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DRAFT

BACKGROUND DOCUMENT

RESOURCE CONSERVATION AND RECOVERY ACT
SUBTITLE C - HAZARDOUS WASTE MANAGEMENT

SECTION 3004 - STANDARDS APPLICABLE TO OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

SECTION 250.42-1 GROUNDWATER HUMAN HEALTH AND ENVIRONMENTAL STANDARD

DECEMBER 15, 1978

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being ~~made available~~ as a draft ~~for comment~~. As new information is obtained, changes may be made in the regulations, as well as in ~~the~~ background material.

~~This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then~~. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

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Office of Solid Waste
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I. Introduction

A. RCRA Mandate for the Regulation:

The Congress of the United States, via Section 3004 of Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 (42 U.S.C. Section 6901 et seq), mandated that the Administrator of the Environmental Protection Agency promulgate regulations establishing such performance standards applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities as may be necessary to protect human health and the environment. These standards are to include, but not be limited to, requirements respecting (1) location, design, and construction, and (2) operating methods, techniques and practices of these facilities.

Compliance with this mandate, therefore, necessitates the establishment of regulations that will protect groundwater from contaminants emanating from hazardous waste treatment, storage and disposal facilities. The purpose of this document is to provide background information on how EPA arrived at its proposed groundwater human health and environmental standard which the Agency believes partially fulfills the Congressional mandate to protect human health and the environment.

B. Key Definitions

The following definitions are pertinent to the groundwater human health and environmental standard:

"Aquifer" means a geologic formation, group of formations, or part of a formation that is capable of yielding useable quantities of groundwater to wells or springs.

"Endangerment" means the introduction of a substance into groundwater so as to:

(1) cause the maximum allowable contaminant levels established in the National Primary Drinking Water Standards in effect as of the data of promulgation of this Subpart to be exceeded in the groundwater; or

(2) require additional treatment of the groundwater in order not to exceed the maximum contaminant levels established in any promulgated National Primary Drinking Water regulations at the point such water is used for human consumption; or

(3) reserved [Note: Upon promulgation of revisions to the Primary Drinking Water Standards and National Secondary Drinking Water Standards under the Safe Drinking Water Act and/or standards for other specific pollutants as may be appropriate].

"Groundwater" means water in the saturated zone beneath the land surface.

"Saturated Zone (Zone of Saturation)" means that part of the earth's crust in which all voids are filled with water.

"Sole Source Aquifers" means those aquifers designated pursuant to Section 1424(e) of the Safe Drinking Water Act of 1974 (P.L. 93-523) which solely or principally supply drinking water to a large percentage of a populated area.

"Underground Drinking Water Source" (UDWS) means:

(1) an aquifer supplying drinking water for human consumption; or

(2) an aquifer in which the groundwater contains less than 10,000 mg/l total dissolved solids; or

(3) an aquifer designated as such by the Administrator or a State.

"Underground Non-drinking Water Source" means an underground aquifer which is not a UDWS.

II. Rationale for the Regulation

> "Ground water is a vital natural resource in the United States. At least half the population depends upon it as a source of drinking water. Waste-disposal practices have contaminated ground water on a local basis in all parts of the nation and on a regional basis in many heavily populated and industrialized areas. The severity of contamination ranges from the exceeding of recommended standards for one or more constituents not related to health to the presence of toxic concentrations of hazardous wastes. Some economic losses have occurred as a result of degradation of ground-water quality, but the overall usefulness of the ground-water resource has not yet been impaired. Nationally, the principal sources of ground-water contamination related to waste-disposal practices are industrial waste-water impoundments and solid-waste land disposal sites. These facilities are widespread, may involve hazardous substances, and physically provide an opportunity for contamination to occur".

The above quotation is taken from the abstract of the document cited in the footnote below and describes the adverse effects that waste disposal activities have had on this nation's groundwater. This 512 page report gives an in-depth presentation of actual and potential sources of groundwater contamination from various waste disposal practices in the United States. Readers interested in groundwater contamination are advised to consult this report for a complete understanding of the threat which waste disposal activities pose to groundwater, and hence the need for regulations to protect this vital natural resource.

1. Waste Disposal and their Effects on Ground Water, The Report To Congress, Office of Water Supply and Office of Solid Waste Management Programs, EPA, January 1977.

III. Identification of Regulatory Options

The agency has taken a dual approach in these proposed rules to protect groundwater through the establishment of both performance standards and practice control standards. Examples of the latter include facility siting, design, construction and operating requirements. The practice control standards contained in these regulations are intended to prevent any discharge to groundwater.

In addition to the practice control standards, the Agency has promulgated a performance standard designated to protect groundwater in the form of a groundwater human health and enviromental standard. This background document identifies the various regulatory options from which the Agency has selected the groundwater human health and environmental standard.

Three questions are pertinent to the development of a groundwater human health and environmental standard:

(1) Which sources of groundwater are to be protected?

(2) What level of contamination, if any, should be allowed in those groundwater sources to be protected?

(3) What benchmark shall be used to determine where the groundwater sources are to be protected?

With regard to question 1, the spectrum of groundwater sources which could be protected ranges from all groundwater sources to only those sources of groundwater which currently supply a public water system. Within that broad spectrum,

the Agency considered to which categories of groundwater sources the Section 3004 groundwater human health and environmental standard should apply. Two options we considered were:

A. Applying the standard to drinking water and groundwater used for purposes other than drinking water, e.g., irrigation,

B. Applying the standard only to groundwater which currently meets the drinking water criteria, except for that which is:

(1) Mineral or oil producing; or

(2) Situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical for the foreseeable future; or

(3) In an area where the availability of alternate drinking water supplies is so substantial that there is no reasonable likelihood that the aquifer will be needed in the future for drinking water purposes.

The second question also has a variety of responses from which the Agency could select a basis for its groundwater performance standard. The options range from zero discharge to adoption of the maximum allowable contaminant levels specified in the Interim Primary Drinking Water Regulations. Other variations of the discharge limitation aspect of the groundwater

standard include the keying of the standard to the Secondary Drinking Water Regulations or to other water quality standards.

The third question only needs to be addressed if the no discharge option under question 2 is not selected. However, if it is decided that discharge to groundwater will be allowed, the distance that the pollutants will be permitted to travel must be specified. That is, the maximum length of the mixing zone during which the aquifer may assimilate the pollutants must be designated. Possible options for the length of the mixing zone include:

A. Directly underneath the facility.

B. The facility property line.

C. A set distance, e.g., one kilometer.

IV. Analysis of Regulatory Options

The following is an analysis of the regulatory options identified in Section III of this document. The analysis focuses on whether or not the option appears to meet the RCRA mandate to protect human health and the environment. The options are so arranged that they are listed in descending order beginning with that which would be most protective of human health and the environment.

Group #1 Options: Identification of Groundwater Sources to be Protected.

A. All Groundwater Sources

- Complies with the RCRA mandate to protect human health and the environment.
- Unnecessarily stringent because some aquifers have been so contaminated that they serve no useful purpose except, perhaps, as a "sink" for other pollutants.

B, Groundwater Sources which meet the criteria of an UDWS,* plus those sources of groundwater which could be utilized by humans for purposes other than drinking (irrigation, stock watering, etc.).

- This option is preferable to option C from the standpoint of protection of human health because additional sources of groundwater which serve a useful purpose would be protected.

- In requiring that the aquifer not be degraded beyond the MCL of the National Primary Drinking Water Standards, the option may provide unnecessarily stringent protection of aquifers not used for drinking water purposes.

3) C. Groundwater Sources which meet the criteria of an UDWS,* plus those sources of groundwater which could be utilized by humans for purposes other than drinking (irrigation, stock watering, etc.).

- Different categories of useful water plus discharge limits for each of these categories would be incorporated into this option.
- This option is preferable to Option C from the standpoint of protection of human health because additional sources of groundwater which serve a useful purpose would be protected.
- However, there are 2 major problems associated with this option:
  1) Different categories of useful water would have to be established.
  2) Discharge limits would have to be determined for each of these newly defined categories.

Such a delineation of groundwater supplies according to variations in utility and attendant discharge limits is not

* see definition, <u>supra</u>.

available at this time, thereby making this option unworkable.

C. Groundwater Sources which meet the criteria of an underground drinking water source (UDWS)*.

- Protects human health insofar as human drinking water supplies are concerned. However, water which is used by humans for other purposes (e.g., irrigation) is not protected. Such use of water which is contaminated with hazardous waste could pose a threat to human health.
- With regard to the environmental aspect of the RCRA mandate, allowing unlimited discharge of hazardous waste into non-UDWS groundwater would not constitute protection of the environment.
- Protects those sources of groundwater which are of most concern to most people, i.e., their drinking water.

D. Groundwater Sources which meet the criteria of an UDWS, except for those aquifers which are:

1) Mineral or oil producing; or
2) Situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impracticable for the foreseeable future; or

* see definition, supra.

3) In areas where the availability of alternative drinking water supplies is so substantial that there is no reasonable likelihood that the aquifer will be needed in the future for drinking water purposes.

With respect to the RCRA mandate, this option is the least acceptable. Groundwater is the drinking water source for at least half of the population of the United States, and to allow endangerment of an aquifer which is capable of supplying drinking water is not in accordance with the congressional mandate to protect human health and the environment. Under that mandate, the Agency is responsible for ensuring that those finite resources, regardless of immediate need or accessibility, and therefore, all UDWS should be protected.

Group #2 Options: Determination of Discharge Limitations to Groundwater

A. Zero Discharge

- Complies with the RCRA mandate to protect human health and the environment.
- Unnecessarily restrictive in that this option ignores the natural attenuative and other assimilative capabilities of the environment.

B. Discharge to maximum contaminant levels specified in the Primary Drinking Water Regulations and additional regulations containing water quality standards as soon as the latter become promulgated (e.g., the secondary drinking water regulations).

- Provides additional protection to human health and the environment as compared to Option C because the number of hazardous substances whose discharge to groundwater is regulated would be increased.
- Even after promulgation of these additional regulations, there will be a gap in the 3004 regulations because the waste content of the discharge could contain hazardous substances which are not listed in any of these promulgated regulations. This option does not necessarily provide protection from such "non-listed" substances.

C. Discharge to the Maximum Contaminant Levels (MCL's) specified in the Interim Primary Drinking Water regulations.

- Protects human health from the 10 inorganic and 6 organic substances listed in the regulation.
- Takes advantage (via adoption) of the only currently available promulgated rule-making which contains drinking water quality criteria.
- The waste content of the discharge may be free of interim primary substances, and yet contain substances which are toxic, carcinogenic, or otherwise detrimental to human health and the environment. This option would not necessarily provide protection from such "non-listed" substances

Group #3 Options: Determination of the length of the mixing zone, or maximum distance over which the environment may assimilate the pollutants before the level of contaminant in groundwater becomes grounds for enforcement action.

A. Directly under the facility

- Of all the options that allow some discharge of pollutants up to some specified MCL, this option is the most protective of human health and the environment because as soon as it is observed that the groundwater beneath the facility has been contaminated beyond the MCL, enforcement action begins, calling forth abatement and control measures to minimize the plume growth.
- Provides little or no opportunity for the attenuative or assimilative capabilities of the environment to work on the discharge.

B. At the facility property line

- Allows the environment to assimilate the pollutants before they become the basis for an enforcement action.
- Poses a greater threat to groundwater sources surrounding the facility than Option A because the facility is in compliance until the passage of contaminants in excess of the MCL beyond the property boundary line.

- For facilities located on very large tracts of land, the amount of groundwater which would be allowed to be contaminated within the property line could be quite extensive.

C. A set distance (e.g., one kilometer)

- More protective than Option B in the case of facilities located on large tracts of land in that this option restricts the size of the mixing zone to some specified distance.
- The selection of a set distance could be arbitrary, and might be difficult to defend.
- Allows the environment to assimilate the discharge within the mixing zone.

V. Identification of Chosen Regulation and Associated Rationale

The following regulation was chosen as the Human Health and Environmental Standard with regard to Groundwater.

All facilities shall be located, designed, constructed and operated in such a manner as to prevent:

(a) Endangerment of an Underground Drinking Water Source beyond the facility property boundary, or

(b) Endangerment of an aquifer which is designated as a sole or principal source aquifer according to Section 1424 (e) of the Safe Drinking Water Act of 1974 (Pub. L. 93-523 88. Stat. 1661, 1678, 42 U.S.C. 300f, 300h-3(a)).

The focal concern of the proposed groundwater human health and environmental standard is the protection of underground drinking water sources. The selection of the UDWS as the resource to be protected by the human health and environmental standard is based on the following line of reasoning:

- This approach is in accordance with the strategy used in the proposed Underground Injection Control (UIC) regulations (40 CFR Part 146, Proposed Rules, August 31, 1976).
- EPA believes that this is a justifiable approach since the mandates of both RCRA and the Safe Drinking Water Act (SDWA) are to protect human health and the environment. Furthermore, RCRA specificially requires integration with SDWA.

- This approach allows discharge into aquifers which are already so contaminated that they serve no useful purpose except as "sinks" for other pollutants.
- This approach concentrates our enforcement capabilities into protecting those groundwater sources which are of most importance to most people, i.e., water which is of a quality suitable for drinking.
- The requirement to protect aquifers with a total dissolved solids content of less than 10,000 mg/l protects not only drinking water, but also most water suitable for irrigation, stock watering, etc.

Unlike the UIC regulations, or those regulations being drafted under Subtitle D of RCRA, the proposed groundwater human health and environmental standard does not provide for relaxation of controls to aquifers which are UDWS's, but which are low yielding, or mineral producing, or any of the other exceptions listed under Option D on page 47. The Agency recognizes that groundwater contamination, more often than not, is an irreparable situation. Since the 3004 regulations deal with wastes which have been determined to be hazardous, the Agency believes that a more stringent position on the discharge of waste to groundwater than that taken by UIC or

4004 is warranted. Because the self-cleansing capability of any aquifer is limited, the release of hazardous waste to an aquifer which meets the requirements of an UDWS essentially takes that aquifer out of the "pool" of potentially usable underground drinking water sources.

Because drinking water is a finite resource, the Agency believes that it would be imprudent to provide for relaxation of hazardous waste discharge controls to any aquifer which meets the criteria requirements of an UDWS.

A second aspect of the groundwater human health and environmental standard that warrents discussion is the concept of endangerment that is incorporated in the standard. The Agency believes that it is unnecessarily restrictive to impose a zero-discharge requirement on facility owners/operators because such an approach ignores the natural attenuative and assimilative capabilities of the environment. On the other hand, the Agency is not aware of any method for designing facilities to allow specific constituent release rates, nor is the Agency aware of any method to determine what release rates would be acceptable. ~~The Agency also cannot predict how long hazardous waste in a landfill will remain hazardous~~. Accordingly, the practice control standards (Sections 250.43, 250.44 and 250.45) have been written to require that facilities be designed, constructed and operated so that discharges are minimized or do not occur.

However, though the practice control standards are designed to provide maximum containment, the Agency recognizes that some

discharge of hazardous waste will occur.

The focus of the groundwater human health and environmental standard is on protection of UDWS. Drinking water does not have to be pollutant free to be drinkable. Therefore, the Agency has taken the position that tolerable limits of discharges can be specified below which an aquifer's water can be safely consumed. EPA's best estimation of what these limits are is specified in its definition of endangerment. For the present, the concept of endangerment adopts the National Primary Drinking Water Regulations. Upon promulgation of the National Secondary Drinking Water Regulations and standards for other specific pollutants, the definition of endangerment will be revised to incorporate the contaminant levels from those regulations which the Agency determines to be appropriate. Thus, the concept of endangerment that the groundwater standard adopts is by no means a static one; with new advancements in determining safe levels for substances not covered by the current definition, endangerment will take on a broader meaning. The Agency also believes that although endangerment is limited to the National Primary Drinking MCL's, the design and operating standards should ensure protection of human health and the environment. The groundwater human health and environmental standard will be used in conjunction with the design and operating standards which are designed to ensure maximum containment.

A third ~~discussion~~ decision which was made with regard to the groundwater standard is the selection of the property boundary line as the benchmark which will be used to measure "endangerment" in an UDWS. The Agency's position in choosing to promulgate this rulemaking based on the property boundary option is based on the following line of reasoning:

- A mixing zone is a practical approach because it takes advantage of the environment's attenuative and assimilative properties.
- The Agency lacks data which would support any set distance or any formula for determining a site specific length of a mixing zone
- The property boundary line concept recognizes individual property rights.

The Agency has decided that the property boundary approach is the most desirable option to endorse in most situations dealing with endangerment of UDWS. However, EPA has taken a slightly different tack with regard to sole source aquifers. Sole source aquifers are, by definition, unique and highly important, and therefore, a more stringent position to protect these aquifers is thought to be warranted. As was brought out in Section IV of this document, there is a greater amount of risk associated with the enforcement point being the property boundary line as compared to the enforcement point being the groundwater directly beneath the facility. The Agency has decided that for facilities located

over sole source aquifers, all groundwater in the aquifer, including that within the facility owners' property, should be protected. Therefore, for enforcement purposes, endangerment will be applied to groundwater directly beneath facilities which overlie sole source aquifers.

Resource Conservation and Recovery Act

Subtitle C - Hazardous Waste Management

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

DRAFT

BACKGROUND DOCUMENT

Section 250.42-2 Surface Water Human Health and Environmental Standard

U.S. Environmental Protection Agency

Office of Solid Waste

December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulation. As new information is obtained, changes may be made in the regulations as well as in this background material.

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1.0 Introduction

1.1 RCRA Mandate and Authority

1.2 Definitions

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2.1 Actual Damage Incidents

2.2 Potential Damage

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3.1 Specific Standards Mandated by RCRA

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4.0 Analysis of Regulatory Options

4.1 Human Health and Environmental Protection Provided

4.2 Analysis of Whether Option Meets RCRA Mandate

5.0 Identification of Chosen Regulation and Associated Rationale

Explication of Human Health and Environmental Standard

Subpart D includes two types of performance standards: Human Health and Environmental Standards under Section 250.42 and design and operating standards under Sections 250.43 through 250.45 which cover General Facility Standards, Storage Standards, and Treatment and Disposal Standards. The design and operating standards are designed to protect human health and the environment. To achieve compliance, the Human Health and Environmental Standards are meant to be overriding standards to be used to supersede the design and operating standards in those presumably few situations where such standards fail to achieve protection of human health and the environment.

Under this regulatory structure, it is intended that the design and operating standards will be the principal regulatory criteria used to manage the treatment, storage and disposal of hazardous waste. These standards will be used, in most cases, by EPA in issuing permits for treatment, storage and disposal facilities and thereby will be incorporated, to the extent applicable, as enforceable conditions of such permits. Further, it is intended that the States will adopt equivalent or more stringent design and operating standards as a requirement for obtaining EPA approval to implement a hazardous waste regulatory program and, in most cases, will incorporate such standards as conditions in the permits or licenses that they issue. Finally,

to the extent that EPA carries out enforcement actions where no permit has been issued, an EPA-issued permit is not in force, and there is no pending permit application, it is intended that non-compliance with the design and operating standards will be the typical basis for such actions. The application of the design and operating standards during interim status, during which a permit application is pending, is discussed later.

Where there is reason to believe that design and operating standards will not achieve compliance with the Human Health and Environmental Standards, it is intended that the latter will be used as the basis for regulatory and enforcement action. In these cases, presumably exceptional, where EPA is issuing the permit, the Human Health and Environmental Standards will be used to establish more stringent design and operating criteria than prescribed in Subpart D, and these more stringent criteria will be incorporated as enforceable conditions of the permit. Also, where EPA has issued a permit and there is a finding of non-compliance with the Human Health and Environmental Standards, the permit will be reopened and the Human Health and Environmental Standards will be employed to develop more stringent permit conditions in the revision of the permit. Where the State has an EPA-approved hazardous waste program and is issuing the permit or license, it is intended that a similar mechanism will operate. Similarly, in enforcement actions where an EPA-issued permit is not in force and no permit application is pending, there will be some occasions where the Human Health and Environmental Standards,

rather than the design and operating standards, of Subpart D will be the basis for such actions.

The rationale for this regulatory structure recognizes that design and operating standards provide a more specific, certain, easier understood and more enforceable basis for regulation, to the benefit of both the regulated community and EPA and the States. Human Health and Environmental Standards require the application of complex cause-and-effect calculations or models to ascertain the design and operating criteria that owners and operators of facilities ultimately need to govern their day-to-day compliance with such standards. Consequently, Human Health and Environmental Standards are less efficient in implementing regulatory programs and provide less certainty for the regulated community as to what constitutes acceptable design and operating requirements. Because of these features, EPA has chosen to rely on design and operating standards as the principal mechanism for assuring the proper management of hazardous waste. It has been further recognized, however, that there can be situations (uncommon geologic or climatic conditions, special waste characteristics, etc.) where the broadly applicable design and operation standards of Subpart D are not sufficient to fulfill their designed purpose. To accomodate these situations, the regulatory structure provides for the use of the Human Health and Environmental Standards of Subpart D as necessary on a case-by-base basis.

EPA believes that where a permit is issued, the permittee should only be obligated to comply with the permit, the presumption being that the conditions of the permit are fully consistent with the Subpart D standards and that compliance with the permit constitutes effective compliance with such standards. Concomitantly, EPA believes that, where a permit is issued, only the terms of the permit should be enforced. Where it can be substantiated that compliance with an issued permit does not, in fact, achieve compliance with the Subpart D standards, EPA believes that the remedy should be the reopening and appropriate revision of the permit. Based on these judgements, it will be EPA's policy to enforce the terms of EPA-issued permits rather than the Subpart D standards where permits are in effect and to reopen and revise EPA-issued permits rather than enforce the Subpart D standards where permit compliance does not achieve compliance with such standards. In certain instances, however, where the process of modifications of a facility's permit will not, in the judgement of EPA, achieve compliance with the Subpart D standards within the time that EPA believes is necessary, EPA may enforce the Subpart D requirements against such facility. EPA believes that the States should and will follow the same practices where they issue permits or licenses under EPA-approved programs. It will also be the policy of EPA in taking enforcement actions against facilities that have State-issued permits, because compliance with the permit will not achieve compliance with the Subpart D standards, to seek the remedy of reopening and reissuing the permit rather than penalizing the facility, if the

facility is complying with the State-issued permit. EPA anticipates that the courts will administer the citizen suit provisions in a similar manner, but EPA cannot require this in these regulations. In concert with these several judgements, the requirements of Section 250.40 of Subpart D specify that owners and operators of facilities that treat, store and/or dispose of hazardous waste must comply with the Subpart D standards unless they are in compliance with an EPA-issued permit.

