MIXED WASTE IN WASHINGTON AND THE NORTHWEST COMPACT REGION:PROBLEM DEFINITION, TIMELINES, AND MANAGEMENT OPTIONS

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ABSTRACT

Results of a second regional survey on mixed waste are presented. Mixed waste volumes have decreased from 1988 to 1989 by 85 percent, apparently because of increased waste minimization and treatment. Two federal deadlines for addressing mixed waste set the timeline for finding a regional solution. States' policies on hazardous waste management will affect the nature of the solution. Three potential mixed waste management options are identified.

INTRODUCTION

The purpose of this paper is to report on efforts to better define the mixed waste problem in the Northwest Compact Region, and to review and discuss technical, legal, and policy factors associated with various mixed waste management options. Timelines associated with the need for more complete information and the need for management solutions are identified. The paper is divided into three major sections: problem definition, timelines, and management options.

BETTER DEFINING THE PROBLEM: VOLUME, NATURE AND TREATABILITY

In February of 1988, the Northwest Compact conducted its first regional survey of potential mixed waste generators. A second regional mixed waste survey has been conducted by Northwest Compact staff. In addition to obtaining updated information on volumes of mixed waste identified in the first survey, staff solicited information on waste treatment and waste minimization.

The survey method used was identical to that used in 1988. An informal, confidential, telephone survey of generators in the states of Alaska, Hawaii, Idaho, Montana, Oregon, Utah, and Washington was conducted. The names of generators of low-level waste with current site use permits to dispose of waste at the commercial site in Washington were crossreferenced with the names of generators of hazardous waste, as listed by the U.S. Environmental Protection Agency (EPA). Forty eight potential mixed waste generators were identified.

It is important to note that surveys have, in general, important limitations. A survey on mixed waste has the additional limitation of a disincentive by generators to report that they generate and hold mixed waste or suspected mixed waste. Such waste may be legally stored on site for a very limited time period and cannot be legally disposed of. Most generators we contacted, however, were willing to discuss the problem and were supportive of efforts to find a solution.

We were able to contact and survey 41 of the 48 potential mixed waste generators identified. Of the 41 contacted, 2 are utilities, 3 are government operations, 13 are industrial facilities, 11 are academic institutions, and 12 are medical facilities. Survey questions and a discussion of the responses are presented below. Of the 41 entities that we talked to, 13 indicated that they currently generate mixed waste, while 28 indicated that they currently generate no mixed waste. In 1988, 40 out of 45 potential mixed waste generators were contacted. Twenty-seven of 40 indicated that they generated mixed waste, while 13 indicated that they generate no mixed waste. If the survey results are accurate, only half as many permittees are generating mixed waste in 1989 as were generating mixed waste in 1988.

Questions on Waste Minimization:

Question: What measures are you currently taking, and planning to take, in your mixed waste production process to minimize or eliminate your mixed waste volume, chemical toxicity, or radioactivity? How much does this reduce your mixed waste volume? Of the 41 facilities, 23 are taking steps to minimize the production of mixed waste. By far the most common means is to use "aqueous" scintillation fluids instead of "organic." Fourteen generators indicated that they are using the aqueous fluids. Several respondents indicated that while they are encouraging such a practice, they cannot require researchers and others to change from the organic. The principal reason researchers are reluctant to change is, according to one generator, the need to maintain consistency in ongoing research projects.

A number of generators expressed concern that the so called "drain discharge" aqueous cocktails are not actually biodegradable. These compounds are apparently designed to have a higher flash point which allows the medium to pass EPA's ignitability characteristics test. One Northwest region generator is not encouraging his facility to use the aqueous version because he believes EPA will change its position on their acceptability.

Other methods being used to minimize or eliminate mixed waste include:

- Substitution of nonhazardous materials
- Evaluation of all hazardous components going into radiation areas, use of "chemical work permits" to regulate chemicals taken into radiation areas
- Review of all items to be purchased for EPA listing and toxicity, prevention of excess purchases of hazardous materials
- Recycling of oil
- Separation of waste streams, Education programs on waste separation, Presorting of waste by isotope and

waste type

- Use of plastic vials and vial slicer
- Reduction in fluid volumes
- Active record keeping to document waste streams as non-mixed
- Transfer from freon dry cleaning to water laundry

Some respondents were able to provide estimates of how much potential mixed waste volume is being minimized or eliminated. The volumes in cubic feet per year and the waste minimization techniques are as follows:

Use of Aqueous Scintillation Fluids	Oil Recycling	Plastic Vials/Vial Slicer	Water Laundry
2	1,000		15
37			
14			
15			
68			
900			
25-35			

Questions on Waste Treatment:

Question: Are you currently doing any research and development on mixed waste stream treatment?

