardous wastes. If they fail to act then, and only then, should the state or federal government become involve The current shortage of Class I sites in California is largely due to the provincial attitude of letting someone else take care of their problems. Ho fully, current efforts by the State Solid Waste Management Board to evalua the Class I disposal situation will establish direction for further action.

Thank you for the opportunity to comment.

Very truly yours,

John A. Lambie
Chief Engineer-General Manager

PAB:sgs

cc: Al Marino, SSWMB
Harvey Collins, SHD

COMMONWEALTH of VIRGINIA

STATE WATER CONTROL BOARD
2111 Hamilton Street

Eugene T. Jensen
Executive Secretary
Post Office Box 11143
Richmond, Virginia 23230
(804)786-1411

JAN 28 1976

IN REPLY, REFER TO: 1-PR

BOARD MEMBERS
Thomas R. McNamara
Chairman
Basil T. Carmody
Vice-Chairman
J. Leo Bourassa
Warren L. Braun
Denis J. Brion
George M. Cornell
Millard B. Rice, Jr

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 Mr. Lehman:

Provided herewith is a paper titled "Hazardous Wastes and Their Management", prepared for submission in response to the invitation appearing on Page 42993 of the Federal Register dated Wednesday, September 17, 1975 (Volume 40, No. 181).

It is hoped that the information provided in the paper accompanying this letter will be of substantial assistance with respect to the question of hazardous wastes management.

Sincerely yours,

Eugene T. Jensen
Executive Secretary

/ls

Enclosure

HAZARDOUS WASTES AND THEIR MANAGEMENT*

Introduction:

Many categories of naturally occurring materials present potential safety problems which become actual hazards under conditions which alter an existing equilibrium condition. For example, the use of natural foods may present hazardous conditions, either from the standpoint of over-consumption or non-consumption in the simplest instance. For example, a number of common foods reportedly contain substances which produce cyanide during digestion and some traces of the free cyanide ion. In addition, naturally occurring waters contain constituents such as fluorides and other compounds which could prove to be hazardous. Naturally occurring are compounds of mercury in geologic formations which during the evolutionary process provides exposure to life forms with varying degrees of toxic effects.

It is rather obvious that nothing is wholly safe or dangerous in or of its own self but that it is the quantity involved, the manner and conditions of use, and the susceptability of the organism which determines the degree of hazard or safety.

Judgments regarding safety of materials must involve knowledge of the material and its inherent capacity to cause harm and of the conditions of use which determine to what extent this capacity for harm will be realized. It should be recognized

---

* Prepared for submission to the Director, Hazardous Waste Management Division, Office of Solid Waste Management Programs, U. S. Environmental Protection Agency, Washington, D.C. By Eugene T. Jensen, Executive Secretary, Virginia State Water Control Board, January 27, 1976.

that safety is a pathway between hazards, some of which are recognizable and measurable with others unknown and indistinct. There is no escape from all risk no matter how remote. There are only choices among risks. Safety lies in proceeding on a path through balance and moderation rather than indulgence in extremes.

Man in his evolution has struggled to protect himself, his food, and his belongings from the ravages of nature. Among the tools that he has used are compounds which kill or suppress pests. These compounds include insecticides, fungicides, bactericides, herbicides and rodenticides to name a few. Such materials, and other toxic compounds, have contributed to human welfare in many ways both with respect to human health and to the production of food and fiber and other economic goods of benefit to humanity.

Toxicity is the inherent capacity of a material to cause harm whereas hazard is the risk that, under any particular set of circumstances, harm will occur. A highly toxic material may be safely manufactured, handled and applied with little hazard and conversely, a material of relatively low toxicity may be handled or used in a hazardous manner.

The objective with respect to the use of toxic materials should lead us to the making of better balanced decisions to ensure that positive effects on the environment are balanced against negative ones and that nonenvironmental effects are duly considered. Such decisions should be made with knowledge sufficient to eliminate surprises which in turn will allow an assessment of the risks involved.

Toxicity is the ability of a material to produce injury to life forms in the environment when those life forms are exposed to that material. Hazard is the probability that injury will be sustained by exposure to toxic materials.