1.1 RCRA Mandate and Authority

The Congress of the United States via Section 3004 of Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 (Pub. L. 94-580) mandates that the Administrator of the U.S. Environmental Protection Agency promulgate regulations establishing performance standards applicable to owners and operators of hazardous waste treatment, storage and disposal facilities as may be necessary to protect human health and the environment. These standards are to include, but need not be limited to, requirements respecting: (1) operating methods, techniques, and practices; (2) location, design and construction; and (3) contingency plans for effective action to minimize unanticipated damage that might occur at these facilities.

All provisions of this Act (including Section 3004) must be integrated with the Clean Air Act (42 U.S.C. 1857 and following), the Federal Water Pollution Control Act (33 U.S.C. 1151 and following), the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 135 and following), the Safe Drinking Water Act (42 U.S.C. 300f and following), the Marine Protection Research, and Sanctuaries Act (33 U.S.C. 1401 and following) and such other Acts of Congress as grant authority to the EPA Administrator. A stated purpose of the above requirements was to avoid duplication to the maximum extent possible. Such integration, however, is to be effected only in a manner consistent with the goals and policies expressed in RCRA and the above-listed Acts.

1.2 Definitions

Definition of the following key words and phrases within the Surface Water Human Health and Environmental Standard is reserved pending public comment.

"Cause a violation"

"Controls"

"Facility"

"Located, designed, constructed and operated"

"Oil or hazardous substance"

"Substantial discharge"

"Surface discharge"

"Water Quality Standards"

2.0 Rationale for Regulations

2.1 Actual Damage Incidents

Numerous damage incidents involving contamination of surface water by both surface and subsurface discharges have been documented by EPA.

Main sources of damage incidents are:

1) Damage Incident Files within the EPA Assessment Incident Files within the EPA Assessment and Technology Branch, HWMD, OSW, 401 M Street, S.W. Washington, D.C. 20460.
2) U.S. EPA. Report to Congress. Disposal of Hazardous Waste. Publication SW-115. Office of Solid Waste Management Programs. 1974.
3) U.S. EPA. Site Location and Water Quality Protective Requirements for Hazardous Waste Treatment, Storage, and Disposal Facilities. Office of Solid Waste. (Contract 68-01-4636).
4) U.S. EPA. Surface Impoundments and Their Effects on Groundwater Quality in the United States. Office of Water Supply. (Contract 68-01-4342).
5) Individual Background Documents. (Within the series of twenty-seven produced for specific treatment, storage, and disposal standards.)
6) Annual Reports by the Coast Guard on Polluting Incidents In and Around U.S. Waters, e.g., 12,057 in calendar year 1975. See U.S. Coast Guard, DOT. Polluting Incidents In and Around U.S. Waters; Calendar Year 1975. CG-487. Washington, D.C. 20590.

2.2 Potential Damage

The potential damage from uncontrolled discharges from both point and non-point sources involving the management of waste is very large indeed. That portion of waste determined to be hazardous under Subpart A may involve waste disposal practices at over 270,000 waste producing facilities. It is expected that a very high percentage of all NPDES permitted facilities will also be permitted under RCRA. These 47,000 facilities have been regulated mainly for their end-of-pipe discharges under Effluent Guidelines established for major categories of point sources under Section 402 of the Clean Water Act, as amended.

RCRA has direct authority to control all discharges to the environment, including discharges to subsurface waters and non-point sources, such as leachate production and surface runoff. EPA delegates RCRA authority to the established regulatory water programs for the control of water pollution, including monitoring, except for areas where the Clean Water Act has no direct regulatory authority, such as for most non-point sources and for subsurface discharges.

3.0 Identification of Regulatory Options

3.0.1. Complete Deference to Existing Federal Regulations under CWA

3.0.2. Modified Deference to Existing Federal Regulations under CWA.

3.0.3. Development of RCRA Surface Water Regulations.

3.1 Specific Standards Mandated by RCRA

RCRA specifies:

1) Integration with the Federal Water Pollution Control Act (33 USC 1151 and following) under RCRA Section 1006(b) (42 USC 6905); and,

2) Promulgation of such standards as may be necessary to protect human health and the environment under RCRA Section 3004 (42 USC 6924).

3.2 Existing Federal, State or Local Regulations

The very large number of regulations concerning water and pollution control from discharges into water would present a formidable obstacle to analysis were it not for the unifying role of the Clean Water Act and regulatory programs established thereunder.

Existing regulations were reviewed under the EPA study: "Site Location and Water Quality Protective Requirements for Hazardous Waste Management Facilities (Contract No. 68-01-4346)."

3.3 Other Standards

The above cited EPA contract proposed exploration of regulatory options based on setting standards for receiving water quality and effluent quality. For receiving water the options were (1) Natural Background Quality; (2) Drinking Water Quality; (3) Receiving Water Use; and (4) Comprehensive List Based on Toxicological Evaluation.

4.0 Analysis of Regulatory Options

4.1 Human Health and Environmental Protection Provided

4.1.1. Option 3.0.1.

It was decided that existing CWA regulations did not provide adequate authority for protection of human health and the environment for nonpoint discharges, especially from leachate and runoff from contaminated areas; nor for discharges to the subsurface environment.

Modification of the stance of complete deference to CWA was also necessitated to achieve coordination with the human health objectives of the Safe Drinking Water Act (SWDA).

Option 3.0.2.

Expansion of the regulatory scheme under CWA for surface water to include subsurface discharges and non-point sources of pollution in a comprehensive manner, was judged by EPA to provide adequate protection of human health and the environment.

Option 3.0.3.

Option 3.0.3. to develop a comprehensive scheme of protection of the hydrologic regime based upon the broad authority of RCRA was judged to be potentially very protective of human health and the environment.

4.2 Analysis of Whether Option Meets RCRA Mandate

4.2.0. Option 3.0.1. was judged to meet the RCRA mandate for integration with the CWA, but not with SWDA and to be insufficiently protective of both human health and the environment.

Option 3.0.2. was judged to meet both RCRA mandates for integration with other Acts and for human health and environmental protection.

Option 3.0.3. was judged likely to be inconsistent with the CWA and SWDA but, in principle, likely to be highly protective of human health and the environment. However due to the unevaluated aspects of any newly developed regulations and the complexity and resource demands of the option, as shown by the above referenced water quality protective requirements study, such high human health and environmental protection could not be predicted with sufficient confidence to warrant development into a set of regulations.

5.0 Identification of Chosen Regulation

Option 3.0.2. was chosen. The following language was chosen as of November 21, 1978 for proposal.

250.42-2 Surface Water Human Health and Environmental Standard

All facilities shall be located, designed, constructed, and operated in such a manner as to prevent any surface or sub-surface discharge from the facility into navigable waters from causing a violation of Water Quality Standards promulgated or approved under Section 303 of the Clean Water Act, or a violation of the controls on the discharge of oil or hazardous substances under Section 311 of the Clean Water Act.

5.2 Rationale

The chosen option was modified to include broadly protective standards of the Clean Water Act as seemed reasonable to meet the conflicting demands and problems concerned with receiving and effluent water quality.

Features chosen were use of Water Quality Criteria published under Section 304(a) of the Clean Water Act; and the 271 substances identified under Section 311 of the Clean Water Act as being hazardous due to their toxicity, their high volume production, and their difficulty of removability if discharged.

Recognition of varying local conditions and existing state and local regulations was adjusted for in the development of specific treatment, storage and disposal regulations elsewhere in these Subpart D regulations. The reader is directed to these more specific background documents.

Surface Water Protection

The surface water protection strategy incorporated into these proposed rules is based on the standards promulgated or approved under the Clean Water Act (CWA). Accordingly, the Human Health and Environmental Standard in this area precludes surface or subsurface discharges from hazardous water treatment, storage, and disposal facilities which could cause the Water Quality Standards to be exceeded, or which constitute a spill of oil or hazardous substances under Section 311 of the CWA. EPA feels that this approach is justified because the mand of RCRA and the water quality criteria in CWA are essentially equivalent, and because RCRA specifically requires integration with CWA.

The current status of the water quality criteria as established by EPA is given in summary in Table I "Quality Criteria for Water", and described in detail in the publication; Quality Criteria For Water, 1976. U.S. Environmental Protection Agency. U.S. Government Printing Office, Washington, D.C. (1977).

Water quality criteria being developed for the 65 priority pollutants will also be included within the Human Health and Environmental Standard for Surface Water as they are published under Section 304(a) of the Clean Water Act. A list of the 65 toxic pollutants is given as Table II, as published in Appendix B, 43 Federal Register 27770, (Monday, June 26, 1978).

The list of hazardous substances to be controlled under Section 311 of the Clean Water Act was published in the Federal Register, 43 Federal Register 10474, (Monday, March 13, 1978) as 40 CFR 116 and is reproduced as Table III.

QUALITY CRITERIA FOR WATER — TABLE 1

Parameter, µg/l	Drinking Water	Fresh Water Aquatic	Marine Aquatic
Alkalinity	-	20,000	-
Ammonia	-	20	-
Arsenic	50	-	-
Barium	1,000	-	-
Beryllium	-	11-1,100	-
Boron	-	-	-
Cadmium	10	0.4-12	5
Chlorine	-	2-10	-
Chromium	50	100	-
Fecal Coliform	200/100ml	14MPN/100ml	-
Color, Units	75	-	-
Copper	1,000	1/	1/
Cyanide	-	5	5
Gases Dissolved (% saturation)	110	110	110
Lead	50	2/	-
Iron	300	1,000	-
Manganese	50	100	-
Mercury	2	0.05	0.1
Nickel	-	2/	2/
Nitrate; Nitrite (as N)	10,000	-	-
Oil and Grease	-	2/	-
Dissolved Oxygen	-	5,000	-
Pesticides:			
Aldrin - Dieldrin	-	0.003	0.003
Chlorodane	-	0.01	0.004
2, 4-D	100	-	-
2, 4, 5-TP	10	-	-
DDT	-	0.001	0.001
Demeton	-	0.1	0.1
Endsulfan	-	0.003	0.001
Endrin	0.2	0.004	0.004
Guthion	-	0.01	0.01
Heptachlor	-	0.001	0.001
Lindane	4	0.01	0.004
Malathion	-	0.1	0.1
Methoxychlor	100	0.03	0.03
Mirex	-	0.001	0.001
Parathion	-	0.04	0.04
Toxaphene	5	0.005	0.005
pH	5-9	6.5-9.0	6.5-8.5
Phenol	1	-	-
Phosphorus	-	-	0.1
Phthalate Esters	-	3	-
PCB	-	0.001	0.001
Selenium	10	2/	2/
Silver	50	2/	2/
Solids (Cl and SO_4)	250,000	-	-
Hydrogen Sulfide	-	2	2
Zinc	5,000	2/	-

1/ 0.1 times 96-hr LC50
2/ 0.01 times 96-hr LC50

TABLE II

APPENDIX B—65 TOXIC POLLUTANTS

Acenaphthene
Acrolein
Acrylonitrile
Aldrin/Dieldrin
Antimony and compounds [1]
Arsenic and compounds
Asbestos
Benzene
Benzidine
Beryllium and compounds
Cadmium and compounds
Carbon tetrachloride
Chlordane (technical mixture and metabolites)

[1] As used throughout this Appendix B the term "compounds" shall include organic and inorganic compounds.

Chlorinated benzenes (other than dichlorobenzenes)
Chlorinated ethanes (including 1,2-dichloroethane, 1,1,1-trichloroethane, and hexachloroethane)
Chloroalkyl ethers (chloromethyl, chloroethyl, and mixed ethers)
Chlorinated naphthalene
Chlorinated phenols (other than those listed elsewhere; includes trichlorophenols and chlorinated cresols)
Chloroform
2-chlorophenol
Chromium and compounds
Copper and compounds
Cyanides
DDT and metabolites
Dichlorobenzenes (1,3-, 1,3-, and 1,4-dichlorobenzenes)
Dichlorobenzidine
Dichloroethylenes (1,1-and 1,2-dichloroethylene)
2,4-dichlorophenol
Dichloropropane and dichloropropene
2,4-dimethylphenol
Dinitrotoluene
Diphenylhydrazine
Endosulfan and metabolites
Endrin and metabolites
Ethylbenzene
Fluoranthene
Haloethers (other than those listed elsewhere; includes chlorophenylphenyl ethers, bromophenylphenyl ether, bis(dichloroisopropyl) ether, bis-(chloroethoxy) methane and polychlorinated diphenyl ethers)
Halomethanes (other than those listed elsewhere; includes methylene chloride methyl chloride, methylbromide, bromoform, dichlorobromomethane, trichlorofluoromethane, dichlorodifluoromethane)
Heptachlor and metabolites
Hexachlorobutadiene
Hexachlorocyclohexane (all isomers)
Hexachlorocyclopentadiene
Isophorone
Lead and compounds
Mercury and compounds
Naphthalene
Nickel and compounds
Nitrobenzene
Nitrophenols (including 2,4-dinitrophenol, dinitrocresol)
Nitrosamines
Pentachlorophenol
Phenol
Phthalate esters
Polychlorinated biphenyls (PCBs)
Polynuclear aromatic hydrocarbons (including benzanthracenes, benzopyrenes, benzofluoranthene, chrysenes, dibenzanthracenes, and indenopyrenes)
Selenium and compounds
Silver and compounds
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
Tetrachloroethylene
Thallium and compounds
Toluene
Toxaphene
Trichloroethylene
Vinyl chloride
Zinc and compounds

APPENDIX C—SUBCATEGORIES OF 21 INDUSTRIES

1. TIMBER PRODUCTS PROCESSING

SIC 2411—Logging Camps and Logging Contractors (Camps Only)
SIC 2421—Saw Mills and Planing Mills, General
SIC 2426—Hardwood Dimension and Flooring Mills
SIC 2429—Special Product Sawmills, Not Elsewhere Classified
SIC 2431—Millwork
SIC 2434—Wood Kitchen Cabinets
SIC 2435—Hardwood Veneer and Plywood
SIC 2436—Softwood Veneer and Plywood
SIC 2439—Structural Wood Members, Not Elsewhere Classified
SIC 2491—Wood Preserving
SIC 2499—Wood Products, Not Elsewhere Classified (Furniture Mills)
SIC 2661—Building Paper and Building Board Mills (Hardboard Only)

2. STEAM ELECTRIC POWER PLANTS

SIC 4911—Electric Services (Limited to Steam-Electric Power Plants)

3. LEATHER TANNING AND FINISHING

SIC 31—Leather and Leather Products

4. IRON AND STEEL MANUFACTURING

SIC 3312—Blast Furnaces (Including Coke Ovens); Steel Works and Rolling Mills
SIC 3313—Electrometallurgical Products
SIC 3315—Steel Wire Drawing and Steel Nails and Spikes
SIC 3316—Cold Rolled Steel Sheet, Strip and Bars
SIC 3317—Steel Pipe and Tubes

5. PETROLEUM REFINING

SIC 2911—Petroleum Refining (Including (1) Topping Plant; (2) Topping and Cracking Plants; (3) Topping, Cracking and Petro-chemical Plants; (4) Integrated Plants; and, (5) Integrated and Petrochemical Plants)

6. INORGANIC CHEMICALS MANUFACTURING

SIC 2812—Alkalies and Chlorine
SIC 2813—Industrial Gases
SIC 2816—Inorganic Pigments
SIC 2819—Industrial Inorganic Chemicals, Not Elsewhere Classified

7. TEXTILE MILLS

SIC 22—Textile Mill Products
SIC 23—Apparel and Other Finished Products Made from Fabrics and Similar Materials

8. ORGANIC CHEMICALS MANUFACTURING

SIC 2865—Cyclic (Coal Tar) Crudes, and Cyclic Intermediates, Dyes, and Organic Pigments (Lakes and Toners)
SIC 2869—Industrial Organic Chemicals, Not Elsewhere Classified

9. NONFERROUS METALS MANUFACTURING

SIC 2819—Industrial Inorganic Chemicals, Not Elsewhere Classified (Bauxite Refining Only)
SIC 3331—Primary Smelting and Refining of Copper
SIC 3332—Primary Smelting and Refining of Lead
SIC 3333—Primary Smelting and Refining of Zinc
SIC 3334—Primary Production of Aluminum
SIC 3339—Primary Smelting and Refining of Nonferrous Metals, Not Elsewhere Classified
SIC 3341—Secondary Smelting and Refining of Nonferrous Metals

10. PHOTOGRAPHIC MATERIALS (FILMS AND ASPHALT)

SIC 2861—Paving Mixtures and Blocks
SIC 2865—Asphalt Felts and Coatings
SIC 3996—Linoleum, Asphalted-Felt-Base, and Other Hard Surface Floor Coverings, Not Elsewhere Classified

11. PAINT AND INK FORMULATION AND PRINTING

SIC 2711—Newspapers: Publishing, Publishing and Printing
SIC 2721—Periodicals: Publishing, Publishing and Printing
SIC 2731—Books: Publishing, Publishing and Printing
SIC 2732—Book Printing
SIC 2741—Miscellaneous Publishing
SIC 2751—Commercial Printing, Letterpress and Screen
SIC 2752—Commercial Printing, Letterpress and Lithographic
SIC 2753—Engraving and Plate Printing
SIC 2754—Commercial Printing, Gravure
SIC 2761—Manifold Business Forms
SIC 2771—Greeting Card Publishing
SIC 2793—Photoengraving
SIC 2794—Electrotyping and Stereotyping
SIC 2796—Lithographic Platemaking and Related Services
SIC 2851—Paints, Varnishes, Lacquers, Enamels, and Allied Products
SIC 2893—Printing Ink
SIC 3951—Pens, Mechanical pencils, and Parts and Stamp Pads (Inked Materials Only)
SIC 3952—Lead Pencils, Crayons, and Artists' Materials
SIC 3955—Carbon Paper and Inked Ribbons

12. SOAP AND DETERGENT MANUFACTURING

SIC 2841—Soap and Other Detergents, except Specialty Cleaners

13. AUTO AND OTHER LAUNDRIES

SIC 7211—Power Laundries, Family and Commercial
SIC 7213—Linen Supply
SIC 7214—Diaper Service
SIC 7215—Coin-operated Laundries and Dry Cleaning
SIC 7216—Dry Cleaning Plants, Except Rug Cleaning
SIC 7217—Carpet and Upholstery Cleaning
SIC 7218—Industrial Laundries
SIC 7219—Laundry and Garment Services, Not Elsewhere Classified
None—Auto Wash Establishments

14. PLASTIC AND SYNTHETIC MATERIALS MANUFACTURING

SIC 282—Plastic Materials and Synthetic Resins, Synthetic and Other Manmade Fibers, except Glass

15. PULP AND PAPERBOARD MILLS AND CONVERTED PAPER PRODUCTS

SIC 2611—Pulp Mills
SIC 2621—Paper Mills, except Building Paper Mills
SIC 2631—Paperboard Mills
SIC 2641—Paper Coating and Glazing
SIC 2642—Envelopes
SIC 2643—Bags, Except Textile Bags
SIC 2645—Die-Cut Paper and Paperboard and Cardboard
SIC 2646—Pressed and Molded Pulp Goods
SIC 2647—Sanitary Paper Products
SIC 2648—Stationery, Tablets, and Related Products
SIC 2649—Converted Paper and Paperboard Products, Not Elsewhere Classified
SIC 2651—Folding Paperboard Boxes
SIC 2652—Set-up Paperboard Boxes
SIC 2653—Corrugated and Solid Fiber Boxes
SIC 2654—Sanitary Food Containers

SIC 2655—Fiber Cans, Tubes, Drums, and Similar Products
SIC 2661—Building Paper and Building Board Mills
SIC 2782—Blankbooks, Looseleaf Binders and Devices

14. RUBBER PROCESSING

SIC 2822—Synthetic Rubber (Vulcanizable Elastomers)
SIC 2891—Rubber Cement
SIC 3011—Tires and Inner Tubes
SIC 3021—Rubber and Plastics Footwear (Rubber Only)
SIC 3031—Reclaimed Rubber
SIC 3041—Rubber and Plastics Hose and Belting (Rubber Only)
SIC 3069—Fabricated Rubber Products, Not Elsewhere Classified
SIC 3293—Gaskets, Packing, and Sealing Devices (Rubber Packing Only)

15. MISCELLANEOUS CHEMICALS

SIC 2831—Biological Products
SIC 2833—Medicinal Chemicals and Botanical Products
SIC 2834—Pharmaceutical Preparations
SIC 2861—Gum and Wood Chemicals
SIC 2879—Pesticides and Agricultural Chemicals, Not Elsewhere Classified
SIC 2891—Adhesive and Sealants
SIC 2892—Explosives
SIC 2895—Carbon Black
SIC 2899—Chemicals and Chemical Preparation, Not Elsewhere Classified
SIC 3861—Photographic Equipment and Supplies