Twenty-nine generators are not conducting any research and development (R & D) on treatment processes for mixed waste. Twelve facilities reported the following R&D activities: treatment of freon, vial crushers, bioreactor that treats scintillation fluids by breaking them down to nontoxic substances, incinerator development, distillation, treatment for lead bricks and sheet, procedures to separate solids from organic liquids, and leaching processes.

Question: What kinds of treatment, if any, are you applying to your mixed waste? How much does this reduce your mixed waste volume?

Seventeen of the 41 entities that we contacted are applying treatment. Decay of waste with short-lived isotopes is practiced by 8 facilities. Other practices include dilution, deactivation of toxins by bleaching, evaporation, compaction, incineration, neutralization, and binding of lead through chemical stabilization procedures.

Where possible, respondents indicated the amount that these treatment processes reduce the mixed waste volumes (in cubic feet per year):

Question: What types of treatment would you like to have available to you?

Of the 17 generators that provided their preferences in response to this question, the majority (12) indicated a need for incineration. Regional or west coast incineration capacity is desired. Other treatment processes identified as needed or desirable include recycling for oils, some type of treatment for freon, "vial eaters," processes for longer-lived isotopes, processes for solvents, solidification or compaction, distillation, and chemical decontamination and separation processes.

Questions on Type and Volume of Mixed Waste Produced:

Question: What specific types of mixed waste do you generate that you will not be able to dispose of until mixed waste disposal capacity is available? What is your annual volume of each type of such waste that you produce? Do you project a change in this amount or will your annual volume remain constant?

Mixed waste types, volumes, and projected changes in volumes were reported as follows (volumes in cubic feet per year):

Waste Type	Waste Volume	Volume Change
Acetone	3	Decreasing 50%
Asbestos	7	
Ethyl Ether	7	Decreasing 50%
Exchange Resins	1	
Freon	27, 13	
Methanol	3	Decreasing 50%
Oils	45-58	
Paints, Solvents	7	
Paper, Chemical Precipitates, and Metals	6	
Phenolchlorofor	1	
Scintillation Fluids	<1, 1, 15	(<1) Decreasing (1) Increasing at 10% per year (15) Increasing gradually
Sealed Sources	5, "a few"	
Solvents	1	
Tolulene	1, 1	
Tributyl Phosphate and Kerosene	8	
Trichloro-floroethane		
Freon	15	Decreasing to 0 in 1 year
Uranyl Nitrate	<1	
Xylene and Toluene	<1	

The 1988 survey waste types identified included:

Alcohol

Chromium waste

Empty contaminated drums

Evaporator bottoms

Freon

Incinerator ash

Lead mixtures

Lead shielding

Lead shielded gauges and scales

Organic corrosives

Petroleum cake and zirconium sand

Scintillation fluids

Transuranic waste with toluene

Yellowcake and dry LSA waste which is EP toxic

Question: What is the total volume of this waste which you are currently storing?

Generators reported that they had five different types of mixed waste in storage. The most common waste type in storage is lead: lead filtration unit (80-90 ft3), lead sealed sources (20-30 ft3, 1 ft3, 1 source, 1-2 ft3, 7 ft3, 1 source, ft3). In addition to lead, freon (30 ft3, 45 ft3), scintillation fluids (13 ft3, 1 ft3), xylene and tolulene (ft3), ethyl ether, acetone, methanol and phenolchloroform (21 ft3), and tributyl phosphate and kerosene (53 ft3) are stored.

Question: What is your total storage capacity, and how long will this last?

Respondents either indicated that storage was not a problem for them, apparently because most of their mixed waste volumes are very low, or indicated how much storage capacity they have remaining (3-5 years, 1 year, and 7500 ft3). No generators indicated that storage capacity is an immediate problem.

Question: Do you generate wastes, which you're not really sure about, i.e., which could be mixed waste? Approximately what would that volume and rate be? How is this waste being handled?

Five facilities indicated that they are unsure of the status of the following potential mixed waste (in ft3 per year):

Questionable Waste	Method of Handling Waste
"Nondecayable materials" (ft3)	Disposed as lowlevel radioactive waste
Halogenated hydrocarbons mixed with	Absorbed and sent to broker/disposer
radioisotopes (millimeters of volume)	
Sealed sources (ft3)	Stored
Aqueous "biodegradable" scintillation fluids	Disposed as lowlevel radioactive waste
Hydrochloric acid (16,000 tons)	Stored in pond

Questions on Effect of Availability of Disposal Capacity on Waste Management:

Question: If mixed waste disposal capacity were available, are there any waste minimization practices, or treatment processes that you now employ, that you would discontinue? Would this increase your mixed waste volumes?