The term "hazardous waste" has been defined in the proposed Hazardous Waste Management Act of 1973 as "any waste or combination of wastes which pose a substantial present or potential hazard to human health or living organisms because such wastes are nondegradable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects". The May 1975 Environmental Information Bulletin, published by the U. S. Environmental Protection Agency, characterises hazardous wastes as "wastes that 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. They may be chemical, biological, flammable, explosive, or radioactive substances." These definitions appear to cover the subject well; however, in view of the fact that the degree of hazard involved is a function of handling use, application, disposition, and exposure, it would be well to include these considerations in any discussion of the definition of hazardous wastes.

In the manufacture of toxic materials, it appears to be most difficul if not near to impossible, for any single regulatory agency or any combination of regulatory agencies effectively to determine the characteristics of existing and evolving compounds and to determine

appropriate measures for their handling, use, application, and disposition in order to minimize adverse effects of such compounds upon living organisms to which they may be exposed. The burden of responsibility with respect to such determinations more properly should rest with the generator of potentially toxic and hazardous compounds prior to the determination by a regulatory agency of the efficacy of handling, use, application, disposition and exposure. The generator of potentially toxic and hazardous materials should bear the burden of determining, in addition to the foregoing, detoxification processes appropriate to apply to insure environmental protection.

Storage and Transport:

The minimization of adverse effects to the environment by potentially toxic and hazardous materials may be accomplished to a significant degree through a requirement of manufacturers, handlers, users, and disposers, by regulation to develop plans designed to prevent escape of such materials to the environment to include measures for containment and hazard elimination in the remote event of escape.

Use of Toxic Materials in Manufacturing and in Agriculture

Since the beginning of recorded history man has been exposed to toxic and potentially hazardous materials which have occurred naturally, as well as to those which have evolved during his evolutionary efforts to provide for and to protect himself. Use of these materials has presented man with dangers as well as with benefits and indeed toxic materials are necessary elements in the production of food and fiber, in manufacturing, for health considerations, and in general they are necessary for day-to-day living. Proper management of the

generation, handling, use, application, disposition and exposure to the environment of toxic materials in such a manner as to minimize adverse effects to the environment is fundamental to any program with which to deal effectively in avoiding hazards and in realizing the benefits to be derived from those materials. Management should lead to the making of decisions balanced so that positive effects on the environment are realized and negative effects minimized or eliminated.

Regulatory Experience:

The Commonwealth of Virginia, since 1946, has been engaged in a program of water pollution control, the purposes of which include the protection of the quality of waters of the State; to restore other State waters to such condition of quality that will permit reasonable public uses; will support the propagation and growth of aquatic life; and provide for the health, safety and welfare of the citizens of the State. The State has had a program of responding to water pollution complaints which provides for the reporting on the part of citizens, industries, agencies, and others, of pollution incidents of all types on a 24 hour a day basis. Experience of the agency has demonstrated somewhat less than 100 per cent effectiveness in an ability to:

1. Determine where and when potential hazardous materials will occur in the environment as a result of mismanagement and/or accident.
2. Determine and evaluate immediately the potential impact on the environment of potentially hazardous materials.
3. Implement immediately procedures for containment, cleanup, and detoxification of toxic wastes entering the environment.

4. Depend on the voluntary assistance of the generator, user, and discharger of toxic materials, in attempts to minimize or to eliminate hazards to the environment.

The experience of the State Water Control Board in the pollution complaint program during a recent four-year period permits the categorization of incidents involving toxic materials identified as follows:

Category of Incident	Percentage of Incidents
1. Irresponsible accumulation of and/or improper disposal of toxic materials	25
2. Lack of containment of toxic materials at industrial facilities (accidental non-transportational)	22
3. Discharge of toxic materials with inadequate treatment	16
4. Transportation (accidental by truck, rail and waterborne vessels)	15
5. Misapplication through use	12
6. Miscellaneous	5
7. Discharges through wastewater treatment plants	4
8. Natural disasters	1

The majority of the incidents experienced by the State Water Control Board with respect to the various categories clearly involve

categories 1 through 5. An analysis of these categories emphasizes the need for management to be directed toward the arena of containment and prevention of excape and disposal of toxic materials through regulation. Comments relative to regulation in the five cagetories are as follows:

1. The mechanism for an effective deterrent relative to this category could be provided through a liability/penalty system as described in Section 311 of the Federal Water Pollution Control Act Amendments of 1972. The effectiveness of regulation through this mechanism might be somewhat less than wholly effective due to the difficulties involved in the determination and designation of extant and evolving toxic compounds and materails. Regulations and/or guidelines with respect to proper land disposal of toxic materials should prove to ameliorate adverse environmental effects potentially imposed by this category.
2. Release to the environment under conditions described in category 2 might well be ameliorated with application of regulations comparable to the regulations promulgated by the U. S. Environmental Protection Agency relating to the prevention of oil pollution as found in Title 40, Chapter 1, Part 112 of the Code of Federal Regulations. Such a regulation would require the owner or operator of a facility where toxic materials are generated, used, or stored, to prepare and implement a plan which would prevent discharge to the environment of such toxic materials.

3. This category should be properly handled through application of the National Pollutant Discharge Elimination System and compliance therewith with respect to pretreatment and final treatment of wastewaters.
4. The category applicable to release to the environment of toxic materials through mishaps in transportation could be approached through promulgation and enforcement of stringent regulations requiring suitable containment vessels of such nature as to withstand mishap-imposed stresses with provisions for primary, secondary and tertiary containment hulls utilized in transport facilities.
5. The question of misapplication and abuse in the use of toxic materials has primarily involved exposure to the environment of compounds which kill or suppress pests some of which are in the process of being regulated under the provisions of the Federal Insecticide, Fungicide and Rodenticide Act, as amended in 1972. Reexamination of that act and of regulations promulgated under the provisions of that act is in order with respect to the need for broader application and/or more effective enforcement.

The question of biochemical, biological, and/or chemical synergism where there is cooperative action of discrete substances, the total effect of which may be greater than the sum of the discrete substances when taken independently, needs to be considered in any management plan involving exposure to the environment of

potentially toxic materials. This aspect of the subject is exceptionally complex and presents its own unique problems which should not be minimized.

Conclusion:

The minimization of adverse effects of toxic materials to living organisms in the environment substantially can be improved by altering exposure to these materials by gathering knowledge so as to:

1. Understand more fully the biochemical mechanisms by which toxic materials affect living organisms within the environment.
2. Improve and expand investigations of the impact of toxic materials to which there is environmental exposure.
3. Improve the gathering of information relative to the characteristics of existing and evolving toxic materials and how these materials should be safely manufactured, handled, and applied to reduce environmental threats through balanced decision making.
4. Make the public aware, routinely and timely, of the data concerning existing and evolving toxic materials used or proposed for use.

The State Water Control Board believes that reaction to the toxic materials question and hazards and benefits relative thereto should be positive and that economic, nutritional, and health welfare must be balanced against occupational and environmental safeguards with more precise definition and assessment of the

situation being requisite to the formulation of appropriate management programs.

Recommendations:

In summary, recommendations need to be based on as clear a view as possible of the overall problem considering economic, nutritional, and health benefits derived from potentially toxic materials, all balanced against environmental safeguards. Specifically the following recommendations are made:

1. The formulation of a discharger liability/penalty system conforming in general with the provisions of Section 311 of the Federal Water Pollution Control Act Amendments of 1972.
2. Promulgation, implementation and enforcement of prevention, containment and detoxification plans applicable to those generating, handling, applying, using, and storing toxic materials.
3. Development, promulgation, and enforcement of regulations which would cause the provision of more suitable containment vessels for transport of toxic materials.
4. Expansion and enforcement of regulations regarding use and misuse of potentially toxic and toxic compounds.
5. Formulate regulatory mechanisms whereby generators of and manufacturers of toxic materials bear the burden of responsibility for the designation of extant and evolving toxic and potentially toxic and hazardous compounds, to include a determination

of the acute and chronic levels of toxicity to living organisms within the environment.

6. Formulation of regulations placing with the manufacturer or generator of potentially toxic and hazardous materials the responsibility for establishing processes and procedures for detoxification of final and intermediate products and residuals.
7. Provision of a mechanism whereby access may be had to facilities for destruction and/or detoxification of toxic and hazardous materials and their residuals.
8. Provision for further emphasis on placing with dischargers to municipal waste treatment plants of potentially toxic and hazardous materials the responsibility for pre-treatment and the responsibility for notification to the potential receiver of such materials their characteristics relative to potential toxicity, hazards, and detoxification processes and procedures required to eliminate or minimize potential adverse environmental effects of such materials.
9. The provision of a national data bank for ready access which could be interrogated by public emergency services entities for the purpose of facilitating the identification of materials and their hazards, and advice for their handling in order to minimize their potential adverse environmental effects.