16. MACHINERY AND MECHANICAL PRODUCTS MANUFACTURING

SIC 3021—Rubber and Plastics Footwear (Balance)
SIC 3041—Rubber and Plastics Hose and Belting (Balance)
SIC 3079—Miscellaneous Plastics Products
SIC 3293—Gaskets, Packing, and Sealing Devices (Balance)
SIC 3321—Gray Iron Foundries
SIC 3322—Malleable Iron Foundries
SIC 3324—Steel Investment Foundries
SIC 3325—Steel Foundries, Not Elsewhere Classified
SIC 3351—Rolling, Drawing, and Extruding of Copper
SIC 3353—Aluminum Sheet, Plate, and Foil
SIC 3354—Aluminum Extruded Products
SIC 3355—Aluminum Rolling and Drawing, Not Elsewhere Classified
SIC 3356—Rolling, Drawing, and Extruding of Nonferrous Metals, except copper and aluminum
SIC 3357—Drawing and Insulating of Nonferrous Wire
SIC 3361—Aluminum Foundries (Castings)
SIC 3362—Brass, Bronze, Copper, Copper Base Alloy Foundries (Castings)
SIC 3369—Nonferrous Foundries (Castings), Not Elsewhere Classified
SIC 3398—Metal Heat Treating
SIC 3399—Primary Metal Products, Not Elsewhere Classified
SIC 3411—Metal Cans
SIC 3412—Metal Shipping Barrels, Drums, Kegs, and Pails
SIC 3421—Cutlery
SIC 3423—Hand and Edge Tools, Except Machine Tools and Hand Saws
SIC 3425—Hand Saws and Saw Blades
SIC 3429—Hardware, Not Elsewhere Classified
SIC 3431—Enameled Iron and Metal Sanitary Ware
SIC 3432—Plumbing Fixture Fittings and Trim (Brass Goods)
SIC 3433—Heating Equipment, Except Electric and Warm Air Furnaces
SIC 3441—Fabricated Structural Metal
SIC 3442—Metal Doors, Sash, Frames, Molding, and Trim
SIC 3443—Fabricated Platework (Boiler Shops)
SIC 3444—Sheet Metal Work
SIC 3446—Architectural and Ornamental Metal Work
SIC 3448—Prefabricated Metal Buildings and Components
SIC 3449—Miscellaneous Metal Work
SIC 3451—Screw Machine Products
SIC 3452—Bolts, Nuts, Screws, Rivets, and Washers
SIC 3462—Iron and Steel Forgings
SIC 3463—Nonferrous Forgings
SIC 3465—Automotive Stampings
SIC 3466—Crowns and Closures
SIC 3469—Metal Stampings, Not Elsewhere Classified
SIC 3482Small Arms Ammunition
SIC 3483—Ammunition, Except for Small Arms, Not Elsewhere Classified
SIC 3484—Small Arms
SIC 3489—Ordnance and Accessories, Not Elsewhere Classified
SIC 3493—Steel Springs, Except Wire
SIC 3494—Valves and Pipe Fittings, Except Plumbers' Brass Goods
SIC 3496—Wire Springs
SIC 3496—Miscellaneous Fabricated Wire Products
SIC 3497—Metal Foil and Leaf
SIC 3498—Fabricated Pipe and Fabricated Pipe Fittings
SIC 3499—Fabricated Metal Products, Not Elsewhere Classified
SIC 3511—Steam, Gas, and Hydraulic Turbines and Turbine Generator Set Units
SIC 3519—Internal Combustion Engines, Not Elsewhere Classified
SIC 3523—Farm Machinery and Equipment
SIC 3524—Garden Tractors and Lawn and Garden Equipment
SIC 3531—Construction Machinery and Equipment
SIC 3532—Mining Machinery and Equipment, Except Oil Field Machinery and Equipment
SIC 3533—Oil Field Machinery and Equipment
SIC 3534—Elevators and Moving Stairways
SIC 3535—Conveyors and Conveying Equipment
SIC 3536—Hoists, Industrial Cranes, and Monorail Systems
SIC 3537—Industrial Trucks, Tractors, Trailers, and Stackers
SIC 3541—Machine Tools, Metal Cutting Types
SIC 3542—Machine Tools, Metal Forming Types
SIC 3544—Special Dies and Tools, Die Sets, Jigs and Fixtures and Industrial Molds
SIC 3545—Machine Tool Accessories and Measuring Devices
SIC 3546—Power Driven Hand Tools
SIC 3547—Rolling Mill Machinery and Equipment
SIC 3549—Metalworking Machinery, Not Elsewhere Classified
SIC 3551—Food Products Machinery
SIC 3552—Textile Machinery
SIC 3553—Woodworking Machinery
SIC 3554—Paper Industries Machinery
SIC 3555—Printing Trades Machinery and Equipment
SIC 3559—Special Industry Machinery, Not Elsewhere Classified
SIC 3561—Pumps and Pumping Equipment
SIC 3562—Ball and Roller Bearings
SIC 3563—Air and Gas Compressors
SIC 3564—Blowers and Exhaust and Ventilation Fans
SIC 3565—Industrial Patterns
SIC 3566—Speed Changers, Industrial High Speed Drives, and Gears
SIC 3567—Industrial Process Furnaces and Ovens
SIC 3568—Mechanical Power Transmission Equipment, Not Elsewhere Classified
SIC 3569—General Industrial Machinery and Equipment, Not Elsewhere Classified
SIC 3572—Typewriters
SIC 3573—Electronic Computing Equipment
SIC 3574—Calculating and Accounting Machines, Except Electronic Computing Equipment
SIC 3576—Scales and Balances, Except Laboratory
SIC 3579—Office Machines, Not Elsewhere Classified
SIC 3581—Automatic Merchandising Machines
SIC 3582—Commercial Laundry, Dry Cleaning, and Pressing Machines
SIC 3585—Air Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment
SIC 3586—Measuring and Dispensing Pumps
SIC 3589—Service Industry Machines, Not Elsewhere Classified
SIC 3592—Carburetors, Pistons, Piston Rings, and Valves
SIC 3599—Machinery, Except Electrical, Not Elsewhere Classified
SIC 3612—Power, Distribution, and Specialty Transformers
SIC 3613—Switchgear and Switchboard Apparatus
SIC 3621—Motors and Generators
SIC 3622—Industrial Controls
SIC 3623—Welding Apparatus, Electric
SIC 3624—Carbon and Graphite Products
SIC 3629—Electrical Industrial Apparatus, Not Elsewhere Classified
SIC 3631—Household Cooking Equipment
SIC 3632—Household Refrigerators and Home and Farm Freezers
SIC 3633—Household Laundry Equipment
SIC 3634—Electric Housewares and Fans
SIC 3635—Household Vacuum Cleaners
SIC 3639—Household Appliances, Not Elsewhere Classified
SIC 3641—Electric Lamps
SIC 3643—Current-Carrying Wiring Devices
SIC 3644—Noncurrent-Carrying Wiring Devices
SIC 3645—Residential Electric Lighting Fixtures
SIC 3646—Commercial, Industrial, and Institutional Electric Lighting Fixtures
SIC 3647—Vehicular Lighting Equipment
SIC 3648—Lighting Equipment, Not Elsewhere Classified
SIC 3651—Radio and Television Receiving Sets, Except Communication Types
SIC 3652—Phonograph Records and Pre-recorded Magnetic Tape
SIC 3661—Telephones and Telegraph Apparatus
SIC 3662—Radio and Television Transmitting, Signaling, and Detection Equipment and Apparatus
SIC 3671—Radio and Television Receiving Type Electron Tubes, Except Cathode Ray
SIC 3672—Cathode Ray Television Picture Tubes
SIC 3673—Transmitting, Industrial, and Special Purpose Electron Tubes
SIC 3674—Semiconductors and Related Devices

SIC 3675—Electronic Capacitors
SIC 3676—Resistors, for Electronic Applications
SIC 3677—Electronic Coils, Transformers and Other Inductors
SIC 3678—Connectors, for Electronic Applications
SIC 3679—Electronic Components, Not Elsewhere Classified
SIC 3691—Storage Batteries
SIC 3692—Primary Batteries, Dry and Wet
SIC 3693—Radiographic X-ray, Fluoroscopic X-ray, Therapeutic X-ray, and Other X-ray Apparatus and Tubes: Electromedical and Electrotherapeutic Apparatus
SIC 3694—Electrical Equipment for Internal Combustion Engines
SIC 3699—Electrical Machinery, Equipment, and Supplies, Not Elsewhere Classified
SIC 3711—Motor Vehicles and Passenger Car Bodies
SIC 3713—Truck and Bus Bodies
SIC 3714—Motor Vehicle Parts and Accessories
SIC 3715—Truck Trailers
SIC 3721—Aircraft
SIC 3724—Aircraft Engines and Engine Parts
SIC 3728—Aircraft Parts and Auxiliary Equipment, Not Elsewhere Classified
SIC 3731—Ship Building and Repairing
SIC 3732—Boat Building and Repairing
SIC 3743—Railroad Equipment
SIC 3751—Motorcycles, Bicycles, and Parts
SIC 3761—Guided Missiles and Space Vehicles
SIC 3764—Guided Missile and Space Vehicle Propulsion Units and Propulsion Unit Parts
SIC 3769—Guided Missile and Space Vehicle Parts and Auxiliary Equipment, Not Elsewhere Classified.
SIC 3792—Travel Trailers and Campers
SIC 3795—Tanks and Tank Components
SIC 3799—Transportation Equipment, Not Elsewhere Classified
SIC 3811—Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment
SIC 3822—Automatic Controls for Regulating Residential and Commercial Environments and Appliances
SIC 3823—Industrial Instruments for Measurement, Display and Control of Process Variables; and Related Products
SIC 3824—Totalizing Fluid Meters and Counting Devices
SIC 3825—Instruments for Measuring and Testing of Electricity and Electrical Signals
SIC 3829—Measuring and Controlling Devices, Not Elsewhere Classified
SIC 3832—Optical Instruments and Lenses
SIC 3841—Surgical and Medical Instruments and Apparatus
SIC 3842—Orthopedic, Prosthetic, and Surgical Appliances and Supplies
SIC 3843—Dental Equipment and Supplies
SIC 3851—Ophthalmic Goods
SIC 3873—Watches, Clocks, Clockwork Operated Devices and Parts
SIC 3911—Jewelry, Precious Metal
SIC 3914—Silverware, Plated Ware, and Stainless Steel Ware
SIC 3915—Jewelers' Findings and Materials, and Lapidary Work
SIC 3931—Musical Instruments
SIC 3942—Dolls
SIC 3944—Games, Toys, and Children's Vehicles: Except Dolls and Bicycles
SIC 3949—Sporting and Athletic Goods, Not Elsewhere Classified
SIC 3951—Pens, Mechanical Pencils, and Parts (Balance)
SIC 3961—Costume Jewelry and Costume Novelties, Except Precious Metal
SIC 3991—Brooms and Brushes
SIC 3993—Signs and Advertising Displays
SIC 3995—Burial Caskets

19. ELECTROPLATING

SIC 347—Coating, Engraving, and Allied Services

20. ORE MINING AND DRESSING

SIC 1011—Iron Ores
SIC 1021—Copper Ores
SIC 1031—Lead and Zinc Ores
SIC 1041—Gold Ores
SIC 1044—Silver Ores
SIC 1051—Bauxite and Other Aluminum Ores
SIC 1061—Ferroalloy Ores, Except Vanadium
SIC 1092—Mercury Ores
SIC 1094—Uranium-Radium-Vanadium Ores
SIC 1099—Metal Ores, Not Elsewhere Classified

21. COAL MINING

SIC 1111—Anthracite
SIC 1112—Anthracite Mining Services
SIC 1211—Bituminous Coal and Lignite
SIC 1213—Bituminous Coal and Lignite Mining Services

APPENDIX C

Acetone
n-alkanes (C_{12}—C_{30})
Biphenyl
Chlorine
Dialkyl ethers
Dibenzofuran
Diphenyl ether
Methylethyl Ketone
Nitrites
Secondary amines
Styrene
Terpenes

[FR Doc. 78-17635 Filed 6-21-78; 3:33 pm]

TABLE III

TABLE 116.4A.—*List of hazardous substances*

Common name	CAS No.	Synonyms	Isomers	CAS No.
Acetaldehyde	75070	Ethanal, ethyl aldehyde, acetic aldehyde.		
Acetic acid	64197	Glacial acetic acid, vinegar acid		
Acetic anhydride	108247	Acetic oxide, acetyl oxide		
Acetone cyanohydrin	75865	2-methyllactonitrile, alpha-hydroxyisobutyronitrile.		
Acetyl bromide	506967			
Acetyl chloride	79367			
Acrolein	107028	2-propenal, acrylic aldehyde, acrylaldehyde, acraldehyde.		
Acrylonitrile	107131	Cyanoethylene, Fumigrain, Ventox, propenenitrile, vinyl cyanide.		
Aldrin	309002	Octalene, HHDN		
Allyl alcohol	107186	2-propen-1-ol, 1-propenol-3, vinyl carbinol.		
Allyl chloride	107051	3-chloropropene, 3-chloropropylene, Chlorallylene.		
Aluminum sulfate	10043013	Alum		
Ammonia	7664417			
Ammonium acetate	631618	Acetic acid ammonium, salt		
Ammonium benzoate	1863634			
Ammonium bicarbonate	1066337	Acid ammonium carbonate, ammonium hydrogen carbonate.		
Ammonium bichromate	7789095			
Ammonium bifluoride	1341497	Acid ammonium fluoride, ammonium hydrogen fluoride.		
Ammonium bisulfite	10192300			
Ammonium carbamate	1111780	Ammonium aminoformate		
Ammonium carbonate	506876			
Ammonium chloride	12125029	Ammonium muriate, sal ammoniac, salmiac, Amchlor.		
Ammonium chromate	7788989			
Ammonium citrate dibasic	3012655	Diammonium citrate, citric acid diammonium salt.		
Ammonium fluoborate	13826830	Ammonium fluoroborate, ammonium borofluoride.		
Ammonium fluoride	12125018	Neutral ammonium fluoride		
Ammonium hydroxide	1336216			
Ammonium oxalate	6009707			
	5972736			
	14258492			
Ammonium silicofluoride	16919190	Ammonium fluosilicate		
Ammonium sulfamate	7773060	Ammate, AMS, ammonium amidosulfate.		
Ammonium sulfide	12135761			
Ammonium sulfite	10196040			
	10192300			
Ammonium tartrate	3164292	Tartaric acid ammonium salt		
	14307438			
Ammonium thiocyanate	1762954	Ammonium rhodanide, ammonium sulfocyanate, ammonium sulfocyanide.		
Ammonium thiosulfate	7783182	Ammonium hyposulfite		
Amyl acetate	628637	Amylacetic ester	iso-	123922
		Pear oil	sec-	626380
		Banana oil	tert-	625161
Aniline	62533	aniline oil, phenylamine, aminobenzene, aminophen, kyanol.		
Antimony pentachloride	7647189			

TABLE 116.4A.—*List of hazardous substances*—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Antimony potassium tartrate	28300745	Tartar emetic, tartrated antimony, tartarized antimony, potassium antimonyltartrate.		
Antimony tribromide	7789619			
Antimony trichloride	10025919	Butter of antimony		
Antimony trifluoride	7783564	Antimony fluoride		
Antimony trioxide	1309644	Diantimony trioxide, flowers of antimony.		
Arsenic disulfide	1303328	Red arsenic sulfide		
Arsenic pentoxide	1303282	Arsenic acid anhydride, arsenic oxide.		
Arsenic trichloride	7784341	Arsenic chloride, arsenious chloride, arsenous chloride, butter of arsenic.		
Arsenic trioxide	1327533	Arsenious acid, arsenious oxide, white arsenic.		
Arsenic trisulfide	1303339	Arsenious sulfide, yellow arsenic sulfide.		
Barium cyanide	542621			
Benzene	71432	Cyclohexatriene, benzol		
Benzoic acid	65850	Benzenecarboxylic acid, phenylformic acid, dracylic acid.		
Benzonitrile	100470	Phenyl cyanide, cyanobenzene		
Benzoyl chloride	98884	Benzenecarbonyl chloride		
Benzyl chloride	100447			
Beryllium chloride	7787475			
Beryllium fluoride	7787497			
Beryllium nitrate	7787555			
	13597994			
Butyl acetate	123864	acetic acid butyl ester	iso-	110190
			sec-	105464
			tert-	540885
Butylamine	109739	1-aminobutane	iso-	78819
			sec-	513496
			di-	13952846
			tert-	75649
Butyric acid	107926	Butanoic acid, ethylacetic acid	iso-	79312
Cadmium acetate	543908			
Cadmium bromide	7789426			
Cadmium chloride	10108642			
Calcium arsenate	7778441	Tricalcium orthoarsenate		
Calcium arsenite	52740166			
Calcium carbide	75207	Carbide, acetylenogen		
Calcium chromate	13765190	Calcium chrome yellow, gubila, yellow ultramarine.		
Calcium cyanide	592018			
Calcium dodecylbenzenesulfonate	26264062			
Calcium hydroxide	1305620	Lime, hydrated, slaked lime, calcium hydrate.		
Calcium hypochlorite	7778543			
Calcium oxide	1305788	Lime, quicklime		
Captan	133062	Orthocide-406, SR-406, Vancide-89		
Carbaryl	63252	Sevin		
Carbon disulfide	75150	Carbon bisulfide, dithiocarbonic anhydride.		
Chlordane	57749	Toxichlor, chlordan		
Chlorine	75003			
Chlorobenzene	108907	Monochlorobenzen, benzen chloride.		
Chloroform	67663	trichloromethane		
Chlorpyrifos	2921882	Dursban		
Chlorosulfonic acid	7790946	Sulfuric chlorohydrin		
Chromic acetate	1066304			
Chromic acid	11115745	chromic anhydride, chromium trioxide.		
Chromic sulfate	10101538			
Chromous chloride	10049055			
Cobaltous bromide	7789437	Cobalt bromide		
Cobaltous formate	544183	Cobalt formate		
Cobaltous sulfamate	14017415	Cobalt sulfamate		
Coumaphos	56724	Co-Ral		

TABLE 116.4A.—*List of hazardous substances*—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Cresol	1319773	Cresylic acid	m-	108394
		Hydroxytoluene	o-	95487
			p-	106445
Cupric acetate	142712	Copper acetate, crystalized verdigris.		
Cupric acetoarsenite	12002038	Copper acetoarsenite, copper acetate arsenite, Paris green.		
Cupric chloride	7447394	Copper chloride		
Cupric nitrate	3251238	Copper nitrate		
Cupric oxalate	5893663	Copper oxalate		
Cupric sulfate	7758987	Copper sulfate		
Cupric sulfate, ammoniated	10380297	Ammoniated copper sulfate		
Cupric tartrate	815827	Copper tartrate		
Cyanogen chloride	506774			
Cyclohexane	110827	Hexahydrobenzene, hexamethylene, hexanaphthene.		
2,4-D acid	94757	2,4-dichlorophenoxyacetic acid		
2,4-D ester	94111	2,4-dichlorophenoxyacetic acid ester		
	94791			
	94804			
	1320189			
	1928387			
	1928616			
	1929733			
	2971382			
	25168267			
	53467111			
DDT	50293	p,p'-DDT		
Diazinon	333415	Dipofene, Diazitol, Basudin, Spectracide.		
Dicamba	1918009	2-methoxy-3,6-dichlorobenzoic acid		
Dichlobenil	1194656	2,6-dichlorobenzonitrile, 2,6-DBN		
Dichlone	117806	Phygon, dichloronaphthoquinone		
2,2-Dichloropropionic acid	75990	Dalapon		
Dichlorvos	62737	2,2-dichlorovinyl dimethyl phosphate, Vapona.		
Dieldrin	60571	Alvit		
Diethylamine	109897			
Dimethylamine	124403			
Dinitrobenzene (mixed)	25154545	Dinitrobenzol	m-	99650
			o-	528290
			p-	100254
Dinitrophenol	51285 (2,4-)	Aldifen	(2,5-)	329715
			(2,6-)	573568
Diquat	85007	Aquacide		
	2764729	Dextrone, Regione, Diquat dibromide.		
Disulfoton	298044	DI-syston		
Diuron	330541	DCMU, DMU		
Dodecylbenzenesulfonic acid.	27176870			
Endosulfan	115297	Thiodan		
Endrin	72208	Mendrin, Compound 269		
Ethion	563122	Nialate, ethyl methylene, phosphorodithioate.		
Ethylbenzene	100414	Phenylethane		
Ethylenediamine	107153	1,2-diaminoethane		
Ethylenediaminetetraacetic acid (EDTA).	60004	Edetic acid, Havidote, (ethylenedinitrilo)-tetraacetic acid.		
Ferric ammonium citrate	1185575	Ammonium ferric citrate		
Ferric ammonium oxalate	2944674	Ammonium ferric oxalate		
	55488474			
Ferric chloride	7705080	Flores martis, iron trichloride		
Ferric fluoride	7783508			
Ferric nitrate	10421484	Iron nitrate		
Ferric sulfate	10028225	Ferric persulfate, ferric sesquisulfate, ferric tersulfate.		
Ferrous ammonium sulfate	10045893	Mohr's salt, iron ammonium sulfate		
Ferrous chloride	7758943	Iron chloride, iron dichloride, iron protochloride.		