Thirteen generators indicated that their mixed waste volume would not increase, primarily because they would not return to using organic scintillation fluids. One respondent noted that the aqueous version is superior from an employee health standpoint. Other reasons given include that minimization is far more cost effective than treatment or disposal, that the liability remains even if disposed, and that generators would not switch back to dry cleaning from a water laundry.

Two generators indicated that it would depend on the cost of disposal, and one of these indicated that it would also depend on whether disposal meant landfilling because he would not want to landfill his waste. If the disposal method was acceptable, then treatment on site would decrease as a factor of disposal cost.

Four entities would generate more mixed waste if disposal capacity was available. The reasons include increased use of solvents to clean equipment and parts (50 ft3 per year), a reluctance to continue to use evaporation (5 ft3 per year), a return to organic scintillation fluids because they are cheaper, and the lack of a need to return lead to original owners (15 ft3 per year).

General Question:

Question: Do you have any major concerns or comments about this issue right now?

Generators shared a number of concerns. Those relating to mixed waste include two basic categories: concerns about the availability of treatment and disposal capacity and concerns about the regulatory framework. Treatment options should remain available and be expanded. It is critical for the continuation of research projects and the viability of certain businesses that the ability to ship most scintillation fluids to a burner be maintained. A west coast incinerator is seen as imperative from an economic standpoint. A disposal solution for lead and the ability to use lead as shielding in disposing other waste is desired. Hazardous waste disposal facilities are reluctant to accept waste that has a decayed radiological component.

Regulatory-related concerns encompass the need for regulatory clarification on mixed waste because of confusion, a desire to insure that small quantities of mixed waste are not RCRA-regulated, the need for exemptions to dispose of small volumes of sources in Washington, the

need for regulatory approval to make generators' treatment of their own waste easier, the need for a determination of whether the aqueous scintillation cocktails are really nonhazardous, a concern that Washington State regulations on lead will put at least one generator out of business soon, and a need to receive regulatory approval to incinerate small quantities of mixed waste.

TIMELINES:

At least two federal deadlines relate to the Northwest Compact regions' planning and ability to manage mixed waste. These include provisions of the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) and of the federal Amendments Act.

Hazardous Waste Certification Requirements

Section (04)(c)(9) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, requires each state to prepare a state Capacity Assurance Plan (CAP). The CAP is to document adequate assurance of hazardous waste treatment/disposal capacity for RCRA-regulated wastes reasonably expected to be generated within a state for the next 20 years. Contents of the CAP will include data and projections, uses of waste minimization practices, plans for developing new capacity, and interstate agreements.

It is expected that mixed waste will need to be addressed in states' CAPs. The deadline for submittal of the assurances is October 17, 1989. Should a state fail to provide such an assurance, monies for Superfund remedial action will be withheld from that state after the statutory deadline.

Federal Amendments Act Requirements

By December, 1992, the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Amendments Act) requires the Northwest Compact region to provide for the disposal of all of its low-level waste. By definition under the Act, low-level waste for which states are responsible includes mixed waste.

MANAGEMENT OPTIONS: TECHNICAL, LEGAL AND POLICY FACTORS

Northwest Compact States' general policies on the management of hazardous waste are being considered as a regional approach for mixed waste is developed. In the state of Washington, waste minimization and treatment is the current policy direction.

Waste Minimization

Waste minimization, according to an EPA definition, refers to source reduction (any action that reduces the amount of waste exiting from a process) and/or recycling (the use, reuse or reclamation of a waste). The state of Washington has established state waste minimization policies. Washington's Hazardous Waste Management statute states as one of its purposes: To promote waste reduction and to encourage other improvements in waste management practices. The statute provides the following policy direction: Management and regulation of hazardous waste disposal should encourage practices which result in the least amount of waste being produced; the following priorities in the management of hazardous waste are necessary and should be followed, in order of descending priority, as applicable:

Waste reduction

Waste recycling

Physical, Chemical and Biological Treatment

Incineration

Solidification/Stabilization Treatment

Landfill

Treatability

The 1984 Hazardous and Solid Waste Amendments of RCRA (HSWA) mandated stringent new land disposal limitations for RCRA-regulated hazardous wastes. The "land ban" restrictions require treatment using a specified technology in order to achieve an acceptable concentration before disposal on land. To date, three "land ban" lists have been developed: "Spent Solvents and Dioxins," the "California List," and the "First Third."