10. The evaluation of the extent to which environmental aspects might be enhanced in the wastewater treatment train by the provision of "multiple barriers" in the treatment train where waste streams involve potentially toxic and/or hazardous materials for the purpose of the potential development, promulgation, and enforcement of regulations which would require "multiple barriers" as appropriate.

Waste Management, Inc.
900 Jorie Boulevard · Oak Brook, Illinois 60521 · 312/654-8800

December 29, 1975

Mr. Timothy Fields, Jr.
Acting Program Manager
Hazardous Waste Assessment
Hazardous Waste Management Div. (AW-465)
Office of Solid Waste Management Programs
U.S. Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Fields:

Please include my enclosed letter of December 29, 1975 as part of the public record with regard to the public meetings held this December on Hazardous Waste Management.

Thank you.

Sincerely,

David L. Smillie
National Accounts Manager

DLS:cb
Enclosure (1)

Waste Management, Inc.
900 Jorie Boulevard · Oak Brook, Illinois 60521 · 312/654-8800

December 29, 1975

Mr. Timothy Fields, Jr.
Acting Program Manager
Hazardous Waste Assessment
Hazardous Waste Management Div. (AW-465)
Office of Solid Waste Management Programs
U. S. Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Fields:

Confirming our telephone conversation of December 22, 1975, following are our reasons for believing the thirteen industrial hazardous waste contract studies are vital to an early understanding of our national hazardous waste problems and a positive force for solving those problems in a fully practical manner.

If the two contract studies we've reviewed (Inorganic Chemicals and Batteries) are typical of what we can expect to see in the remaining eleven studies, they represent the first practical data accumulation with which to depict the parameters of our hazardous waste problems.

These studies provide a data base that can be manipulated mechanically (through EDP programs) to project the nature and quantity of hazardous waste streams, thus disclosing treatment and disposal markets for the private service companies to concentrate upon. They will help us design and operate private and public systems for minimizing the environmental impact of these effluents.

Our intent is to quantify and qualify waste stream identification for each major plant in our present service areas. This information can be added to our base data.

We can then run various analyses to establish statistical indicators or factors which can be applied against similar installations outside our operating areas to project their anticipated generations of waste by type and volume.

Our program can become a marketing tool designed to tell us probable return on investment in unknown markets and what equipment, personnel and technologies should be represented for best return in these new markets or in existing markets where profitable new service capabilities could be established.

We needed the contract studies on hazardous waste because they give us a dimension on hazardous waste not readily attainable due to the extraordinary complexity of the hazardous waste field. Keyed to SIC codes, like our base data, your information can be manipulated in our program to attain our immediate information objectives.

However, there is an obvious problem with the SIC codes in any data manipulation program. Each plant generally has more than one SIC code -- and frequently, as many as six SIC codes. They perform more than one type of classified work at one location. It's virtually impossible to quantify waste streams where multiple SIC codes pertain unless you verify volumes of work performed within specific SIC's, and these volumes shift continuously.

This "Catch 22" requires interviews with knowledgeable personnel at the site, which we're set up to do in a special interview sequence either locally or by working through cooperative executives at the corporate level.

From commercial data sources, we already have EDP manipulatable information identifying specific industrial facilities with a good range of statistical data such as:

SIC Codes (type of work performed on site)
Number of Employees
Dollar Sales
Key Plant Executives
Mailing Addresses and Phone Numbers
Types of Metal Processes (at metal working plants)
HQ, Branch or Single Location Identifiers
Parent Companies, Divisions, Subsidiaries and Affiliates

From our customer records, we can determine solid waste and secondary recoverable wastes data by type and volume, and we have working relationships with client personnel to develop additional waste stream identification data.

Our operating divisions have good knowledge of private and public treatment, disposal and recovery facilities, current and projected for near term.

By some estimates fewer than 1,000 companies control 80% of the manufacturing and distribution assets in this country. Each of these firms has anywhere from one to 5,000 locations but possibly fewer than 50,000 locations employ over 100 employees. Far fewer than that employ over 500 employees at single locations where hazardous waste is generated in significant quantities.