TABLE 116.4A.—*List of hazardous substances*—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Ferrous sulfate	7720787	Green vitrol		
	7782630	Iron vitrol, iron sulfate, iron protosulfate.		
Formaldehyde	50000	Methyl aldehyde, methanol, formalin.		
Formic acid	64186	Methanoic acid		
Fumaric acid	110178	Trans-butenedioic acid, trans-1,2-ethylenedicarboxylic acid, boletic acid, allomaleic acid.		
Furfural	98011	2-furaldehyde, pyromucic aldehyde		
Guthion	86500	Guasthion, azinphos-methyl		
Heptachlor	76448	Velsicol-104, Drinox, Heptagran		
Hydrochloric acid	7647010	Hydrogen chloride, muriatic acid		
Hydrofluoric acid	7664393	Fluohydric acid		
Hydrogen cyanide	74908	Hydrocyanic acid		
Isoprene	78795	2-methyl-1,3-butadiene		
Isopropanolamine dodecylbenzenesulfonate.	42504461			
Kelthane	115322	DKp-chlorophenyl)-trichloromethylcarbinol, DTMC, dicofol.		
Lead acetate	301042	Sugar of lead		
Lead arsenate	7784409			
	7645252			
	10102484			
Lead chloride	7758954			
Lead fluoborate	13814965	Lead fluoroborate		
Lead fluoride	7783462	Lead difluoride, plumbous fluoride		
Lead iodide	10101630			
Lead nitrate	10099748			
Lead stearate	7428480	Stearic acid lead salt		
	1072351			
	52652592			
Lead sulfate	7446142			
Lead sulfide	1314870	Galena		
Lead thiocyanate	592870	Lead sulfocyanate		
Lindane	58899	Gamma-BHC, gamma-benzene hexachloride.		
Lithium chromate	14307358			
Malathion	121755	Phosphothion		
Maleic acid	110167	Cis-butenedioic acid, cis-1,2-ethylenedicarboxylic acid, toxilic acid.		
Maleic anhydride	108316	2,5-furandione, cis/butenedioic anhydride, toxilic anhydride.		
Mercuric cyanide	592041	Mercury cyanide		
Mercuric nitrate	10045940	Mercury nitrate, mercury pernitrate		
Mercuric sulfate	7783359	Mercury sulfate, mercury persulfate		
Mercuric thiocyanate	592858	Mercury thiocyanate, mercuric sulfocyanate, mercuric sulfocyanide.		
Mercurous nitrate	7782867			
	10415755			
		Mercury protonitrate		
Methoxychlor	72435	DMDT, methoxy-DDT		
Methyl mercaptan	74931	Methanethiol, mercaptomethane, methyl sulfhydrate, thiomethyl alcohol.		
Methyl methacrylate	80626	Methacrylic acid methyl ester, methyl-2-methyl-2-propenoate.		
Methyl parathion	298000	Nitrox-80		
Mevinphos	7786347	Phosdrin		
Mexacarbate	315184	Zectran		
Monoethylamine	75047	Ethylamine, aminoethane		
Monomethylamine	74895	Methylamine, aminomethane		
Naled	300765	Dibrom		
Naphthalene	91203	White tar, tar camphor, naphthalin		
Naphthenic acid	1338245	Cyclohexanecarboxylic acid, hexahydrobenzoic acid.		
Nickel ammonium sulfate	15699180	Ammonium nickel sulfate		
Nickel chloride	37211055	Nickelous chloride		
	7718549			

TABLE 116.4A.—*List of hazardous substances*—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
Nickel hydroxide	12054487	Nickelous hydroxide		
Nickel nitrate	14216752			
Nickel sulfate	7786814	Nickelous sulfate		
Nitric acid	7697372	Aqua fortis		
Nitrobenzene	98953	Nitrobenzol, oil of mirbane		
Nitrogen dioxide	10102440	Nitrogen tetraoxide		
Nitrophenol (mixed)	25154556	Mononitrophenol	m-	554847
			o-	88755
			p-	100027
Paraformaldehyde	30525894	Paraform, Formagene, Triformol, polymerized formaldehyde, polyoxymethylene.		
Parathion	56382	DNTP, Niran		
Pentachlorophenol	87865	PCP, Penta		
Phenol	108952	Carbolic acid, phenyl hydroxide, hydroxybenzene, oxybenzene.		
Phosgene	75445	Diphosgene, carbonyl chloride, chloroformyl chloride.		
Phosphoric acid	7664382	Orthophosphoric acid		
Phosphorus	7723140	Black phosphorus, red phosphorus, white phosphorus, yellow phosphorus.		
Phosphorus oxychloride	10025873	Phosphoryl chloride, phosphorus chloride.		
Phosphorus pentasulfide	1314803	Phosphoric sulfide, thiophosphoric anhydride, phosphorus persulfide.		
Phosphorus trichloride	7719122	Phosphorous chloride		
Polychlorinated biphenyls	1336363	PCB, Arocior, polychlorinated diphenyls.		
Potassium arsenate	7784410			
Potassium arsenite	10124502	Potassium metaarsenite		
Potassium bichromate	7778509	Potassium dichromate		
Potassium chromate	7789006			
Potassium cyanide	151508			
Potassium hydroxide	1310583	Potassium hydrate, caustic potash, potasse.		
Potassium permanganate	7722647	Chameleon mineral		
Propionic acid	79094	Propanoic acid, methylacetic acid, ethylformic acid.		
Propionic anhydride	123626	Propanoic anhydride, methylacetic anhydride.		
Pyrethrins	121299	Pyrethrin I		
	121211	Pyrethrin II		
Quinoline	91225	1-benzazine, benzo(b)pyridine, leucoline, chinoleine, leucol.		
Resorcinol	108463	Resorcin, 1,3-benzenediol, meta-dihydroxybenzene.		
Selenium oxide	7446084	Selenium dioxide		
Sodium	7440235	Natrium		
Sodium arsenate	7631892	Disodium arsenate		
Sodium arsenite	7784465	Sodium metaarsenite		
Sodium bichromate	10588019	Sodium dichromate		
Sodium bifluoride	1333831			
Sodium bisulfite	7631905	Sodium acid sulfite, sodium hydrogen sulfite.		
Sodium chromate	7775113			
Sodium cyanide	143339			
Sodium dodecylbenzene-sulfonate.	25155300			
Sodium fluoride	7681494	Villiaumite		
Sodium hydrosulfide	16721805	Sodium hydrogen sulfide		
Sodium hydroxide	1310732	Caustic soda, soda lye, sodium hydrate.		
Sodium hypochlorite	7681529	Bleach		
	10022705			
Sodium methylate	124414	Sodium methoxide		
Sodium nitrite	7632000			
Sodium phosphate, dibasic	7558794			
	10039324			

TABLE 116.4A.—*List of hazardous substances*—Continued

Common name	CAS No.	Synonyms	Isomers	CAS No.
10028247				
	10140655			
Sodium phosphate, tribasic	7785844			
	7601549			
	10101890			
	10361894			
	7758294			
	10124568			
Sodium selenite	10102188			
	7782823			
Strontium chromate	7789062			
Strychnine	57249			
Styrene	100425	Vinylbenzene, phenylethylene, styrol, styrolene, cinnamene, cinnamol.		
Sulfuric acid	7664939	Oil of vitriol, oleum		
Sulfur monochloride	12771083	Sulfur chloride		
2,4,5-T acid	93765	2,4,5-trichlorophenoxy-acetic acid		
2,4,5-T ester	2545597	2,4,5-trichlorophenoxy/acetic esters.		
	93798			
	61792072			
	1928478			
	25168154			
TDE	72548	DDD		
Tetraethyl lead	78002	Lead tetraethyl, TEL		
Tetraethyl pyrophosphate	107493	TEPP		
Toluene	108883	Toluol, methylbenzene, phenylmethane, Methacide.		
Toxaphene	8001352	Camphechlor		
Trichlorfon	52686	Dipterex		
		Dylox		
Trichlorophenol	25167822	Collunosol, Dowicide 2 or 2S, Omal, Phenachlor.		
Triethanolamine dodecylbenzenesulfonate.	27323417			
Triethylamine	121448			
Trimethylamine	75503	TMA		
Uranyl acetate	541093			
Uranyl nitrate	10102064			
	36478769			
Vanadium pentoxide	1314621	Vanadic anhydride, vanadic acid anhydride.		
Vanadyl sulfate	27774136	Vanadic sulfate, vanadium sulfate		81
Vinyl acetate	108054	Acetic acid ethylene ether		
Xylene (mixed)	1330207	Dimethylbenzene	m-	108383
		Xylol	o-	95476
			p-	106423
Xylenol	1300716	Dimethylphenol, hydroxydimethylbenzene.		
Zinc acetate	557346			
Zinc ammonium chloride	14639975			
	14639986			
	52628258			
Zinc borate	1332076			
Zinc bromide	7699458			
Zinc carbonate	3486359			
Zinc chloride	7646857	Butter of zinc		
Zinc cyanide	557211			
Zinc fluoride	7783495			
Zinc formate	557415			
Zinc hydrosulfite	7779864			
Zinc nitrate	7779886			
Zinc phenolsulfonate	127822	Zinc sulfocarbolate		
Zinc phosphide	1314847			
Zinc silicofluoride	16871719	Zinc fluorosilicate		
Zinc sulfate	7733020	White vitriol, zinc vitriol, white copperas.		
Zirconium nitrate	13746899			
Zirconium potassium fluoride.	16923958			
Zirconium sulfate	14644612	Disulfatozirconic acid		
Zirconium tetra-chloride	10026116			

TABLE 116.4B.—*List of Hazardous Substances By CAS Number*

CAS No.	common name
50000	Formaldehyde
50293	DDT
51285	2,4-Dinitrophenol
52686	Trichlorfon
56382	Parathion
56724	Coumaphos
57249	Strychnine
57749	Chlordane
58899	Lindane
60004	Ethylenediaminetetraacetic acid (EDTA)
60571	Dieldrin
62533	Aniline
62737	Dichlorvos
63252	Carbaryl
64186	Formic acid
64197	Acetic acid
65850	Benzoic acid
67663	Chloroform
71432	Benzene
72208	Endrin
72435	Methoxychlor
72548	TDE
74895	Monomethylamine
74908	Hydrogen cyanide
74931	Methyl mercaptan
75047	Monoethylamine
75070	Acetaldehyde
75150	Carbon disulfide
75207	Calcium carbide
75445	Phosgene
75503	Trimethylamine
75649	tert-Butylamine
75865	Acetone cyanohydrin
75990	2,2-Dichloropropionic acid
76448	Heptachlor
78002	Tetraethyl lead
78795	Isoprene
78819	iso-Butylamine
79094	Propionic acid
79312	iso-Butyric acid
79367	Acetyl chloride
80626	Methyl methacrylate
85007	Diquat
86500	Guthion
87865	Pentachlorophenol
88755	o-Nitrophenol
91203	Naphthalene
91225	Quinoline
93765	2,4,5-T acid
93798	2,4,5-T ester
94111	2,4-D ester
94757	2,4-D acid
94791	2,4-D ester

94804 2,4-D Butyl ester
95476 o-Xylene
95487 o-Cresol
98011 Furfural
98884 Benzoyl chloride
98953 Nitrobenzene
99650 m-Dinitrobenzene
100027 p-Nitrophenol
100254 p-Dinitrobenzene
100414 Ethylbenzene
100425 Styrene
100447 Benzyl chloride
100470 Benzonitrile
105464 sec-Butyl acetate
106423 p-Xylene
106445 p-Cresol
107028 Acrolein
107051 Allyl chloride
107131 Acrylonitrile
107153 Ethylenediamine
107186 Allyl alcohol
107493 Tetraethyl pyrophosphate
107926 n-Butyric acid
108054 Vinyl acetate
108247 Acetic anhydride
108316 Maleic anhydride
108383 m-Xylene
108394 m-Cresol
108463 Resorcinol
108883 Toluene
108907 Chlorobenzene
108952 Phenol
109739 n-Butylamine
109897 Diethylamine
110167 Maleic acid
110178 Fumaric acid
110190 iso-Butyl acetate
110827 Cyclohexane
115297 Endosulfan
115322 Kelthane
117806 Dichlone
121211 Pyrethrin
121299 Pyrethrin
121448 Triethylamine
121755 Malathion
123626 Propionic anhydride
123864 n-Butyl acetate
123922 iso-Amyl acetate
124403 Dimethylamine
124414 Sodium methylate
127822 Zinc phenolsulfonate
133062 Captan
142712 Cupric acetate
143339 Sodium cyanide
151508 Potassium cyanide
298000 Methyl parathion
298044 Disulfoton
300765 Naled
301042 Lead acetate
309002 Aldrin
315184 Mexacarbate
329715 2,5-Dinitrophenol
330541 Diuron
333415 Diazinon
506774 Cyanogen chloride
506876 Ammonium carbonate
506967 Acetyl bromide
513495 sec-Butylamine
528290 o-Dinitrobenzene
540885 tert-Butyl acetate
541093 Uranyl acetate
542621 Barium cyanide
543908 Cadmium acetate
544183 Cobaltous formate
554847 m-Nitrophenol
557211 Zinc cyanide
557346 Zinc acetate
557415 Zinc formate
563122 Ethion
573568 2,6-Dinitrophenol
592018 Calcium cyanide
592041 Mercuric cyanide
592858 Mercuric thiocyanate
592870 Lead thiocyanate
625161 tert-Amyl acetate
626380 sec-Amyl acetate
628637 n-Amyl acetate
631618 Ammonium acetate
815827 Cupric tartrate
1066304 Chromic acetate
1066337 Ammonium bicarbonate
1072351 Lead stearate
1111780 Ammonium carbamate
1185575 Ferric ammonium citrate
1194656 Dichlobenil
1300716 Xylenol
1303282 Arsenic pentoxide
1303328 Arsenic disulfide
1303339 Arsenic trisulfide
1305620 Calcium hydroxide
1305788 Calcium oxide
1309644 Antimony trioxide
1310583 Potassium hydroxide
1310732 Sodium hydroxide
1314621 Vanadium pentoxide
1314803 Phosphorus pentasulfide
1314847 Zinc phosphide
1314870 Lead sulfide
1319773 Cresol (mixed)
1320189 2,4-D ester
1327533 Arsenic trioxide
1330207 Xylene
1332076 Zinc borate
1333831 Sodium bifluoride
1336216 Ammonium hydroxide
1336363 Polychlorinated biphenyls
1338245 Naphthenic acid
1341497 Ammonium bifluoride
1762954 Ammonium thiocyanate
1863634 Ammonium benzoate
1918009 Dicamba
1928387 2,4-D esters
1928478 2,4,5-T ester
1928616 2,4-D ester
1929733 2,4-D ester
2545597 2,4,5-T ester
2764729 Diquat
2921882 Chlorpyrifos
2944674 Ferric ammonium oxalate
2971382 2,4-D ester
3012656 Ammonium citrate, dibasic
3164292 Ammonium tartrate
3251238 Cupric nitrate
3486359 Zinc carbonate
5893663 Cupric oxalate
5972736 Ammonium oxalate
6009707 Ammonium oxalate
6369966 2,4,5-T ester
7428480 Lead stearate
7440235 Sodium
7446084 Selenium oxide
7446142 Lead sulfate
7447394 Cupric chloride
7558794 Sodium phosphate, dibasic
7601549 Sodium phosphate, tribasic
7631892 Sodium arsenate
7631905 Sodium bisulfite
7632000 Sodium nitrite
7645252 Lead arsenate
7646857 Zinc chloride
7647010 Hydrochloric acid
7647189 Antimony pentachloride
7664382 Phosphoric acid
7664393 Hydrofluoric acid
7664417 Ammonia
7664939 Sulfuric acid
7681494 Sodium fluoride
7681529 Sodium hypochlorite
7697372 Nitric acid
7699468 Zinc bromide
7705080 Ferric chloride
7718549 Nickel chloride
7719122 Phosphorus trichloride
7720787 Ferrous sulfate
7722647 Potassium permanganate
7723140 Phosphorus
7733020 Zinc sulfate
7758294 Sodium phosphate, tribasic
7758943 Ferrous chloride
7758954 Lead chloride
7758987 Cupric sulfate
7773060 Ammonium sulfamate
7775113 Sodium chromate
7778441 Calcium arsenate
7778509 Potassium bichromate
7778543 Calcium hypochlorite
7779864 Zinc hydrosulfite
7779886 Zinc nitrate
7782505 Chlorine
7782630 Ferrous sulfate
7782823 Sodium selenite
7782867 Mercurous nitrate
7783188 Ammonium thiosulfate
7783359 Mercuric sulfate
7783462 Lead fluoride
7783495 Zinc fluoride
7783508 Ferric fluoride
7783564 Antimony trifluoride
7784341 Arsenic trichloride
7784409 Lead arsenate
7784410 Potassium arsenate
7784465 Sodium arsenite
7785844 Sodium phosphate, tribasic
7786347 Mevinphos
7786814 Nickel sulfate
7787475 Beryllium chloride
7787497 Beryllium fluoride
7787555 Beryllium nitrate
7788989 Ammonium chromate
7789006 Potassium chromate
7789062 Strontium chromate
7789095 Ammonium bichromate
7789426 Cadmium bromide
7789437 Cobaltous bromide
7789619 Antimony tribromide
7790945 Chlorosulfonic acid
8001352 Toxaphene
10022706 Sodium hypochlorite
10025873 Phosphorus oxychloride
10025919 Antimony trichloride
10026116 Zirconium tetrachloride
10028225 Ferric sulfate
10028247 Sodium phosphate, dibasic
10039324 Sodium phosphate, dibasic
10043013 Aluminum sulfate
10045893 Ferrous ammonium sulfate
10045940 Mercuric nitrate
10049055 Chromous chloride
10099748 Lead nitrate
10101538 Chromic sulfate
10101630 Lead iodide
10101890 Sodium phosphate, tribasic
10102064 Uranyl nitrate
10102188 Sodium selenite
10102440 Nitrogen dioxide
10102484 Lead arsenate
10108642 Cadmium chloride
10124502 Potassium arsenite
10124568 Sodium phosphate, tribasic
10140655 Sodium phosphate, dibasic
10192300 Ammonium bisulfite
10196040 Ammonium sulfite
10361894 Sodium phosphate, tribasic
10380297 Cupric sulfate, ammoniated
10415755 Mercurous nitrate
10421484 Ferric nitrate
10588019 Sodium bichromate
11115745 Chromic acid
12002038 Cupric acetoarsenite
12054487 Nickel hydroxide
12125018 Ammonium fluoride
12125029 Ammonium chloride
12135761 Ammonium sulfide
12771083 Sulfur chloride
13597994 Beryllium nitrate
13746899 Zirconium nitrate
13765190 Calcium chromate
13814965 Lead fluoborate
13826830 Ammonium fluoborate

13952846 sec-Butylamine
14017415 Cobaltous sulfamate
14216752 Nickel nitrate
14258492 Ammonium oxalate
14307358 Lithium chromate
14307438 Ammonium tartrate
14639975 Zinc ammonium chloride
14639986 Zinc ammonium chloride
14644612 Zirconium sulfate
15699180 Nickel ammonium sulfate
16721805 Sodium hydrosulfide
16871719 Zinc silicofluoride
16919190 Ammonium silicofluoride
16923958 Zirconium potassium fluoride
25154545 Dinitrobenzene
25154556 Nitrophenol
25155300 Sodium dodecylbenzenesulfonate
25167822 Trichlorophenol
25168154 2,4,5-T ester
25168267 2,4-D ester
26264062 Calcium dodecylbenzenesulfonate
27176870 Dodecylbenzenesulfonic acid
27323417 Triethanolamine dodecylbenzenesulfonate
27774136 Vanadyl sulfate
28300745 Antimony potassium tartrate
30525894 Paraformaldehyde
36478769 Uranyl nitrate
37211055 Nickel chloride
42504461 Dodecylbenzenesulfonate isopropanolamine
52628258 Zinc ammonium chloride
52740166 Calcium arsenite
53467111 2,4-D ester
55488874 Ferric ammonium oxalate
61792072 2,4,5-T ester

[FR Doc. 78-6339 Filed 3-10-78; 8:45 am]

[6560-01]

Resource Conservation and Recovery Act

Subtitle C - Hazardous Waste Management

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

DRAFT

BACKGROUND DOCUMENT

Section 250.42-3 Air Human Health and Environmental Standard

250.43(e) Open Burning

250.45(c) Non-point Sources of Air Contaminant Emissions

DECEMBER 15, 1978

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulation. As new information is obtained, changes may be made in the regulations as well as in this background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

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Regulations to Control

Air Emissions

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1.0 Introduction

1.1 Authority

The Congress of the United States via Section 3004 of Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 (PL 94-580) mandates that the Administrator of the U.S. Environmental Protection Agency promulgate regulations establishing such performance standards applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities as may be necessary to protect human health and the environment. These standards are to include, but need not be limited to, requirements respecting: (1) operating methods, techniques, and practices; (2) location, design, and construction; and (3) contingency plans for effective action to minimize unanticipated damage that might occur at these facilities.

All provisions of this Act (including Section 3004) must be integrated with the Clean Air Act, as amended (42 U.S.C. §§ 7401 et seq.), the Clean Water Act, as amended (33 U.S.C. §§ 1251 et seq.), the Federal Insecticide Fungicide, and Rodenticide Act (7 U.S.C. §§ 136 et seq.), the Safe Drinking Water Act, as amended (42 U.S.C. §§ 300f et seq.), the Marine Protection, Research and Sanctuaries Act (33 U.S.C. §§ 1420 et seq.) and such other Acts of Congress as grant authority to the EPA Administator. A stated purpose of the above requirement was to avoid duplication to the maximum

extent possible. Such integration, however, is to be effected only in a manner consistent with the goals and policies expressed in RCRA and the above-listed acts.

1.2 Definitions

The following definitions should aid the reader in understanding the area of concern covered by this document and the regulations for which this document is intended as background information.

1. "Disposal of Solid or Hazardous Waste" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.
2. "Disposal Facility" means any facility which disposes of hazardous waste.
3. "Facility" means any land and appurtenances, thereon and thereto used for the treatment, storage, and/or disposal of hazardous waste.
4. "Fugitive Emissions" means air contaminant emissions which are not planned and emanate from sources other than stacks, ducts, or vents or from non-point emission sources.

5. "Hazardous Waste" has the meaning given in Section 1004(5) of the Act as further defined and identified in Subpart A.

6. "Incinerator" means an engineered device using controlled flame combustion to thermally degrade hazardous waste. Examples of devices used for incineration include rotary kilns, fluidized beds, liquid injection incinerators, pathological incinerators, cement kilns, and utility boilers.

7. "Incompatible Waste" means a waste unsuitable for commingling with another waste or material, because the commingling might result in:

   (i) Generation of extreme heat or pressure,

   (ii) Fire,

   (iii) Explosion or violent reaction,

   (iv) Formation of substances which are shock-sensitive, friction-sensitive, or otherwise have the potential of reacting violently,

   (v) Formation of toxic (as defined in Subpart A) dusts, mists, fumes, gases, or other chemicals, and

   (vi) volatilization of ignitable or toxic chemicals due to heat generation, in such a manner that the likelihood of contamination of groundwater, or escape of the substances into the environment, is increased, or

(vii) any other reactions which might result in not meeting the air human health and environmental standard (See Annex 4 for more details).

8. "Monitoring" means all procedures used to systematically inspect and collect data on operational parameters of the facility, or on the quality of the air, groundwater, or surface water, or soils.

9. "Non-Point Source" means a source from which pollutants emanate in an unconfined and unchannelled manner, including, but not limited to the following:

(i) For non-point sources of water effluent, this includes those sources which are not controllable through permits issued pursuant to Sections 301 and 402 of the Clean Water Act. Non-point source water pollutants are not traceable to a discrete identifiable origin, but result from natural processes, such as run-off precipitation, drainage, or seepage.

(ii) For non-point sources of air contaminant emissions, this normally includes any landfills, landfarms, surface impoundments, and basins.

10. "Open Burning" means the combustion of any material without the following characteristics:

(i) Control of combustion air to maintain adequate temperature for efficient combustion,

(ii) Containment of the combustion-reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and

(iii) Emission of the gaseous combustion products through a stack, duct, or vent adequate for both visual monitoring and point source sampling.

11. "Owner/Operator" means the person who owns the land on which a facility is located and the person who is responsible for the overall operation of the facility.

12. "Point Source" means any discernible, confined, and discrete conveyance, including, but not limited to, the following:

(i) For point sources of water effluent, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated feeing operation, vessel or other floating craft from which pollutants are or may be discharged; and

(ii) For point sources of air contaminant emissions, any stack, duct, or vent from which pollutants are or may be discharged.

13. "Retention Time" means the time hazardous waste is subjected to the combustion zone temperature.

14. "Storage of Hazardous Waste" means the containment of hazardous waste either on a temporary basis or for a period of years in such a manner as to not constitute disposal of such hazardous waste.

15. "Storage Facility" means any facility which stores hazardous waste, except generators who store their own waste on-site for less than 90 days for subsequent transport off-site, in accordance with regulations in Subpart B.

16. "Storage Tank" means any manufactured non-portable covered device used for containing pumpable hazardous wastes.

2.0 Rationale for Regulatory Action

The rationale for regulatory action comes first and foremost from the authority of Section 3004 of RCRA. This Section requires the Administrator to promulgate regulations establishing such performance standards applicable to owners and operators of facilities for the treatment, storage and disposal of hazardous wastes as may be necessary to protect human health and the environment.