Mandatory treatment of land banned mixed wastes is expected to reduce mixed waste volumes. For example, the "best demonstrated available technology" (BDAT) for land banned solvents is incineration. Many of the waste streams identified in our survey are land ban wastes and will require treatment before land disposal. Of the 14 general types of mixed waste identified in our 1988 survey, at least half appear to fall under land ban restrictions as currently developed. These 7 waste types, and the applicable requirements, are as follows:

Alcohol: Applicability will depend on the specific chemical composition, but in general, would fall under solvent list, probably requiring incineration.

Chromium waste: If in liquid form, California list applies, probably requiring solidification, but no specific BDAT indicated.

Evaporator bottoms: Solvent list would probably apply, requiring incineration.

Lead mixtures: If in liquid form, California list applies, probably requiring solidification.

Organic corrosives: If pH is less than 2.0, California list applies, requiring buffering. Organic nature may require additional treatment such as incineration.

Transuranic waste with toluene: Solvent list applies, requiring incineration.

Scintillation fluids: If contain toluene and/or xylene, solvent list would apply, requiring incineration.

Additional mixed waste identified in the 1989 survey are being evaluated to determine if they are land ban waste requiring treatment before disposal. Both waste minimization practices and required treatment is

expected to further reduce current regional mixed waste volumes.

Regional Options

The Northwest Compact is beginning to explore various options for managing in-region mixed waste. One option would be to develop a public or promote the development of a private, facility for treatment, storage, and/or disposal within the region.

The current site operator of the commercial low-level waste facility in Washington has explored the idea of developing a private mixed waste unit on its existing site. The company has made a preliminary determination that it would not be economically viable to operate a mixed waste facility because of the low estimated volumes of regional mixed waste. The permitting process is expected to be time intensive; by the time the facility could be permitted, potential mixed waste volumes are expected to be low and eventually limited to regional mixed wastes.

An additional option would be to enter into a contract with another state or region for treatment, storage, and/or disposal. Currently, at least 3 compact regions and states that are siting new low-level waste facilities are planning to include mixed waste disposal units. The federal Amendments Act allows for contracting with other states or regions to provide disposal access.

A third option would be to develop and/or promote waste minimization and treatment to the extent that no disposal is required. Whether or not this is a realistic goal needs to be determined.

SUMMARY AND CONCLUSIONS

In order to better define the regional mixed waste problem the Northwest Compact conducted its second regional survey of potential mixed waste generators. The focus of this survey was on waste minimization and treatment. The number of facilities generating mixed waste decreased from 1988 to 1989 by 50 percent. The total volume of mixed waste produced per year decreased by 85 percent (excluding the unusually large volume of 15,000 ft3 reported by one generator in 1988). The total volume of mixed waste in storage increased from 273 ft3 to 297 ft3.

Increased waste minimization and treatment practices appear to be the cause of reduced mixed waste volumes. Regional volumes are very low and while four facilities indicated that their mixed waste volumes would increase if disposal capacity were available, thirteen respondents indicated volumes would not increase. Twenty three generators are practicing waste minimization; ten of these indicated that this reduces their waste volumes by a total of 2,087 ft3 per year. Use of various treatments was reported by 17 facilities; ten of these reported that this reduces volume by a total of 388 ft3 per year.

The Northwest Compact will use this new information in developing mixed waste management options for the region. The timeline for such development is influenced by two federal deadlines. CERCLA requires states to prepare plans which document assurance of hazardous waste treatment and disposal capacity. It is expected that mixed waste will need to be addressed in the plans, due in October, 1989. The federal Amendments Act requires states and regions to provide for the disposal of all of their low-level waste which by definition includes mixed waste, by December, 1992.

Northwest Compact states' hazardous waste policies are a contributing factor in the development of a regional approach for mixed waste. In Washington, the policy is to give priority to waste minimization and treatment. The land ban restrictions of RCRA apply to many of the mixed waste streams identified, and, together with waste minimization practices, are expected to further reduce already low regional mixed waste volumes.

Currently three potential management options have been identified: one, the development of a regional treatment, storage and/or disposal facility; two, the execution of a contract with another state or region for treatment, storage and/or disposal; and three, the development and promotion of minimization and treatment to the extent that no disposal is required.