If employment, weighted by SIC (type of work performed) is a good statistical indicator of effluent generation, then perhaps fewer than 10,000 locations are the principal generators of hazardous waste. We then have a manageable number of plants for which to design treatment systems to minimize the effect of the major portion of hazardous waste.

Your hazardous waste studies, together with other available machine processable data, give us the means to project quantified and fully identified hazardous waste streams on a plant site by plant site basis.

From this data, we may be able to better determine which of these waste streams (and where) can be handled by the private sector and which ones will require partial or total government funding.

Reducing the risk element for capital investment planning encourages private financing of treatment, recovery and disposal facilities and allows us to suggest better deployment of government funds where the risk factors or project size are beyond private capital resources.

The 13 contract studies alone are not enough data to produce such a profound effect in the short term. However, it allows us to reduce the number of major identifiable generators to a few thousand and trace their ownership back to a few hundred companies. We can then initiate an interview system to refine our initial projections into acceptable parameters for facility planning without adding an enormous market research burden.

Once we determine source, quantity and nature of hazardous waste, our task becomes relatively simple. We, as a private service company, can determine which waste streams justify service within our capability resources. We'll know where and to what extent we can respond to projectable handling and treatment requirements.

There is substantially only one additional equation needed in order to assure our design and construction of necessary facilities -- reliable knowledge of regulatory parameters and the degree of uniform enforcement of those control measures. That's the really tough part because it is a political problem.

Every intelligent human being wants to preserve, if not enhance, the quality of life -- if it's free. A community wants the use of a landfill, for example, but it wants it located in someone else's backyard. Politics -- the art of compromise -- is the medium through which such problems are resolved.

Knowing the dimensions and locations of the problem is important because it points to the significant options that can be negotiated through politics.

The more information you can give us -- like these 13 hazardous waste studies -- the better able we are to cooperatively suggest model legislation and regulatory interpretation to produce optimum results with minimum economic dislocation.

There has always been a high price paid for waste treatment and disposal. The price for bad disposal practices is paid in human lives, impaired health and economic disaster.

For example, one drum of hazardous chemical waste hidden within a relatively innocuous load of solid waste can lead to the death of a landfill compactor operator and the total destruction of a $100,000 piece of equipment as described in your June, 1975 Hazardous Waste Disposal Damage Report.

Properly identified, that one drum might have cost its generator $20 or $30 to dispose of properly rather than incur the cost of a man's life and $100,000 worth of equipment. If that drum contained low flash point spent solvent, there might even have been a secondary material recovery market for it to reduce the net cost of handling and disposal.

Measured in these terms, the cost of beneficial disposal, treatment and recovery is paid in a very modest amount of money. Under uniform inspection and enforcement, that cost can be absorbed in manufacturing or distribution costs with minimal economic dislocation.

Total system engineering directed toward resource recovery rather than terminal waste disposal can reduce disposal costs for secondary materials and conserve finite virgin materials.

We know that hazardous waste treatment and disposal is where the money is going to be in our service industry. But, under present conditions, it is a capital intensive, high risk investment in an area of great complexity and swifty changing control parameters.

That's why we're working on our EDP system and why we want your input. We can reduce our risk and deploy our finite capital resources better when we can be intelligently selective about which waste streams we will handle, the quantities and locations of it, and when enforcement will apply to make our facility design economically viable.

It would be idiotic for us to build a ten or twenty million dollar facility if we knew that unresponsible operators would be allowed to continue to use country roads in the dark of the night as unsupervised "shallow well injection systems."

So, we're paying tribute to the old adage, "in the land of the blind, a one-eyed man can become king." The more we know about these waste streams, the better able (and more willing) we'll be to put our knowledge and capital to work solving the problems created by them.

Your continued help is not only appreciated -- we consider it vital. We are looking forward to proceeding with our planning models upon receipt of the remaining 11 studies as well as the benefits your own EDP programs will represent for the entire industry and our country at large.

Sincerely,

David L. Smillie
National Accounts Manager

cc: Donald B. Mausshardt
William Sanjour

Weyerhaeuser Company

Tacoma, Washington 98401
(206) 924-2345

January 29, 1976

Mr. Emery Lazar
U. S. Environmental Protection Agency
Hazardous Waste Management Division
Waterside Mall, 401 M Street, S.W.
Washington, D. C. 20460

Dear Mr. Lazar:

It was a pleasure meeting you at the Hazardous Waste Management meeting in San Francisco last December.