The direction to address the air environment is specified in part in the RCRA definition of disposal. Disposal is defined as the placing of any solid or hazardous waste into or on any land or water so that such waste or any constituent thereof may enter the environment or be "emitted into the air." Treatment, storage and disposal facilities

can emit constituents of the waste into the air, and thus air standards must be promulgated to ensure that air pollutants do not adversely affect human health and the environment.

2.1 Actual Damage

TRW Inc., under contract to EPA to evaluate emission control criteria for air emission standards under Section 3004 of RCRA, summarized information compiled by the Office of Solid Waste staff on specific incidents for which damage to human health and the environment took place at hazardous waste treatment, storage and disposal facilities. These hazardous waste disposal damage reports have been deleted from the text of the background document but are included as an appendix. A summary of these damage incidents is provided in Table 1.

2.2 Potential Damage: Identification of Sources of Hazards to Human Health and the Environment.

As can be readily seen from the summary of damage incidents shown in Table I, damage to the environment and to health can occur from several methods of disposal. One cannot conclude, however, that these methods are inadequate means for treatment or disposal. The damage incidents demonstrate in most cases inadequate management by owners and operators of facilities that treat and store hazardous wastes using one or more of the methods. For example, sludges from oil and solvent recovery operations could contain a large amount of heavy metals including lead, zinc, and cadmium. Uncontrolled incineration of these sludges will result in

Table I

SUMMARY OF DAMAGE INCIDENTS

Incident No.[a]	Management Method	Waste	Pollution
1	Incineration	Solvent Recovery	Pb, Zn containing gases
2	Landfill	Mg chips and Misc.	Explosion & Fire
3	Landfill	Unidentified Indust. (Compaction)	Explosion & Fire
4	Evaporation Ponds	Misc. Industrial	Noxious Fumes
5	Landfill	Industrial and Minicipal	Fire
6	Holding Basin	Alkyl Lead	Alkyl Lead Fumes
7	Evaporation Pond	Mixed Allylic Amine	Fumes (amines, chlorides, hydrocarbons)
8	Landfill	Pesticide (uncovered)	BHC Fumes
9	Landfill	Asbestos	Wind blown asbestos
10	Landfill	Asbestos	Wind blown asbestos
11[b]	Landfill	HCB	HCB
12[c]	Landfill	Agricultural Chem.	H_2S from reaction
13[d]	Landfill	Unidentified Indust. (Compaction)	Explosion & Fire
14[e]	Sand Pit	Misc. Industrial	Noxious fumes, fires

[a] See Appendix for corresponding Incident Report.

[b] EPA/530/SW-151.3, pp. 6-9 (June 1976)

[c] EPA/530/SW-151.3, pp. 10-12 (June 1976)

[d] EPA/530/SW-151, pp. 6-8 (June 1975)

[e] EPA/530/SW-151.2, pp. 3-11 (December 1975)

significant hazardous air emissions. Dumping of flammable, ignitable or very volatile waste streams will often lead to fires and explosions. Table 2 is a summary of potential or possible pathways to the air environment of waste management methods.

In summary, the potential impact of hazardous waste management methods on public health and the air environment depends on a multitude of factors specific to the methods used and the individual facilities. All of these factors will affect, to different degrees, the extent to which a potential impact becomes a real one. The more important factors include:

- The physical and chemical principles of the management method.
- The existence and nature of possible routes to the air environment.
- The design and specific operating procedures of individual management facilities.
- The physical and chemical characteristics of the wastes subjected to the method.
- The quantity of wastes managed by a facility.
- The nature and degree of potential hazards associated with the waste.
- The proximity and relationship of the management facility to population centers
- The number of facilities employing the method and their geographical locations.

TABLE II

WASTE MANAGEMENTS SYSTEMS AND POSSIBLE PATHWAYS TO THE AIR ENVIRONMENT

Management Method	Typical Classes of Wastes Treated	Possible Pathways to Air Environment
Incineration	Organics (no heavy metals)	Stack, Leaks in Feed Equipment
Landfill	Organics & Inorganics (Encapsulation Req. in some cases)	Evaporation, Sublimation, Wind Erosion, Reaction Products, Accidental Exposure, Fire
Aerated Lagoon	Organics (non toxic to microorganisms)	Evaporation, Aerosols, Reaction Products
Anaerobic Lagoon	Organics (non toxic to microorganisms)	Reaction Products, Evaporation
Land Burial	Radioactive	Breaching of container by accident or corrosion
Pyrolysis	Organics (no heavy metals)	Stack, Equipment Leaks, Dust in receiving and conveying area
Storage Tanks	Organics & Inorganics	Evaporation during filling and emptying; leaks and accidents
Land Farming /Land Spreading	Municipal waste water, Sewer sludge, Oil field wastes.(limited heavy metals)	Evaporation, Sublimation, Reaction Products, Wind Erosion
Composting	Organics (Food, Agricultural, wood pulp, municipal)	Evaporation from reactor and windrows, Dust from waste handling and windrows
Activated Sludge	Organics (non toxic to microorganisms)	Evaporation and mist from open aeration tanks, Evaporation from final settling tanks
Oxidation Ponds	Organics (Food, Agricultural, Pulp, Textile, etc.) and Some Inorganics (non toxic to microorganisms)	Evaporation, Reaction Products
Solvent and Oil Reclamation	Used Oil and Solvents	Evaporation from filling, Transfer from storage, Leaks from processing equipment

- The inherent potential for abuse of the method.
- Relative cost differential between proper and improper application of the method.
- the existence and enforcement of adequate regulations pertaining to the method.

The following sections are devoted to a general discussion of the ways in which these factors are related to the impact of waste management systems on public health and the environment.

The basic physical and chemical principles by which a management method isolates or transforms a hazardous waste play a significant part in determining its potential environmental impact. These basic principles govern the kinds and quantities of wastes which may be effectively managed, as well as the availability of possible routes to the air environment.

For example, operators of management facilities which rely on biological destruction or detoxification of wastes (e.g., lagoons, activated sludge, land farming) must limit the kinds and/or quantities of hazardous materials treated at any time to levels which do not destroy the useful microbial population. In a properly run facility this requirement will tend to limit the total quantity of hazardous material present and available as potential pollutants. The vulnerability of the biota on which these methods depend may provide a greater opportunity for pollution

incidents to occur in an improperly run facility than if the wastes had been subjected to other, more appropriate treatment methods or had been stored in a secure manner until an appropriate method was developed. In a similar manner, properly run "physical" treatment and disposal methods (e.g., incineration, pyrolysis, landfill) are restricted in the kinds and quantities of hazardous materials they can handle by virtue of design limitations (e.g., attainable incineration temperatures, throughput requirements for efficient burning, pollution control technology, waste volatility or reactivity). Failure to respect those limitations increases the probability of adverse environmental and health impact.

Whether or not biological and physical limitations inherent to proper use of specific methods are sufficient to protect human health or the environment is an important question to be answered by the regulatory agency charged with the mandate to do so.

The use of a management method which is theoretically capable of isolating a hazardous waste from the environment or rendering it harmless is not sufficient to assure that those goals will, in fact, be reached. For example, the efficiency of most biological treatment methods is strongly affected by local meteorological conditions. Thus the rate of destruction of a waste in a lagoon located in a warm

climate may be sufficient to prevent the build-up of toxic concentrations of volatile waste components or decomposition products whereas the biological degradation rate of the same waste may be so slow in a cooler climate as to provide the opportunity for the accumulation of toxic levels of materials which could escape into the atmosphere. If the equipment at a management facility is not properly maintained or if the operating personnel are poorly trained, a potentially effective technique may become a source of environmental insult. Similar statements can be made with respect to any of the design parameters which affect the availability of routes to the air environment. The existence and enforcement of adequate regulations can also have an effect on the level of performance of hazardous waste management facilities. Permissive regulations, lax enforcement and trivial or non-existent penalties can make it more profitable to pollute than to properly manage hazardous waste streams.

Geographic concentration is another consideration which will affect the potential impact of a hazardous waste management method. The location of several facilities, each of which may be emitting acceptable quantities of gaseous pollutants, within a limited area might lead to an unacceptable aggregate concentration of air pollutants.

Based on the information examined during this program, a clear, qualitative case can be made for the existence of potential impact on the environment and public health from air pollution emanating from unregulated hazardous waste management methods. Unfortunately, with only a few exceptions, quantitative data on air pollution from these sources are not available. Without such data it is difficult to fully document the actual, as opposed to potential, impact of each method.

Therefore, a prudent course in developing design, construction, and operating standards is to prescribe standards to protect health and the environment against the types of damage on which the most data and where significant incidents have been documented. Standards that would control or prevent fires and explosions, of course, would be a primary focal area for regulations. Other considerations include:

- The relative frequency of use of each of the methods for the management of hazardous wastes.
- The known quantities of potentially hazardous materials subjected to the respective methods.
- The potential for abuse of the method as reflected in reported damage incidents.

A compilation of data on the first two considerations was made by the OSW programs which studied the waste

generation rates and disposal practices of 14 key industries thought to generate most of the nation's potentially hazardous wastes (Lazar, et al. 1976). These studies found that the primary disposal method used was lagooning in unlined surface impoundments (48.4%). Land disposal on non-secure surfaces was the second most frequently used method (30.3%). Third in importance was disposal by uncontrolled incineration (9.7%). More than 95% of the hazardous wastes were disposed of by one of these three management methods.

3.0 Identification of Regulatory Framework

3.1 Performance Standards

The following discussion outlines the development of performance standards to protect human health and the environment from air pollution emitted by facilities that treat, store, and dispose of hazardous wastes.

3.1.1. Performance Standards

Performance standards have been used in both air and water regulations. The term is relatively non-specific but, in general, means an emission standard based upon the application of the best system of emission reduction available to accomplish the goal the standard is to achieve. In the case of the Clean air Act, the emission reduction necessary under Section 111 of the Act was "...the amount achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction) the Administrator determines has been adequately demonstrated." This type of performance standard is often

described as the "best practicable technology" since it does not require the use of a technology which may be proven but is extraordinarily costly.

The goal for performance standards under Section 3004 of RCRA is "protection of human health and environment." Standards to protect human health or the environment for the air and water media promulgated under other acts of Congress are, of course, candidates for adoption under 3004 of RCRA if it can be judged that they are intended to provide the requisite degree of protection.

In the Report to Congress, Disposal of Hazardous Waste 1974, the types of hazardous waste standards that might be used in regulations were described (USEPA 1974): This report to the Congress provided background for the passage of the Resource Conservation and Recovery Act of 1976. Part of this discussion is reproduced below:

> "Because of the nature of the discharges associated with improperly managed hazardous waste, two types of standards are likely to be necessary in order to satisfactorily regulate hazardous waste treatment and idsposal: (1) the "performance" standard would set restrictions of quantity and quality of waste discharged from the treatment process and on the performance of the disposal site (e.g., the amount and quality of leachate allowed); (2) the "process" standard would specify

treatment procedures or process conditions to be followed (e.g., incineration of certain wastes) and minimum disposal site design and operating conditions (e.g., hydraulic connections are not allowed)."

3.4.2. Best Available Technology

Performance standards normally do not specify design construction and operating requirements. As described in the Report to Congress, Disposal of Hazardous Wastes, 1974, excerpted above, "process standards' prescribe specific requirements as to "what must be done with that waste."

Certain features of process standards however have become part of the Section 3004 mandate requiring a judgment as to what is "necessary technology." The Congress mandated in Section 3004 that performance standards would include requirements respecting:

"(3) treatment, storage or disposal of all such waste received by the facility pursuant to such operating methods, techniques and practices as may be satisfactory to the Administrator;

"(4) the location, design, and construction of such hazardous waste treatment, disposal or storage facilities."

Thus, the best technology is not required specifically under Section 3004 of the Act. Methods to treat, store and dispose need to be whatever may be "...necessary to protect human health and the environment."

Conversely, the best technology may not be adequate enough to treat, store, and dispose of all hazardous waste since, in fact, a technology may be designed for specific a type of waste or conditions. Applied technology which cannot prevent hazardous air pollutants from causing detrimental effects on human health or other living things may be the best available, but may not be good enough.

The quality and quantity of a facilities emissions may be compared with EPA or OSHA "health" standards but where such emission data and a ready conversion from emissions to concentrations are not available to determine a facility's adequacy of environmental protection in the short and long terms, judgement must be made by carefully examining the processes employed. Design and construction requirements may be employed to achieve the requisite level of protection.

3.1.3. Health-Based Standards

The data necessary to establish health standards to protect human health and the environment from pollutant exposures in air, water, soils, and food are far from complete. There is a much greater amount of data per pollutant supporting the National Ambient Air Quality Standards than for other similar efforts but, many unanswered questions about health standards still exist due to gaps in toxicological and epidemological information.

Documentation of OSHA standards (AC61H, 1976) (particularly documentation for those ACGIH TLV's which have

remained unchanged and untested for decades) is not as good as we would like. Nonetheless, the standards represent the expert judgments of a committee of industrial hyienists charged with determining a safe exposure to a contaminant for a working individual. We believe that these judgments on health-based standards must be accepted and used when they are the only limits available.

3.1.4. Summary

The requirement to promulgate such performance standards (including design, construction, and operating methods, techniques and practices) for facilities that store, treat, and dispose of hazardous wastes as are necessary to protect human health and the environment involves two distinct and separate tasks:

- Identifying standards and guidelines limiting pollutants from the air media based on some level of health or environmental protection, applying a safety factor judged necessary to protect human health and the environment and requiring for purposes of RCRA that the facilities not emit air contaminants which will exceed these levels beyond the property of the facilities.
- Describing the design, construction, and operating methods, techniques and practices that represent good practicable technology for the treatment, storage and disposal of hazardous wastes and prescribing their use.

3.2 The Clean Air Amendments

The following discussion reviews provisions of the Clean Air Act, as amended, and its relationship to the regulation of hazardous waste treatment, storage, and disposal facilities under Section 3004 of RCRA. Provisions of the Clean Air Act, as amended, applicable to this discussion are sections related to the Air Quality Criteria and Control Techniques (Section 108), National Primary and Secondary Ambient Air Quality Standards (NAAQS) (Section 109), State Implementation Plans (Section 110), Standards of Performance for New Stationary Sources (NSPS) (Section 111), and National Emission Standards for Hazardous Air Pollutants (NESHAPS) (Section 112).

3.3.1 In Section 108, Air Quality Criteria and Control Techniques, Congress mandated that the Administrator:

> ...within 30 days after the date of enactment of the Clean Air Amendments of 1970 publish, and ...from time to time thereafter revise, a list which includes each air pollutant -
>
> (A) which in his judgment has an adverse effect on public health and welfare;
>
> (B) the presence of which in the ambient air results from numerous or diverse mobile or stationary sources; and
>
> (C) for which air quality criteria had not been issued before the date of enactment

of the Clean Air Amendments of 1970, but for which he plans to issue air quality criteria under this section.

Simultaneously, the Administrator was required to issue information on air pollution control techniques, available technology, alternative methods of prevention and control of air pollution, and costs of emission control.

3.2.2. In Section 109, National Ambient Air Quality Standards, the Congress mandated that the Administrator:

> (A) within 30 days after the date of enactment of the Clean Air Amendments of 1970,... publish proposed regulations prescribing a national secondary ambient air quality standard for each air pollutant for which air quality criteria have been issued prior to such date of enactment; and
>
> (B) after a reasonable time for interested persons to submit written comments thereon (but no later than 90 days after the initial publication of such proposed standards) shall by regulation promulgate such proposed national primary and secondary ambient air quality standards with such modifications as he deems appropriate.
>
> (2) With respect to any air pollutant for which air quality criteria are issued after the date of enactment of the Clean Air Amendments of

1970, the Administrator shall publish, simultaneously with the issuance of such criteria and information, proposed national primary and secondary ambient air quality standards for any such pollutant. The procedure provided for in paragraph (1)(B) of this sub-section shall apply to the promulgation of such standards.

(b)(1) National primary ambient air quality standards, prescribed under sub-section (a) shall be ambient air quality standards, the attainment and maintenance of which, in the judgement of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health. Such primary standards may be revised in the same manner as promulgated.

Criteria documents were completed for particulate, sulfur dioxide, carbon monoxide, photochemical oxidants, hydrocarbons, nitrogen dioxide and more recently for lead. Standards were proposed and promulgated for these pollutants (except lead) in 1971 and for lead in 1978.

Therefore, National Ambient Air Quality Standards are promulgated for those pollutants for which criteria documents have been published which are those pollutants that not only have proven to adversely affect public health and welfare but also "...result from numerous or diverse mobile or stationary sources." Additionally, the publishing of

criteria documents sets in motion the development and issuance of control method and costs documentation.

Owners and operators of facilities which treat, store, and dispose of hazardous wastes must, of course, indirectly comply with these standards if they emit any of the pollutants for which there is a National Primary or Secondary Standard. An "ambient air quality standard," usually however, requires translation to an "emission" standard for purposes of enforcement since by definition the sources of any one pollutant for which there is an ambient standard are "numerous and diverse" (Section 108(a)(1)(8) above). No one source therefore, is held "responsible" for meeting on NAAQS, (without an emission standard) unless ~~although~~ emissions from such a source ~~must not~~ contribute, by themselves, to exceedences of the NAAQS.

This is not to say that ambient air quality standards are not enforeable. Direct enforcement of the sources of a pollutant proceed through enforcement of emission standards. Enforcement of ambient air quality standards normally proceeds through EPA review and approval of state implementation plans. Plans must provide for the attainment of the standard as well as the maintenance of air quality concentrations of pollutants below the National Ambient Air standards. In short, emission standards are established either by the states under the authority of Section 110 and 111(d) of the CAA or by EPA under 111.

3.2.3 Section 110 - State Implementation Plans

The translation of National Ambient Air Quality Standards (NAAQS) into emission standards that will ensure ambient air concentrations of the "criteria" pollutants takes place in part through Section 110. Here Congress mandated that the States adopt and submit plans which provide for the implementation, maintenance, and enforcement of the NAAQS. The Administrator approves of the plan if, in part,

> (B) It includes emission limitations, schedules, and timetables for compliance with such limitations, and such other measures as may be necessary to insure attainment and maintenance of such primary or secondary standard, including, but not limited to, land-use and transportation controls;
>
> (C) it includes provision for establishment and operation of appropriate devices, methods, systems, and procedures necessary to (i) monitor, compile, and analyze data on ambient air quality and, (ii) upon request, make such data available to the Administrator;
>
> (D) it includes a procedure, meeting the requirements of paragraph (4), for review (prior to construction or modification) of the location of new sources to which a standard of performance will apply;

Emission limitations which might apply under Sections 109 and 110 of the Clean Air Act to facilities which treat, store, and dispose of hazardous wastes would be found within the respective State implementation plans (published in 40 CFR Part 52, Approval and Promulgation of Implementation Plans). Few States, however, have promulgated regulations for emissions limitations which specifically apply to hazardous waste treatment, storage, and disposal facilities. Those standards, which have been promulgated under Section 110 of the Clean Air Act, are for any one of five NAAQS's. "Total Hydrocarbon" standards are promulgated in some States to limit the formation of ozone concentrations which would exceed the ozone standard. For instance, California air pollution regulations for the emission of organic compounds require that "...a person shall not discharge into the atmosphere an effluent containing a concentration of more than 50ppm of organic compounds calculated as hexane (or 300 ppm total carbon). Such emission standards under Section 110 differ from State to State as to which sources are included and which are not. Incineration emission standards, where they exist, are most often regulated by the States to control suspended particulate concentrations (by weight), or to control visible emissions (by opacity).

3.2.4 The New Source Performance Standards promulgated under Section 111 of the Act are primarily emission standards for new sources of any pollutants. This point is explained in more depth later on. For municipal incinerators,

a limit of .08 grains of particulate per dry standard cubic foot was established while sewage sludge incinerators particulate emissions were limited to 1.30 pounds of particulate per ton of dry sludge input (under 42 CFR 60). Neither of these standards applies to hazardous waste incinerators unless municipal solid waste or sewage sludge is burned.

The Administrator is charged in Section 111 to list categories of sources which he determines to contribute significantly to air pollution which causes or contributes to the "endangerment of public health or welfare."

Under Section 111(d), emission standards for categories of existing stationary sources may be established for existing sources and new sources as well for those pollutants other than those for which there is a National Primary or Secondary ambient Air Quality Standard or which have been listed as "hazardous pollutants" under Section 112 of the Act. The authority under Section 111(d) is rarely used as there have been few standards under Section 111 for new criteria pollutants. Regulated "designated" pollutants, as they are called under Section 111(d), and their sources include fluorides from phosphate and aluminum plants, sulfuric acid mist from acid plants, and total reduced sulfur compounds from paper mills. Standards under 111(d) must first be established by the States before EPA approval.

Performance standards promulgated under Section 111 are based upon the best practicable technology approach.

"Performance standards" are defined under Section 111(d) as:

> "...a standard for emissions of air pollutants which reflects the degree of emission limitations achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction), the Administrator determines has been adequately demonstrated."

3.2.5. Section 112, National Emission Standards for Hazardous Air Pollutants mandates the Administrator to list hazardous air pollutants and establish emission standards which "...provides an ample margin of safety to protect the public health from such hazardous air pollutants."

Unlike the "best practicable technology" method mandated under Section 111 for "New Source Performance Standards" this Section of the Clean Air Act of 1970 does not mandate prescribing the best system of emission reduction. For beryllium and mercury, a maximum allowable conentration was used to provide an ample margin of safety to protect the public health. This required that either a threshold concentration first be determined for the lowest concentration for which an adverse effect to the public health might occur in addition to incorporating an "adequate margin of safety" or, values be assigned as a maximum allowable concentration which incorporate an adequate margin of safety.

Five air pollutants have been "listed" as Hazardous Air Pollutants: asbestos, beryllium, mercury, vinyl chloride, and more recently, benzene.

Additionally, the Clean Air Act of 1977 requires that EPA determine if cadmium, arsenic, polycyclic organic matter (POM) and certain radioactive pollutants should be added to the "list" published under Section 108(a)(1) or 112(b)(a).

3.2.6. In summary, National Ambient Air Quality Standards for total suspended particulate, carbon monoxide, sulfur dioxide, ozone, total hydrocarbons, nitrogen dioxide and lead or pollutants have been promulgated. New Sources Performance Standards for five of the above six "criteria pollutants" and three "designated pollutants" are applicable to a variety of sources including municipal and sewage sludge incinerators (particulate emissions). National Emission Standards for four hazardous air pollutants have been promulgated. Standards for arsenic, benzene and other volatile organic chemicals are currently under development. Cadmium, arsenic, POM, and some radioactive pollutants must be evaluated for inclusion as a result of the Clean Air Amendments of 1977.

3.3 Air Contaminant Concentration Limits to Protect Workers

The American Conference of Governmental Industrial Hygienists (ACGIH) was organized in 1938 by a group of governmental industrial hygienists who desired a medium for the promotion of standards and techniques in industrial health. The USPHS Bureau of State Services was established in 1944 and contained the industrial hygiene program, which included until 1955, the federal air pollution program. The ACGIH publishes and updates yearly a list of chemicals

with specific concentrations, called "Threshold Limit Values" (TLV). The lists are published as guides in the control of health hazards and were not intended to be legal requirements. The Occupational Safety and Health Administration (OSHA), however, adopted the TLVS (1968) as legal requirements in 1972.

Worker standards and guidelines (TLVS) represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect. The TLVS are time-weighted average concentrations for a normal workday.

Although the standards apply to human health, they can not be considered adequately protective of the population at large. The health status of workers is theoretically better than the general population which contains more susceptible subpopulations including the elderly, young children and the infirm. Additionally the public may be exposed to hazardous air pollutants continuously rather than on an eight hour basis.

The ACGIH in their annual publication listing of the TLVS preface those values by warning,

> "These limits are intended for use in the practice of industrial hygiene and should be interpreted and applied only by a person trained in this discipline. They are not intended for use or for modification for use: (1) as a relative index of hazard or toxicity; (2) in the evaluation for control of community air pollution nuisances; (3) potential of continuous uninterpreted exposures..."

Data demonstrating that 90-day continuous exposures of TLV concentrations can result in effects ranging from mild toxicity to 100% mortality became available during tests to insure safe atmospheres for space-craft occupants (Back and Thomas, 1970; House, 1964; Sandage, 1961 a and b).

Despite known pitfalls, and expressed ACGIH warnings, the TLVS have been "interpreted" by many persons who are not industrial hygienists. Additionally, the TLVS have been compared with one another to determine toxicity. The TLVS have been used as legal limits rather than guidelines (OSHA) and used as a benchmark for comparison in determining maximum allowable air contaminant concentrations in the community (Battelle, 1976 and Cleland, et al, 1977).

The modification of TLVS for use as maximum allowable air contaminant concentrations in the community is covered in the next section.

3.4 Air Contaminant Concentration Limits to Protect Workers Non-Workers, and the Environment.

It should appear from the above discussion in 3.3 that protection of human health and the environment on a continuous basis from air contaminants on the ACGIH TLV list would require an additional measure of safety or numerical division than an adoption of the TLV concentration limits alone. At issue, however, is whether a singular factor applied to all of the OSHA or ACGIH TLV's can or should "guarantee" freedom from harm at an exposure equivalent to the limit

that is set. On the one hand, no limits, per se, could be interpreted by some as allowing unlimited emissions. In counter argument, limits are also "safe exposure levels" since, in effect, an exposure to concentrations of contaminants less than a "limit" is allowed. It is important to recognize however that owners and operators of facilities that emit hazardous air pollutants may be liable for damages to health and environment, if it can be proven in a court of law to a reasonable person, a judge, that air contaminants caused the harm (regardless of whether the level was above or below a given limit).

The use of the ACGIH TLV's times a safety factor for the protection of more than the working force for more than a working day was instituted by the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 62-73 "Natural and Mechanical Ventilation." ASHRAE Standards for Natural and Mechanical Ventilation were developed in accordance with American National Standards Institute (ANSI) approved procedures. ASHRAE in an active accredited ANSI standard writing organization (ASHRAE, 1973).

The purpose and scope of ASHRAE Standard 62-73 is to define "ventilating requirements for spaces intended for human occupancy and specify minimum and recommended ventilation air quantitites for the preservation of the occupant's health, safety, and well being." In Section 3.3 (of ASHRAE 62-73), the Standard states that:

"air shall be considered unacceptable for ventilation use in accordance with this standard if it contains any contaminant in a concentration greater than one-tenth the Threshold Limit Value (TLV) currently accepted by the American Conference of Governmental Industrial Hygienists."

One-tenth is, of course, convenient since it allows a simple manipulation of the decimal point of the TLV. The greater lack of precision (in terms of the number of significant figures) relates to the general inability to quantify in exact terms factors such as protection of susceptible individuals. Adding or multiplying such factors is also not precise since their sensitivities and relative degrees of importance differ.

Examples of such safety factors and their use is shown in Table 3.4.

There is little disagreement among toxicologists and industrial hygienists that an application of a singular safety factor or time weighted adjustment factor to convert occupational standards to community wide standards is most often inappropriate. All might agree that the data that support TLV's should be reviewed by regulatory bodies on a pollutant by pollutant basis including data of more recent vintage that may be compiled from those investigations that have taken place since the TLV decisions were made. Of

Table 3.4

FACTORS TO ADJUST WORKPLACE LIMITS TO COMMUNITY WIDE LIMITS

Factor	Basis	Use	Comments
1/3	8 hrs. for workers 24 hrs. a day	Not used by itself; used in factor 1/300	one exact number (3) among many in exact factors.
5/21	40 hrs. for workers 168 hrs. per week community	Not used alone Used in factor 1/420	(as above) same as 1/4.2
1/4	40/168 as above rounded to even fraction	Interim guideline by Navy	(as above)
1/10	One order magnitude from workers to public health standard	ASHRAE; New York State guideline	This factor and those preceeding assumes OSHA standards adequate to protect workers
1/30	1/3 x 1/10(?)	Colorado Dept. of Health Maximum Allowable Concentration	(as above)
1/100	10 for each 8/24; HABER's LAW	TRW recommended action to HWMD, EPA (1973) (provisional limits)	
1/300	8/24 x 1/100	Monsanto Research Corp. for EPA IERL, RTP	See comments above for 1/3. (1/3 x 1/100)
1/420	40/168 x 1/100	Battelle Columbus Lab. (1976) for EPA, IERL, RTP Research Triangle Inst. (1977) for EPA, IERL, RTP	See comments for 5/21. (5/21)

significance to this question, however, is the amount of time, money, and data that is necessary to set a particular health based standard, particularly, when the data consists solely of rat or mouse acute toxicity studies. Although efforts may be better spent focusing on the control technologies, criteria for the amount of control to be applied is tantamount. The use of an adjusted worker standard may be permissable so long as it is on an interim basis until a pollutant by pollutant risk assessment is made and a concentration limit for each pollutant is developed.

4.0 Analysis of Regulatory Options

The following options represent strategies for regulatory development. Option 7 summarizes the performance standards as presently proposed. A summary of issues related to adoption of each of the options is discussed.

4.1.1 Option 1

Promulgate standards which require compliance with all provisions of the Clean Air Act as amended (only).

The Clean Air Act offers a mechanism for setting health-based exposure limits as National Ambient Air Quality Standards or ambient air goals for which the National Emissions Standards for Hazardous Air Pollutants are based. To set such stanards, however, a pollutant must first be listed which sets in motion a significant EPA commitment to limiting

emissions of this singular pollutant at all significant sources. For each singular pollutant hazardous waste management facilities, as a whole may qualify as low emitters in terms of the amount of each pollutant emitted. In many cases, however, the species or contaminants are many and the total amount can be significant to nearby residents. In summary, the Clean Air Act alone does not provide a mechanism that enables EPA to limit hazardous air emissions from facilities that treat, store, and dispose of hazardous wastes as directly or efficiently as Section 3004 of the Resource Conservation and Recovery Act. Other regulations in addition to applicable provisions of the Clean Air Act must be established that will focus on the air emitting operations within the facilities that treat, store and dispose of hazardous wastes.

4.1.2 Option 2

Promulgate standards which require compliance with the following:

1. All provisions of the Clean Air Act as amended, and,
2. On an interim basis until EPA regulates the pollutant, worker standards times a safety factor to account for the difference between protection of workers on an eight-hour basis and the protection of (all) human health and the environment (e.g., worker standards times 0.1).

This option possesses similar pros and cons as the previous option since it also requires compliance with the Clean Air Act with the addition of the adapted worker standards. However, under this option, those air contaminants which are of concern in the work place will also have limits in the community.

The number of pollutants covered (400-600) by worker standards could be judged necessary to protect human health and the environment since it effectively requires that owners and operators of hazardous waste treatment, storage and disposal facilities know to what extent possible concentrations of hazardous waste air emissions are emitted and may be found at the property line of the facility. On the other hand, it may not be considered protective by some since thousands of species may be emitted. Attempts to prescribe limits for every contaminant emitted might be an endless and costly race for standards that do not relate to actual operations or practices.

This option by itself is "health based" but lacks design, construction, and operating standards mandated by RCRA. Without such standards, owners and operators of hazardous waste treatment, storage and disposal facilities would not be given the benefit of knowing how to meet these emissions standards. More importantly, the Congress requires that operating and design standards be promulgated. Concentration limits at the fence line of a facility require that standards be developed based on atmospheric dispersion modeling.

The precision of such models and the ability to specify air contaminant emission rates for the variety of treatment and disposal methods make this option a poor choice on which to regulate.

4.1.3 Option 3

Promulgate performance standards which require compliance with design, construction, and operating prescriptions which are based upon a best technology approach. (only)

With no standards that are health based, this option alone could not be considered for adoption as performance standards "necessary to protect human health and the environment." Complete data for all techniques, methods and the factors that must be prescribed is not available at this time to comprehensively cover the many sources of waste disposal emissions.

The best technology prescribed may not be adequately protective, and, conversely, "good' technology which is much less costly than the "best" may be all that is "necessary" taking into account factors related to risks and controls.

4.1.4 Option 4

Performance standards will include two provisions as follows:

A. Recommend those design, construction, and operating prescriptions that can be identified

as good practicable technologies. Compliance with these procedures allows the owners and operators of hazardous waste facilities to be permitted.

B. Promulgate standards which require compliance with the following:

1. All provisions of the Clean Air Act as amended, and,
2. On an interim basis until standards prescribed by a pollutant by pollutant risk assessment are promulgated by EPA, compliance with one-tenth the TLV's published by the ACGIH.

This option combines the requirements for protection of human health and the environment inherent in Option 2, and the requirements for design, construction, and operating procedures found in Option 3.

Like the law (Section 3004), there is no precedent for both the use of emission standards/ambient air goals based upon health and the use of good practicable technology together. The latter are based upon design, construction and operating principles demonstrated to perform their intended function (i.e., destruction via incineration) practically and most completely without threatening the communities that they are located in. Monitoring is conducted to ensure that the technology is operating as designed (e.g., CO, CO_2, temperature to ensure that

incinerators operate towards maximum combustion and destruction efficiencies).

Facilities applying for permits to operate a process which is not covered under the recommended procedures must prove or demonstrate that human health and the environment will not be threatened. To do so a comparison of probable emissions based on the wastes accepted will be required to be compared, via an acceptable dilution model with the ambient goals at the property line. Once the technology, however, is determined to be adequate, operating, design and construction procedures may be written as permit conditions. A more direct approach for obtaining a permit for new technologies is to demonstrate technological equivalence with those technologies covered under the recommended procedures.

Like OSHA, monitoring for more than 400 pollutants for which standards apply will not be required at every facility. Enforcement activities should focus on facility compliance with design, operating and construction standards.

An acceptable dilution model requires of the very least emission rates or concentrations for the pollutants regulated. No data is presently available nor a method presently in use to provide EPA or owners and operators with emission values.

Finally, the standards especially the ambient goals, must be carefully reviewed, revised and promulgated as

amendements to Section 3004 of RCRA provisions or Section 112 of the CAA in order to more precisely define what is necessary to protect human health and the environment. In this option, emphasis must be placed on updating maximum concentration values for those judged inadquately protective or those for which limits are not prescribed already.

This option (above) is a poor choice for regulations since resources must be devoted towards "fence line values" and a dispersion model. Such models are not available, nor are means to relate disposal emissions to emission rates (a very necessary parameter in ~~only~~ any models).

4.1.5 Option 5

Promulgate performance standards which require compliance with design, construction, and operating procedures. Ambient air guidelines are provided via Section 1008 of RCRA in order to compare the adequacy of procedures to health-based goals.

This option reflects a strategy towards controlling air contaminant concentration levels and the need for air quality goals. In this option, prescribed operating and design specifications are the basis for performance standards, with ambient air guidelines (promulgated under Section 1008 of RCRA) provide to compare monitored air concentration levels with those listed in the guidelines. Since the ambient air guidelines would not be mandatory standards, they could be reviewed, evaluated, and revised without amending the

Section 3004 regulations. New toxicological and epidemiological information could be used to periodically revise the guidelines for particular air contaminants.

This option avoids prescribed ambient concentration limits which have not been evaluated by EPA for their adequacy or validity on a pollutant-by-polutant basis. Additionally, this option avoids the complexity and costs associated with area source emission rate determinations, atmospheric dispersion modeling, or establishing individual air contaminant background levels. This option could be adopted as a permit condition at the discretion of permitting officials.

As guidelines, however, the ambient air requirements are not enforceable unless adopted as permit conditions. As unenforceable standards, the use of ambient guidelines may not satisfy the mandate to protect human health and the environment by establishing performance standards. Additionally, this option, like Option 5, assumes faith in the prescribed concentration limits, the ability to determine emission rates, and to model the transport of pollutants from their source to a fenceline.

Finally, since this option involves utilizing a section (1008) of the Act for a purpose for which it was not intended, it is a poor choice for regulations.

4.1.6 Option 6

Promulgate performance standards which require compliance with design, construction, and operating

standards based upon health are not prescribed. Thus this option (alone) is a poor choice for air emission standards.

4.1.7 Option 7

Performance standards will be promulgated to include the following provisions:

A. Compliance with applicable regulations promulgated pursuant to the Clean Air Act (Sections 110, 111, and 112).

B. For point sources (e.g., incineration): Compliance with design, construction, and operating procedures identified as control technology. Variances may be granted on the basis that proposed alternative methods for specific waste cases will result in equivalent degree of control (e.g., destruction) that would have been achieved by the control technology

C. For non-point sources (e.g., landfills, landfarms, surface impoundments and basins):

1. Compliance with "overriding" air emission (concentration) limit which apply above the surface of the non-point source. These limits will be the "workplace" limits prescribed by the ACGIH or by OSHA.

2. Compliance with a ban against placing into non-point sources wastes which are ignitable, reactive, incompatible or volatile (greater than 78 mm of mercury of 25°C at sea level)

unless owners and operators can demonstrate through monitoring compliance with the "overriding limits.

This option comprises facets of the previous options to prescribe operating, design, and construction standards while also prescribing "overriding" standards to protect human health and the environment.

Several facets of the previous options and their policy implications have been incorporated, deleted or changed. However, this option does not include fence line standards comprised of the worker standards times a safety factor. While this would limit the number of contaminants for which ambient human health and environmental limits are prescribed, it would also limit the formidable problems associated with the fence line worker adopted limits. In summary these problems included:

- a general lack of air modeling techniques for non-point sources that are sufficiently developed.
- a lack of air emission rate or concentration data from non-point sources to be used in models or as a parameter in which standards may be prescribed (and actions or operations may be conducted or changed by owners and operators of facilities).
- A significant lack of ~~support by the regulators and the regulated~~ agreement within the science community that the limits provide human health and environmental protection since a "limit" is also considered to be a "safe exposure."

Since OSHA regulations apply to the workplace, workers at hazardous waste treatment, storage and disposal facilities are also protected. Thus, air concentrations from the facilities must be less than OSHA limits. An adoption of these regulations by EPA provides a necessary measure of protection to human health and the environment since owners and operators could effectively meet OSHA standards by requiring workers to wear breathing protective devices.

OSHA air contaminant monitoring regulations are not expressly required unless non-point sources receive a reactive waste, an ignitable waste, a waste that is incompatable with those already disposed or is a volatile waste. Monitoring for compliance with the OSHA limits would be required if the owner/operator choses to dispose of any of the above listed waste in a non-point source.

5.0 Air Protection Strategy and Proposed Regulations

The air protection strategy used in these proposed rules requires compliance with control technology standards for all point and non-point emission sources, and specifies overriding standards for human health and environmental proctection.

Control technology standards for point sources, such as incinerators and storage tanks, are included within these proposed rules. Control technology standards for other point sources, such as oil re-refiners, landfill vents, and wet air oxidation facilities may be proposed at a later date

following a determination of what control techniques are necessary. Notes accompanying the control technology standards provide general rules for deviations or variances. Variances to those control technology standards for point sources, that are accompanied by notes, are to be granted if proposed alternative methods for specific wastes will result in an equivalent degree of control or destruction as that which would have been achieved by the prescribed control technology standards. (The same variance procedure applies to the areas of groundwater and surface water protection).

Control technology standards for non-point sources of air contaminants (which include landfills, landfarms, surface impoundments and basins) include restrictions on treatment and disposal for wastes that are ignitable, incompatible, reactive, or volatile wastes which have a vapor pressure greater than 78 mm of mercury at 25°C. Additionally, requirements related to the type and depth of soil cover, the use of cover on a daily basis, and a minimum distance between the active portion of the non-point source and the facility property line are prescribed in order to control hazardous air emission effects.

New Source Performance Standards (NSPS) for Petroleum Storage Vessels for control of hydrocarbon emissions (pursuant to Section 111 of the Clean Air Act) requires the use of floating roofs or vapor recovery systems for petroleum liquids with a true vapor pressure greater than 78 mm of Hg (1.5 psi)

at 25°C. This value has been adopted for all storage tanks for storage of hazardous wastes, and as an upper limit for the disposal of volatile compounds in non-point sources. ~~It is~~

~~possible that 70 mm of Hg is unrealistically too high and therefore only protective Comments are requested on the use of 28 mm of Hg at 25°C as a numerical limitation for volatile wastes in non-point sources.~~

Facility non-point sources shall not contribute any air contaminant to the atmosphere exceeding the concentration limit value for that air contaminant, as promulgated in 49 CFR 1910.1000 pursuant to the Occupational Safety and Health Act of 1970. Air monitoring at non-point sources is not prescribed in these regulations on a routine basis. Facilities wishing to dispose of ignitable, reactive, volatile, or incompatible wastes in non-point sources, however, must monitor at the surface of these sources for particular compounds of concern regulated by OSHA in order to demonstrate compliance with the adopted OSHA limits.

Additionally, these sources will be required to demonstrate at the time a permit is issued that such treatment or disposal will not damage the structural integrity of the landfill, surface impoundment, or basin, or affect the attenuation capacity of a landfarm, through heat generation, fires or explosive reactions. The purpose of this provision is to insure proper disposal and isolation of reactive and ignitable wastes from sources of ignition.

Fires and explosions comprised fourteen damage incidents which were reported to and investigated by EPA's Office of Solid Waste between 1973 and 1976. Additionally, volatile waste disposal and the mixing of waste streams containing compatible chemical groups have contributed to some seventeen specific incidents of some type of air contamination (Lazar, et al, 1976).

The practice of land filling 55 gallon drums of ignitable, reactive and or highly volatile wastes has been responsible for a number of these incidents where bulldozers, necessary for compaction and cover operators, provide the source of ignition while the ignitable and reactive waste contained within the drums provides the flammable mixture. The damage incident is triggered when the drum splits by compaction or by chemical or physical degradation. Several persons have been killed and seriously injured in separate incidents involving this mechanism.

Due to these damage incidents and the known potential for fires, explosions and hazardous air pollution episodes, only facility operations and designs which demonstrate adequate precautions should be permitted. The best regulatory means of control is to ban the practice of land disposal of ignitables, reactives, and highly volatile waste and to ban open burning. Thus the wastes, prior to land disposal would require chemical and/or physical treatment (including incineration). The necessary treatment required would depend on the chemical and physical properties of the waste

and what one intends to do with the waste (i.e., destruction, evaporation, etc.). Certain practices of land disposal of these wastes should be permitted following a demonstration that these practices would be safe and that future damage would be significantly improbable. A note following the regulation to ban land disposal in non-point sources describes the conditions for allowing a demonstration. As a minimum, gas samples must be taken periodically for select air contaminants as part of the variance conditions allowed in the note. ~~The rationale for taking such samples is to provide information on the air emissions from the non-point source in order to judge compliance with standards related to the health of those who may breathe concentrations of the emissions which result from such process.~~ Concentrations for select air contaminants will be ~~composed with~~ compared to OSHA limits prescribed in rules promulgated pursuant to the Occupational Safety and Health Act of 1970.

Incompatible wastes and highly volatile wastes require definition as to what groups are mutually incompatible and at what vapor pressure a waste is to be considered highly volatile. A definition and more complete discussion of incompatible wastes including lists of chemical groups mutually incompatible is provided in the background ~~document~~ document for landfilling, landfarming, surface impoundments and basins.

Volatile wastes are defined as those with a true vapor pressure greater than 78 mm of Hg at 25°C. Petroleum liquids

greater than 78 mm of Hg are so volatile as to have been considered to be a significant contribution to the "endangerment of public health or welfare." Thus, the EPA Administrator promulgated rules to require vapor recovery systems, floating roofs, [redacted] (or equivalent means of control), to be applied to storage tanks where such volatile wastes are stored. These rules for petroleum tanks were promulgated as 40 CFR 60.110 pursuant to Section 111 of the Clean Air Act of 1970.

Emissions from a 40,000 gallon tank were considered as a significant endangerment to public health and public welfare in the storage of petroleum liquids. In the case of the storage of hazardous wastes with a vapor pressure greater than 78 mm of mercury, all tanks greater than 5000 gallons are considered significant. Additionally, the definition of storage in RCRA implies no emissions to the environment.

A ban on the practice of open burning with no means of deviation would not be prudent policy for "combustible" wastes for which a more acceptable means of treatment or disposal is unavailable. In particular, certain ordnance wastes are normally detonated prior to final disposal. Such detonation would be more prudent than direct land disposal or incineration unless a facility is fully equipped to handle such wastes. Thus a note accompanies the ban to allow certain wastes under controlled conditions to be detonated or destructed via combustion other than incineration.

5.1 Preamble language relative to the proposed rules under Section 3004.

The following language accompanied the regulations published in the Federal Register on December 18, 1978, ~~the regulations pursuant to Section 3004 of RCRA~~ This language was drafted to explain to the public what is proposed as rules and, in general, as a means of clarifying "technical and legal" language within the body of the regulation.