The management of solid/hazardous wastes is a formidable task because, to a very large extent, the public is an important contribution to these wastes. Thus any efficient management system will require a change in lifestyles.

With that perspective, perhaps it is best then that EPA promulgate advisory guidelines for the time being. This would allow opportunity for public education on the subject, and also allow EPA to gain some more understanding about the return of materials to the environment. Effective education remains the only long-term hope for constructive participation in this problem.

The road ahead is challenging. I wish you well.

Sincerely,

Vivien Lee

Vivien Lee, Ph.D.
Environmental Impact Analys

VL:jh

January 27, 1976

Mr. John P. Helman, Director
Hazardous Waste Management Division
Office of Solid Waste Management Programs
Environmental Protection Agency
Washington D. C. 20460

The Wichita-Sedgwick County Environmental Resource Advisory Board respectfully submits the following comments in response to the Notice of Public Meeting concerning Hazardous Waste Management dated September 11, 1975, FR Volume 40, No. 181 - Wednesday, September 17, 1975.

The Environmental Resource Advisory Board (ERAB) believes that the EPA published estimate of 10 million tons for the quantity of hazardous waste generated may be conservative. A recent survey conducted by the Kansas Department of Health and Environment for 143 industrial firms in and around Wichita, Kansas, indicated that over 2 million tons of hazardous waste was generated from this area alone.

The Board believes that it is in the best interest of industry and the community that properly licensed hazardous waste disposal facilities exist. Such depositories should allow for safe and economic disposal of hazardous materials without compromising the health and safety of the public. The Board appreciates the fact that proper handling--processing and/or disposal--may require joint participation of industry and government (local, state and federal).

In the area of management of hazardous wastes, the Board recommends that efforts be directed to eliminating unacceptable methods of disposal such as discharging to sanitary sewers and open on-site dumping of hazardous wastes. Improvement in the technology of disposal and storage of hazardous wastes should result in greater safety to a community and would facilitate reclamation and recycling of waste products when such becomes economically feasible.

1763

Wichita-Sedgwick County Department of Community Health
1900 East Ninth Street-Wichita, Kansas 67214 (316)268-8201
100% recycled paper

We understand that production of hazardous waste can be reduced considerably through improved production technology, recycling and improvements in reclamation of waste products.

We appreciate the opportunity to comment on this subject and offer our advisory view for your consideration.

Barbara Keltner

Barbara Keltner, Chairperson
Environmental Resource Advisory Board

BK:pp

CONCURRENCE BY

James F. Aiken, Jr.

James F. Aiken, Jr.,
Environmental Health Director
Wichita-Sedgwick County Department of
Community Health

Wichita-Sedgwick County Environmental Resource Advisory Board

This Board was established through a Resolution of the governing body of the City of Wichita, Kansas, the Board of County Commissioners of Sedgwick County, Kansas, and the Wichita-Sedgwick County Board of Health.

The purpose of the Board is to develop long-range community objectives relating to the environment and to have the responsibility on their initiative or at the request of one or more of the appointing bodies or any city or county department for investigating environmental concerns including but not limited to water quality, air quality, solid waste, land use, open space, noise and housing and providing recommendations relating thereto. They also recommend projects and sources of funding for such projects. Evaluate existing environmental efforts with recommendations for change where appropriate. Provide public information and education.

Box 234
Oakland, N. J. 07436

January 5, 1976

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

Dear Sir:

I hope that the dangers of hazardous wastes have come through loud and clear at the hearings held in December. The mere fact that the EPA has seen fit to single out certain wastes appearing in the environment and to classify them as "Hazardous" should be sufficient to place an immediate ban on their continued release into the environment.

I appreciate the desire of the EPA to proceed in a democratic fashion, thus enabling all parties to come forth to state their position; however, I believe the EPA should act on an emergency basis in many areas. For example, if a building is burning, the procedure is to extinguish the fire as quickly as possible in the best interests of life and property. In a sense, one could say that emergency powers have been granted for the purpose of fighting fires. Why not to fight dangers to the environment?

The environment is in serious trouble NOW. It may be too late to save it through the Democratic process. I urge you to get on with the task in the best interest of life and property.

Very truly yours,

(Mrs.) Ruth Gaat

μσ1319