STANDARDS FOR TREATMENT/DISPOSAL

> Section 250.45 prohibits treatment or disposal of certain kinds of waste in landfills, surface impoundments, basins, or landfarms unless the owner/operator can demonstrate that such treatment or disposal will not exceed OSHA's permissible contaminant levels for any listed airborne contaminants (29 CFR §1910.1000) above such non-point sources and that it will not contribute two or more airborne contaminants to the air in a manner which will cause a specified equation to exceed unity. EPA believes that this prohibition is justified because reactive, ignitable, and volatile waste pose special treatment and disposal problems. The Agency does not know of any way to ensure protection of human health and the environment without imposing this prohibition and attendant Note requirement. Comments on this approach are requested.
>
> Air sampling at non-point sources (e.g., surface impoudments, landfills) is not required in these regulations. Sampling at a non-point source may be made a permit condition, however, in a situation such as this, where the owner/operator is authorized to deviate from a design and operating standard. Air sampling procedures for non-point sources are under development. A manual will be provided by EPA following promulgation of these rules to describe the procedures by which air sampling at non-point sources could be accomplished.

Incineration

The standards in Section 250.45-1 apply to hazardous waste incinerators which are defined as combustion devices. One example of an incinerator is a rotary kiln. These regulations also apply to cement kilns, utility boilers, and any other devices which burn hazardous waste by combustion.

The Subpart D performance standards for the incineration of hazardous waste prescribe conditions for destruction of the waste introduced and for control of the resulting emissions. Thus, these proposed rules include specifications on residence time, combustion temperature, excess air, combustion efficiency, scrubber efficiency, and automatic feed cutoffs. Trial burns are required for incinerators burning waste of a type which has not previously been burned in similar incinerators. The results of trial burns must be submitted to the Regional Administrator. Additionally, an emission standard for particulates is given.

EPA sponsored a program to assess processes for destroying chemical waste in commercial scale incinerators, as well as programs to destroy chemical waste in experimental incincineration units. EPA has concluded that thermal destruction as a method of treatment of primarily organic chemical waste is both technically feasible and environmentally sound.

The successful utilization of certain cement kilns for destruction of chlorinated organic waste is one of the more important results of EPA's program. Cement kilns use the halogen content of the waste to reduce alkalinity in the cement clinker while using the hydrocarbons as fuel. The BTU value of waste reduces the fuel otherwise required to produce cement. Combustion conditions in the kiln are more rigorous than those in incinerators designed solely for hazardous waste disposal. Thus, the combustion conditions are usually more than adequate for the destruction of halogenated and non-halogenated hydrocarbon fuels, including PCBs.

EPA has received comments that incineration should not be so strictly regulated that already costly

incineration facilities become more so. EPA believes that because incineration has been found to be technically feasible and environmentally sound, and because it reduces or eliminates the volume and/or toxicity of waste to be land disposed, it should be actively encouraged.

Comments are requested on all of the regulations prescribed for incineration, particularly the standards for which explicity limiting values are proposed. These include 99 percent halogen removal in emission control systems, 99.9 percent combustion efficiency, 99.99 percent destruction efficiency, 1000°C combustion zone temperature, two-second retention time, 0.08 grains per dry standard cubic foot stack concentration limit for particulates, and the monitoring requirements.

Appendix A

The following are damage incidents of importance to the development of a strategy to protect human health and the environment from hazardous air emissions.

DAMAGE INCIDENTS
HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 1

July 8, 1977

Waste Incineration Causes Air Pollution in Connecticut

In early 1974 reports of air and groundwater pollution cause by the incineration of wastes were made. The Air Compliance Division of the Connecticut Department of Environmental Protection subsequently closed down two organic solvents recovery operations. Solvents Recovery in Southington, Connecticut was contaminating the air with heavy metals from the incineration of solvent sludges including lead and zinc, which in turn contaminated the soil and groundwater in the area and the company's own well. Incineration was ceased in early 1974. In Beacon Falls, Connecticut, a similar operation was closed for reasons of air pollution.

REFERENCES

The information summarized above was recorded by Alice Giles, February 1975. Her sources of information were:

1. Jeff Heidtmann, Hydrogeologist, Connecticut Department of Environmental Protection.
2. Bill Hegener, Water Compliance Division, Connecticut Department of Environmental Protection

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 2

July 8, 1977

Air Pollution from Frequent Landfill Fires

1. Personal Damage - None documented

2. Environmental Damage - Contamination of the air from burning of magnesium chips in the landfill.

3. Economic Damage - None documented

4. Cause of Problem - Improper disposal of magnesium chips and filings

5. Type and Quantity of Hazardous Waste - An unknown quantity of magnesium chips and filings were discarded via surface disposal for an unknown number of years. Other wastes which also may have been dumped at the site were not identified.

6. Source of Waste - Valley Metal Co., Centerbrook (town or village) in Essex, Connecticut

7. Date of Incident - About 1970

8. Location - Essex, Connecticut

9. Status - Unreported

10. Remedial Action Taken - Unreported

11. Legal Action Taken - Unreported

12. Narrative - Valley Metal, Co., Essex, Connecticut disposed of magnesium chips and filings in a privately owned dump site for an unspecified period of time. The waste was probably co-mingled with other fill material, however, no information is available on the type and quantity of such material. Around 1970 frequent intense fires and explosions were reported. No information is available concerning remedial actions or legal actions. It is not known whether disposal of the magnesium wastes and/or fires and explosions are still occuring at the site.

REFERENCES

The above information was recorded by Alice Giles, OSW, EPA in February 1975. Her source of information was Bill Hegener, Water Compliance Division, Connecticut Department of Environmental Protection.

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 3

July 7, 1977

Springfield Township, Pennsylvania[1]

1. Personal Damage - None documented

2. Environmental Damage - Contamination of air, and surface and groundwater down gradient from the landfill. Contaminants include oily wastes and nickel.

3. Economic Damage - Compacting bulldozer destroyed, unidentified number of fish killed

4. Cause of Problem - Drums containing unidentified industrial wastes exploded during compaction. Resulting fire burned for several days. Fish kill is attributed to runoff from a recently oiled access road. Probable groundwater contamination attributed to chemical wastes in the landfill.

5. Type and Quantity of Hazardous Waste - Occasionally tank-car quantities and many barrels of unidentified chemical wastes were compacted and buried with other fill materials for an unspecified period of time.

6. Sources of Waste - Unidentified

7. Date of Incident - Incident occured in 1971.

8. Location - Mayer Landfill, Springfield Township, Delaware Co., Pennsylvania

9. Status - The site was closed and covered some time between 1971 and August 1975.

10. Remedial Action Taken - Leachate collection and subsequent transport to a public treatment plant for treatment began either after the 1971 fire of after the 1974 fish kill. Leachate collection may still be occurring or may have been discontinued when the landfill was closed.

11. Legal Action Taken - None documented

12. Narrative - For an unspecified period of time the Mayer Landfill located in Delaware County, Pennsylvania, accepted all types of industrial wastes. Quantities of industrial wastes ranged from drums to tank car loads. Indications are that other types of fill materials were also accepted. The industrial wastes were probably co-mingled with these fill materials and compacted during disposal operations. At the time of the incident the surface of the landfill was approximately 100 feet above the original ground level. The area occupied by the landfill was not specified. The landfill site lies in the floodplain of Crum Creek.

In 1971 a drum exploded during compacting operations and caused a fire that burned for several days. The air around the landfill was polluted during the fire.[2] The compacting bulldozer was destroyed. There is no indication that any remedial action was taken by the landfill operators, or by the state, local, federal government as a result of this incident.

In 1973, and possibly earlier, it was noted that leachate from the landfill occasionally flowed into Crum Creek. There was also some evidence of groundwater contamination at the landfill site. A leachate sample collected on December 6, 1973 showed 0.360 ppm Ni. A fish kill which occurred on June 4, 1974 was attributed to oil runoff from oiling the road leading to the site.

At some time, probably in 1974, surface leachate collection was begun. The leachate was treated at an unspecified public treatment plant. The landfill was closed and covered some time before August 1975.

REFERENCES

1. All information contained in this summary was obtained from handwritten notes from what was probably a telephone conversation on August 14, 1975 with Wayne Lyn of the Solid Waste Commission of the Pennsylvania Department of Environmental Resources. The EPA person who jotted down the information was not identified.

2. This statement was not part of the conversation with Lyn. Comes from unidentified EPA source.

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 4

July 14, 1977

Air Pollution at Evaporation Ponds

1. Personal Damage - Noxious odors, eye and throat irritation

2. Environmental Damage - Contamination of air by fumes from ponding of liquid organic waste

3. Economic Damage - Corrosive damage to homes

4. Cause of Problem - Fumes (organic vapors, acidic vapors, etc.) from the surface of industrial liquid waste evaporation ponds

5. Type and Quantity of Hazardous Waste - For years, unspecified (but large quantities) or a variety of industrial waste liquids have been disposed of via evaporation in ponds. Many of the constituents in the wastes are more volatile than water.

6. Source of Waste - Industrial and some municipal sources

7. Date of Incident -Numerous incidents occurring over a period of several years.

8. Location - San Francisco Bay Area

9. Status - Operations continue

10. Remedial Action Taken - None specified

11. Legal Action Taken - Numerous citations, usually by local Air Pollution Control Boards.

12. Narrative - Evaporation ponds have been used in certain areas of the country for many years for disposal of liquid and semi-solid waste of industrial origin. As an example of the kinds of air pollution associated with many of the disposal activities, some experiences with Industrial Tank, Inc., are given below.

    Industrial Tank, Inc. operates several evaporation pond sites in the San Francisco Bay Area. Three sites, the Martinez Site, the Antioch Site, and the Benicia Site, are discussed here.

    The Antioch site operated for many years. It is located in Contra Costa County, California, and was originally located in the center of a Superior Oil tank farm. Its purpose was to receive waste water containing substantial amounts of oil and recover as much of the waste oil as possible. This recovered oil was then sold to

various sources and used in oiling roadways. The site consisted of a series of ponds through which the water-borne waste flowed. At some point in the ponding procedure skimming equipment removed the portion of the water which contained high concentrations of the oil. The final pond acted as an evaporation pond for the sludge material contained in the waste. This site operated in the manner described above for an unspecified number of years during which time Superior Oil abandoned the tank farm and sold part of the land to private individuals who received zoning variances and developed the area into a residential community. Some time after the subdivision was build residents began to complain of odor problems from the disposal activity. Many complaints to the Air Pollution Control Board were made. The citizens filed a one million dollar law suit against Industrial Tank's Antioch site for personal damage including damage to the houses of the home owners. These homes were suffering damage such as paint discoloration and peeling.

Apparently, the Antioch site had never received a permit to operate a Class I landfill but had operated for several years with the tacit approval of the California Water Quality Control Board. They did routinely send the analysis of water from observation wells around the perimeter of the site to the Water Quality Control Board. When the pressure from residents became intense, the Water Quality Control Board gave notice to the Antioch site that it should be closed. The first notice came in July 1973 and was deferred until January 1974. At this time the process of filling in the pond began. The method for filling was to add municipal refuse to the liquid in the ponds until they would be gradually filled with municipal refuse. The process of closing the site began in January of 1974 and continued for an unspecified period of time. It is not known whether the site has been completely closed at this time. During the process of closing the site one fire occurred July 1974. It appears that the fire may have been deliberately set. (This fire is the subject of a separate Air Hazardous Waste Damage Report.)

The Martinez site is an active site. It consists of four evaporation ponds. Two (A and D) are used in a biological treatment method. The other two (B and C) rely on evaporation as the disposal mechanism.

The biodegradation pond receives flock containing a large variety of unidentified material from oil company effluents. It is generally quite odorous. This flock is pumped into pond A and then periodically the more solid material is pumped into pond D where it is disced frequently. This allows for anaerobic degradation procedures. The efficency of the aerobic biodegradation process is questionable.

The remaining two evaporation ponds accept a wide variety of liquid organic waste. These include acids, bases, flourides, solvents, and organic oils. Some of the organic oils are recovered and burned in an incinerator owned and operated by Industrial Tank. The kinds and efficiencies of air pollution control equipment on this incinerator were not identified. The pH of the waste materials is adjusted in holding tanks prior to discharge to the ponds. The pH generally ranges from 6.8 to 7 before discharge in ponds. Once the materials are contained in the ponds the pH appears to gradually become more acidic.

Some biological activity does take place. These ponds are largely an anaerobic process since the lagoons are not aerated. Some of the materials produced as the wastes degrade under anaerobic, reducing conditions include hydrogen sulfide, organic sulfur compounds, nitrogen bases and possibly ammonium chloride. Occasionally blue smoke can be observed over a pond. It has been postulated that this occurs when ammonia evaporates from one pond, HCl evaporates from the adjacent pond, and the two are mixed by prevailing winds to form ammonium chloride. This does not always account for the blue smoke because the smoke has been observed when the winds are blowing the wrong way. In addition to these kinds of materials which are produced while the material is in the pond, many of the materials discharged to the ponds are volatile.

Numerous citations have been issued against the Martinez facility, and there have been complaints from near by residents in Martinez and Concord. In the summer time very bad odors commonly occur in the evening and are detectable many miles away. The composition and quantities of materials evaporating to the air from this site have not been determined. Occasionally certain wastes are slipped into a pond which cause severe odor problems. These are generally the ones which result in citations. There appears to be some degree of monitoring by the San Francisco Bay Area Air Pollution Control Board; however, the extent of this surveillance is unknown. Whatever the extent of the surveillance, contaminants to the air continue to be released. This site does have a permit to operate as a Class I hazardous waste disposal site.

The Benecia site is a Class I hazardous waste disposal site and accepts exclusively hazardous wastes, sludges, and other solids which may at some time be classified as Class I material. It does not accept any municipal refuse. This site,as is the case in the Martinez site, consists of a series of evaporation ponds. The principle difference between the two sites is that the odorous wastes are treated and handled at the Martinez site while the more non-odorous wastes are handled at the Benecia site. The Benecia site also has a sludge treatment area. The site was originally owned by J & J Disposal, Inc. and was subsequently purchased by Industrial Tank, Inc. To operate the site as a Class I disposal site, Industrial Tank, Inc. built a retaining wall along the bottom of the site. They accept plastic and acidic waste materials. For example, they accept wastes from Du Pont Chemical's titanium dioxide operation. The odor problems described for Martinez apply to Benecia as well although the odor problems appear to be slightly less.

REFERENCES

1. Case #21 of the table entitled "Public Health and Environmental Damage Assessment Inventory," completed by Bob Testani, OSW, EPA, undated. The source of the

information was Dave Storm, California Department of Health.

2. Karen Slimak, Environmental Engineering Division, TRW, Inc. July 14-15, 1977. Report of Verbal Communications with Mr. Carl Schwartzer, Division of Vector and Solid Waste Control, California Department of Health.

VERBAL COMMUNICATION REPORT

Call From: Karen Slimak, TRW, Inc., Consulting to EPA (Contract #68-01-4644)

Call To: Mr. Carl Schwartzer
Vector and Solid Waste Control Division
California Department of Health
415-843-7900 X434

Date: July 14-15, 1977

Subject: Air Pollution Incidents at Industrial Tank, Inc. Evaporation Ponds

The following information regarding the air pollution incidents associated with Industrial Tank, Inc. was received from Mr. Carl Schwartzer via telephone conversation on July 14-15, 1977. Three sites operated by Industrial Tank were mentioned. These are the Martinez site, the Benecia site, and the Antioch site. The Martinez site is also known as the Baker site and the Vine Hill site; the Vine Hill name denotes the processing equipment used to blend the various waste materials and the Baker site refers to the evaporation pond area.

Antioch site (Contra Costa County, California);

- The Antioch facility is now either completely abandoned or in the process of being filled in and abandoned.

- The site during active operation was designed as an oil recovery facility. There were several ponds in a series. Waste oil was added to the first pond and allowed to flow through the pond system during which time surface skimming was accomplished with floatation equipment. One of the ponds was designed as a drop out pond for the sludge from the oil. All materials not skimmed from the surface were retained in the evaporation pond system. The recovered oil (with its relatively high water content) was sold for use as road oil.

- The Industrial Tank oil recovery facility operated for many years (exact number of years unspecified). The facility was initially surrounded by a Superior Oil tank farm. Superior Oil subsequently sold the property, it was rezoned for residential use and houses were built.

- Complaints from near-by residents began. They reached a peak in about 1972. At which time, a coalition of residents filed a one-million dollar suit against Industrial Tank. Industrial Tank counter-sued for three million dollars. There appeared to be some cooperation with local air pollution inspectors. The inspectors passed out forms for the residents to fill out rather than interviewing each complaintant and filling out the forms as required. Other efforts to harass the Industrial Tank facility included daily calls to Industrial Tank and to the Air Pollution Control Board concerning odors. This was apparently an activity of a few residents who took it upon themselves to call daily. The suits progressed to the point where depositions started to be taken, but then the lawyer for the citizens group dropped out. Eventually both suits were dropped.

- In 1973 the Water Quality Control Board decided to close the landfill. The site had apparently never received a Class I landfill permit but had been operating as a Class I site with the tacit approval of the Water Quality Control Board. Periodically samples from observation wells in the vicinity were submitted to the Water Quality Control Board. The notice for closure was received in July 1973 and deferred until January 1974 when waste oils were no longer accepted at the facility.

- The process of abandoning the site included gradually filling the pond with municipal refuse.

- When one of the ponds was approximately one-third filled with municipal refuse a fire occurred on the morning (1 a.m. through 5 a.m.) of July 5. The fire was apparently not started by spontaneous combustion of the filled material. Although the exact cause of the fire remains undetermined possibilities include fire crackers, hot charcoal in trash, and malicious mischief. The Fire Department determined that the fire started in the corner where the most recent garbage dumping had occurred. The size of the pond involved was approximately one-half acre with an undetermined depth. The fire flared twice in the 1 a.m. to 5 a.m. time period.

Martinez site:

- This is an active facility. It consists of four evaporation ponds. Two ponds are used for biodegradation of the materials from oil refineries. It is placed in pond A where anaerobic degradation takes place and the sludge from that pond is pumped into pond D where it is disced almost continually to allow for aerobic degradation. Probably the efficiency of biodegradation is low because there is no mechnaism for periodic removal of accumulated salt although there is a conveniently available area for draining the liquid. The two remaining ponds (B and C) receive wastes for evaporation. Anaerobic degradation occurs here.

- This site has received several citations from the local Air Pollution Control Authority. The frequency of citations and of complaints increases in the summer time when there are very bad odors. Some evenings the odors can be detected for many miles. The City of Concord is considering a suit against the facility.

- Occasionally a blue smoke can be observed over the pond. This is possibly ammonium chloride formed by the reaction of ammonia and hydrogen chloride gases from adjacent ponds. This does not always explain the appearance of the blue smoke because it has been observed when the winds were blowing the wrong way to allow for mixing of the two gases.

- There is some H_2S odor occasionally. Other odors are from chlorinated hydrocarbons.

- The pH of the material discharged into the pond is between 6.8 and 7 (this is to allow for protection of the pipes which convey the wastes to the pond); the pH probably increases in acidity with time. The ponds are largely anaerobic. (Reducing atmosphere produces H_2S and sulfate and also produces sulfide, organic sulfur compounds and nitrogen bases.) At the surface of the pond contact with air would allow the conversion of alkaline material containing CO_2 to sodium bi-carbonate.

- Materials accepted include acids, bases, flourides, solvents, organic oil. Some organic oils are recovered and burned in an incinerator.

- Recently they have installed a chlorinator for decomposition of cyanide containing waste.

- Quite a large percentage of the waste materials are significantly more volatile than water.

Benecia site (Salona County, California):

- The site accepts exclusively hazardous wastes, sludges, and other solids. No Class II materials such as municipal refuse are disposed of at the site.

- The site is a very poor location. It was originally operated by J & J Disposal, but was shut down by the Water Quality Control Board. It was purchased by Industrial Tank who subsequently built a retaining wall along the lower edge of the facility at a cost of $750,000. The area is monitored periodically for signs of leachate from the landfill.

- Materials accepted include plastics, acids, and all of Du Pont's hydrochloric acid waste from its titanium dioxide operations.

- Currently their are few water related problems with the site; however, these have been dry years and possible problems may occur during wet years. The subsoil doesn't seem to fit some geological requirements.

- Some of the same types of wastes are accepted at both the Benecia and the Martinez facilities. The more odorous are treated in specially ventilated holding tanks, neutralized and routed to evaporation ponds. The more non-odorous material is disposed at the Benecia site.

- There is a sludge treatment process at the site.

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 5

July 14, 1977

Fire at Hazardous Waste Landfill

1. Personal Damage - None

2. Environmental Damage - Contamination of air from fire at landfill

3. Economic Damage - None reported

4. Cause of Problem - The cause of the fire is undetermined. Possibilities include fire crackers, hot charcoal in refuse, malicious mischief.

5. Type and Quantity of Hazardous Waste - Primarily residue from waste oils. Quantities are unknown. Other combustible material was contained in municipal refuse.

6. Source of Waste - Unidentified; the waste came from several industrial and municipal sources.

7. Date of Incident - July 5, 1974; 1a.m. - 5a.m.

8. Location - Antioch site of Industrial Tank, Inc.

9. Status - Site is closed.

10. Remedial Action Taken - None directly related to the fire. The site was in the process of being closed at the time of the incident.

11. Legal Action Taken - None identified

12. Narrative - The Antioch disposal site of Industrial Tank, Inc. was primarily a waste oil recovery operation. It was a series of ponds through which oily water was passed. Large sized skimming equipment was used to remove the oily water (for use as road oil) from the surface of the pond. Up until 1973 this site apparently operated as a Class I landfill with the tacit approval of the California Water Quality Control Board. Although there is indication that there was not formal approval of the operation of this site as a Class I landfill observation wells were routinely monitored by Industrial Tank and the results sent to the Water Quality Control Board on a routine basis. This continued until 1973 when public pressure against the landfill became quite vocal. At this time the state Water Quality Control Board gave notice to Industrial Tank, Inc. that the site would have to be closed. The initial notice of July 1973 was deferred until January 1974 when the site stopped accepting hazardous wastes.

The procedure for closing the site involved gradual additions of municipal refuse to the site to absorb the water without causing

overflowing of the pond. Once the pond area was completely filled with garbage it would be covered and abandoned. By July 1974 one pond whose dimensions were approximately 1/2 acre in area and several feet deep, was filled to approximately 1/3 capacity with municipal refuse. A fire occurred in the early morning of July 5. (This pond was originally designed as a drop out pond for sludge from the waste oil. At the water surface there was some oil which was skimmed with floatation equipment.) Fire burned from approximately 1 a.m. until 5 a.m. and flared at least twice during that time. Possibilities for the cause of the fire include fire crackers from the 4th of July celebration, hot charcoal present in some of the trash material, and malicious mischief from some of the near by residents. The actual cause of the blaze was not determined although the fire department did think that the fire started in the corner of the pond where they had been dumping the garbage. The procedure of filling the series of ponds continued without modification after the fire was put out. The exact time of final covering and abandonment of the site is not known.

REFERENCES

1. Case #21 of the Table entitled "Public Health and Environmental Damage Assessment Inventory," completed by Bob Testani, OSW, EPA, undated. His information source was Dave Storm, California Department of Health. There is no record of the communications with Storm.

2. Report of Communication of Karen Slimak, Environmental Engineering Division, TRW, Inc. with Mr. Carl Schwartzer, Division of Vector and Wastes, California Department of Health on July 14, 1977.

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 6

July 12, 1977

Air Pollution from Disposal and Recovery of Lead Wastes, San Francisco, California

1. Personal Damage - Alkyl lead intoxication occurred at lead recovery facility. Toll collectors on a bridge became ill from vapors escaping from trucks hauling organic lead wastes. Hazard was created to workers at another reprocessing plant and to surrounding firms.

2. Environmental Damage - Contamination of air from escaping alkyl lead vapors.

3. Economic Damage - None reported

4. Cause of Problem - Evaporation of organic lead vapors from disposal sites, recovery facilities, and from transporting vehicles.

5. Type and Quantity of Hazardous Waste - The type is liquid, organic waste. The quantity of waste is unknown other than that approximately 50 tons of organic lead waste has been produced annually in the San Francisco Bay Area.

6. Source of Waste - Several unidentified manufacturers

7. Date of Incident - Problem has existed for several years

8. Location - San Francisco Bay Area

9. Status - Proper disposal and/or recovery of organic lead wastes is still a problem. Wastes are stored in a holding basin by one manufacuturer awaiting further instructions.

10. Remedial Action Taken - This series of incidents has been handled in a variety of ways; these include (a) temporary storage of the wastes awaiting further instructions, (b) a reprocessor returned the wastes to the original disposal site.

11. Legal Action Taken - At least one recovery plant was closed down.

12. Narrative - The disposal of organic lead wastes from the manufacture of alkyl lead has been a continuing problem for several years. Several of the associated incidents in the San Francisco Bay Area are related below:

    The annual production of organic lead waste from the manufacturing process for alkyl lead in the Bay Area has amounted to about 50 tons

per year. Although the organic lead waste is now being stored in a holding basin at the manufacturing plant while capability for recovering the lead is developed, the waste was previously disposed of in ponds at one industrial waste disposal site. Those attempts of lead recovery resulted in alkyl lead intoxication of recovery plant employees. A later attempt to reprocess the lead wastes at another location created a hazard to employees at the plant, as well as a hazard to surrounding firms, as a result of air-borne alkyl lead vapor. Also, toll collectors on a bridge along the truck route to the new reprocessing facility became ill from the escaping vapor. After this second recovery plant was closed, some hazardous material remained on the property and created a health hazard. Finally, after much delay without achieving proper control, this material was returned to the original disposal site. Recently, with the detection of significant levels of alkyl lead in the air in the vicinity of another disposal facility, a new hazard has been identified. The source of this air-borne lead has not yet been confirmed because it cannot be accounted for at the disposal site.

In summary, material generated by one firm has been deposited in a disposal site which is operated by a second party and owned by a third. Responsibility for protection of the public under these conditions has been weak.

REFERENCES

1. Case #7 of the table entitled "Public Health and Environmental Damage Assessment Inventory". Information recorded by Bob Testani, OSW, EPA on December 16, 1975. His information came from Don Andreas, California Department of Public Health via Tim Fields, OSW, EPA.

2. 1973 Report to Congress, Disposal of Hazardous Wastes (SW-115) Appendix A, p.41.

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 7

July 12, 1977

Air Pollution Incident at Pond Disposal Site

1. Personal Damage - Nausea was reported

2. Environmental Damage - Contamination of air resulted from the evaporation of volatile liquid wastes from pond surface

3. Economic Damage - At least one of the buildings downwind of the pond lost an undetermined number of working manhours from its employees due to the evacuation of the building.

4. Cause of Problem - Volatile odorous wastes evaporated from the surface of a disposal pond

   Type and Quantity of Hazardous Waste - The material consisted of between 4,000 and 16,000 gallons of volatile odorous liquid wastes from the manufacture of allyl amines. Constituents included organohalogens such as crotyl chloride (C=C-C-Cl), amines, and C_5 - C_6 hydrocarbons.

. Source of Waste - Shell Oil in San Francisco Bay area

7. Date of Incident - September 1975

8. Location - Richmond Disposal Site of Richmond Sanitary Service, Contra Costa County, California, Parent company - West Contra Costa Disposal, Inc.

9. Status - Pond was closed shortly after the incident due to water pollution problems. Pond may have reopened for certain restricted uses in May or June of 1977.

10. Remedial Action Taken - None

11. Legal Action Taken - Richmond Sanitary Services and Industrial Tank, Inc. (hauler) were cited for air pollution violations by the San Francisco Bay area Air Pollution Control. Other legal actions were considered and may have been carried out, these included criminal charges against the hauler.

12. Narrative - There were four firms involved in this incident. Shell Oil Company in the San Francisco Bay Area was the company who produced the waste. Industrial Tank, Inc. was contracted by Shell Oil to dispose of the waste, they were also the hauler of the waste. BKK Disposal was the southern California company which rejected the waste at its disposal site. Richmond Sanitary Services was the company which ultimately disposed of the waste material in its evaporation pond.

In September 1975, Shell Oil Company generated several thousand gallons of volatile liquid waste at its allyl amine plant in San Francisco Bay Area. The exact quantity of the waste is not known; however, the amount is between 4,000 and 16,000 gallons (1-4 truck loads). These wastes were all volatile material. The primary constituents were organohalogens such as crotyl chloride, amines, and short-chain hydrocarbons. This composition was reported by the manufacturer and was confirmed by analyses performed by the California Department of Health.

Arrangements were made with Industrial Tank, Inc. for the hauling and disposal of this waste material. The wastes were loaded into vacuum trucks and presumably hauled to an Industrial Tank facility. Industrial Tank, Inc. operates evaporation pond disposal sites in the Martinez and Antioch areas. It was determined that the wastes were not suited for pond disposal. The material was then transported in the vaccumn trucks to BKK Disposal in West Covina, California. The BKK Disposal site is a municipal refuse co-mixing operation typical of the southern California area.

BKK disposal rejected the material at the gate on the basis of an initial examination. The waste very odorous. BKK was especially sensitive to odorous waste at this time because it had been closed down by the town of West Covina for from 1-2 days in just the previous week. (At a later time the odors were proved not to be due to the BKK landfill.)

Industrial Tank, Inc. returned the material to the San Francisco area and sent it to the Richmond disposal site of Richmond Sanitary Services. The Richmond disposal site is primarily a sanitary landfill which handles the sanitary trash business of West Contra Costa Disposal. They also have one small evaporation pond. Richmond Sanitary Service accepted the waste and ran it into their evaporation pond.

The material floated to the top of the pond and evaporated. During the evaporation there was a visible plume (white mist typical of amines), very bad odors, and complaints of nausea from persons downwind.

REFERENCES

1. Case #19 (original case #) from the table entitled "Public Health and Environmental Damage Assessment Inventory" completed by Alice Giles and Bob Testani, OSW, EPA, January 28, 1976. The source of the information contained therein was Harvey Collins, Head, Vector Control, California Health Department. There is no record of the contact(s) with Collins in the EPA file.

2. Notes from a conversation between Dave Storm, California Department of Health and an unidentified person, presumably from EPA. The notes are undated.

3. Verbal communication report by Karen Slimak, Environmental Engineering Division, TRW, Inc. concerning telephone conversation on July 11, 1977 with Dr. Robert Stevens of the California Department of Health.

Where conflicting information occurred among these three sources, the verbal communication report was used.

VERBAL COMMUNICATION REPORT

Call From: Karen Slimak, TRW, Inc., Consulting to EPA (Contract #68-01-4645)

Call To: Dr. Robert Stevens
California Department of Health
415-843-7900 X434

Date: July 11, 1977

Subject: Air Pollution Incident at Richmond Disposal Site

The following information regarding the above incident which occurred in September 1975 was received from Dr. Robert Stevens.

- Some number of truck loads of wastes were involved. Exact amount is not known; between 4,000 and 16,000 gallons (1-4 truck loads)

- Wastes were produced by a Shell allyl amine plant

- Constituents (as reported by the manufacturer and as confirmed by analysis of California Department of Health) included very volalite organohalogens (e.g., crotyl chloride C=C-C-Cl) amines, and C_5 - C_6 hydrocarbons

- Industrial Tank Incorporated was contracted by Shell to dispose of the wastes

- ITI has evaporation ponds in Martinez and Antioch, but determined that the wastes were not suitable for ponding

- They shipped the material to BKK Disposal in West Covina, California. This is a municipal refuse co-mixing operation typical of the Southern California area.

- Dr. Stevens was at the BKK site in West Covina collecting samples the day the trucks arrived.

- BKK rejected the material at the gate on the basis of initial examination, the waste was very odiferous. BKK had been closed down by town of West Covina for from 1-2 days the previous week because of the odor problems (later odors proved not to be due to the landfill). Therefore BKK was very sensitive to odor problems at the time.

- Industrial Tank then returned the material to the San Francisco area and took it to Richmond Sanitary Services' Richmond Disposal Site. (Parent company - West Contra Costa Disposal Incorporated)

- Richmond Sanitary Services handles the Sanitary trash business for the parent company. They also have one small evaporation pond.

- Richmond Sanitary Services accepted the wastes and ran it into the evaporation pond.

- The material floated to the top and began evaporating

- There was a visible plume (white mist), no fire, very bad odors, and complaints of nausea from persons downwind. One or more buildings were evacuated including a Social Security building.

- There were unconfirmed reports that the plume didn't rise readily but hovered above ground for several hours, moved in various directions by prevailing wind before dissipation.

- There were reports that the plume was sighted 10-15 miles away in Atlameta.

- An air pollution citation was issued against Richmond Disposal and against Industrial Tank Inc. One Industrial Tank official was almost jailed in the incident.

- No remedial action was taken because this was a one-time incident and the material evaporated.

- Air pollution surveillence increased after the incident and more requirements were placed on testing wastes and on procedures for accepting wastes; volatiles were restricted

- Shortly after this incident the pond was closed because of leaks and because it got too full

- It has possibly reopened in 1977.

- For more information on the complaints of nausea, etc. contact Bob Gaynor
  Bay Area Pollution Control District
  415-771-6000

HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 8

July 22, 1977

Bulldozer Operator Nauseated from Fumes

1. Personal Damage - Bulldozer operator became nauseated

2. Environmental Damage - Contamination of air when wastes were uncovered; leaks from waste material into a local stream

3. Economic Damage - None documented

4. Cause of Problem - Fumes from wastes from lindane and benzene hexachloride manufacture uncovered during site preparation for a baseball field

5. Type and Quantity of Hazardous Waste - About 400 tons of BHC waste

6. Source of Waste - Unidentified pesticide manufacturer

7. Date of Incident - August 4, 1976

8. Location - Hamilton Township, Allegheny County, Pennsylvania

9. Status - Undetermined

10. Remedial Action Taken - Undetermined

11. Legal Action Taken - None

12. Narrative - Apparently, an unidentified pesticide manufacturer produced lindane/BHC on a site in Hamilton Township, PA. The operation ceased in about 1966. Subsequently, the site was deeded to the town.

    Recently, the town decided to construct a baseball field and a bulldozer operator became nauseated when he unearthed what was later shown to be BHC waste. Pennsylvania Department of Conservation (PDC) estimates over 400 tons of BHC waste is present. Further, there is a confirmed leak from the waste into a local stream.

    As of August, 1976 the State was undecided on the best course of action. The town did not have the funds to effect clean-up. The two options considered were containment of the waste on site with treatment of the leaking material or excavation and removal to a hazardous waste site. A PDC group was scheduled to survey the buried waste to determine its extent.

The PDC was provided with some specific information, obtained from TRW, on treatment of BHC waste by conversion to trichlorobenzene with calcium oxide. They may elect to use this method for treatment of the discharge.

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HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 9

July 19, 1977

Asbestos Air Pollution from Landfills

1. Personal Damage - Possible exposure of workers and their families to high levels of asbestos

2. Environmental Damage - None documented

3. Economic Damage - None documented

4. Cause of Problem - Unsatisfactory methods of disposal of hazardous waste containing asbestos from asbestos mine and mill

5. Type and Quantity of Hazardous Waste - Undetermined quantities of chrysotile asbestos in disposal area

6. Source of Waste - Pacific Asbestos Company, Copperopolis, California, Parent Company - H. K. Porter Corporation

7. Date of Incident - February - March, 1973

8. Location - Copperopolis, California

9. Status - Unknown

10. Remedial Action Taken - None determined

11. Legal Action Taken - None determined

12. Narrative - The Pacific Asbestos Company operates a quarry - mill complex adjacent to the community of Copperopolis, California. Processing wastes are apparently disposed on site. The method for disposal is unsatisfactory and has resulted in complaints of exposure to the community of high levels of chrysotile asbestos.

    At the request of the International President of the Cement, Lime, and Gypsum Workers, the Industrial Union Department of the AFL/CIO conducted an investigation of worker and community resident exposure to asbestos. A medical and environmental science team headed by Professor Irving J. Selikoff visited the Copperopolis community and the Pacific Asbestos plant on March 9-10 to assess the adequacy of the method of disposal of material from the Pacific Asbestos plant as well as the levels of exposure of residents in the community and workers in the plant to chrysotile asbestos fibers.

The results of this investigation are unknown. There is no data on any remedial measures or any legal action taken.

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HAZARDOUS WASTE DISPOSAL
DAMAGE REPORT NO. 10

July 20, 1977

Air Pollution from Waste Asbestos Piles

1. Personal Damage - Potential exists for asbestosis and mesothelioma among workers at asbestos mill and nearby residents.

2. Environmental Damage - Contamination of air (ambient levels 3.6 ng/m^3 above background; emission levels 108 to 1739 ng/m^3 above background) due to disposal activities and wind erosion at asbestos waste pile. Leachate from waste pile (Total solids: 980 mg/l; pH 11.1) contaminated nearby stream.

3. Economic Damage - None identified

4. Cause of Problem - Asbestos emissions from waste storage pile as a result of wind erosion and dumping activities. Periodic leachate from landfill.

5. Type and Quantity of Hazardous Waste - Approximately 1.5 million cubic yards of asbestos containing wastes; the waste pile is 50 feet high and covers 20 acres. Other waste constituents include calcium and magnesium carbonate.

6. Source of Waste - Various asbestos manufacturing process and milk-of-magnesia manufacture.

7. Date of Incident - The Nicolet Landfill (and associated asbestos emissions) began operation in about 1870 and continued until about 1975; Certainteed Products Landfill began operations sometime after January 1, 1970 and discontinued operations in March, 1972.

8. Location - Ambler Borough, Montgomery County, Pennsylvania

9. Status - The present status is unreported; both sites were required to complete closure and site abandonment procedures by May 1, 1974. However, appeals delayed this deadline until September 1975. As of January 1976 the site was neither covered nor removed.

10. Remedial Action Taken - As of early 1975, the Nicolet site was not fenced. Equipment to filter out the asbestos and concentrate the waste has been purchased. The resultant asbestos containing wastes will go to the Montgomery County Landfill.

11. Legal Action Taken

    - In 1973 Nicolet was ordered to cease and desist dumping, and to cover and stabilize the dumps.

- On February 19, 1974, Pennsylvania Department of Environmental Resources ordered Nicolet Industries, Inc. and Certain-teed Products Corporation to cease waste disposal operatons immediately and comply with landfill closure requirements by May 1, 1974.

- On February 10, 1975, Pennsylvania Department of Environmental Resources denied the Nicolet Industry permit for disposal and required that Nicolet cease operation of its solid waste disposal facility by August 1, 1975 and proceed with closure activities.

12. Narrative - In 1867 two Ambler, Pennsylvania companies, Keasley and Mattison (K & M) began manufacturing milk of magnesia and asbestos products and dumping wastes a short distance away at the intersection of Butler Avenue and Morris Road near the main section of the borough. The wastes then, as now, were primarily (~80%) magnesium carbonate and calcium carbonate. The site contains about 100,000 tons of magnesium. Asbestos concentration varies throughout the site depending on waste type encountered, e.g., asbestos dust - up to 40%, asbestos pipe - up to 12%, waste water sludge - ~2%.

Dumping has occurred at the site for a total of about 90 years. Much of the waste pile was due to K & M activities. In 1930 when Nicolet Industries, Inc. purchased the insulation and general products divisions of K & M they inherited the waste pile. In 1962 Certain-teed Products Corporation bought out the pipe manufacturing operation of K & M. Nicolet Industries, Inc. and Certain-teed Products Corporation are now joint owners of the pile. Certain-teed Products Corporation has added about 2700 tons of crushed asbestos pipe each year. Nicolet industries disposes of its asbestos waste in piles adjacent to the old pile at Butler Avenue and Morris Road.

The old pile contains approximately 1.5 million cubic yards of waste; its dimensions are approximately 50 feet high by 20-25 acres. A residential development and the Wissahickon Creek are nearby.

The locations of the active sites are shown in Figure 1. Current waste treatment and disposal processes include waste collection, settling ponds, lagoons, and disposal piles.

Waste generated as a dust (40 percent asbestos) from the sanding of monolithic board is collected in baghouses. The dust is transferred from the baghouse to containers where the material is wetted, covered, and transported to a settling pond about one kilometer away. The waste material is dumped into a section of the settling poind, mixed into a slurry, and pumped to the active disposal lagoon approximately 50 meters away. Other asbestos-containing waste generated at the plant empties into a wastewater system and is channeled to the settling pond.

Waste generated from machining the pipe ends is collected in a baghouse and recycled rather than being discarded as waste. Pipe scraps greater

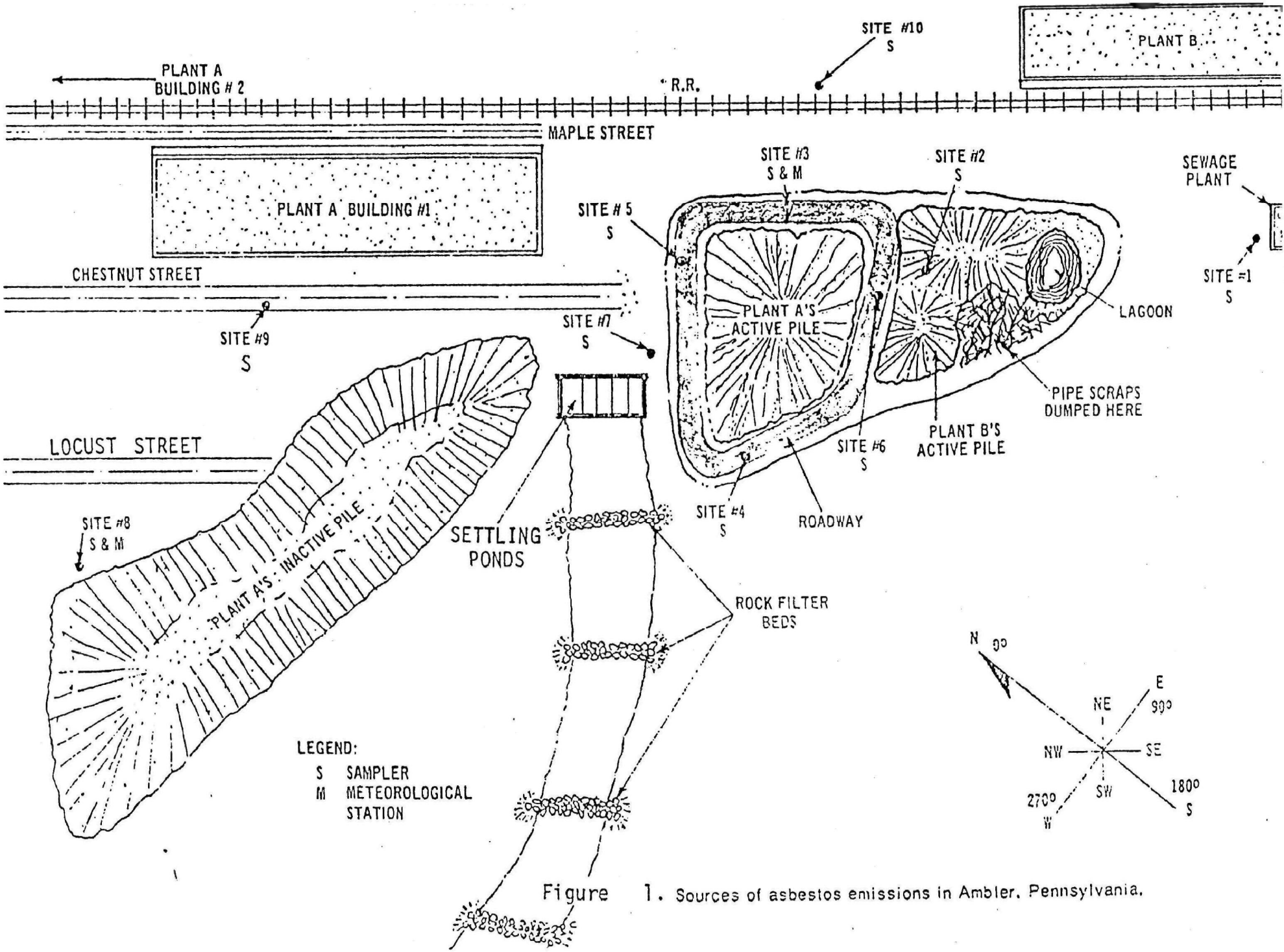

Figure 1. Sources of asbestos emissions in Ambler, Pennsylvania.

than 30 cm (ca. 12 inches) in diameter are not recycled, and this waste is transported to the disposal pile. A large amount of asbestos-containing sludge is created in the wastewater treatment operation. Tank trucks transport the slurried sludge to the disposal lagoon; each truck carries approximately 23,000 liters (ca. 6000 gallons) per load and empties into the lagoon at a rate of about 10 to 12 truck-loads per 6-week period.

After water evaporates from the disposal lagoon, portions of the lagoon have a dry, cracked crust. The top layer is light in color, has a relatively low density, and is fibrous. The fibers appear to be bound securely enough so that they are not released by wind action alone. The sides of the disposal site are about 46 cm higher than the level of the lagoon and form a roadway approximately 4.5 meters wide. Solid material is deposited and spread on this roadway when it becomes necessary to build up the sides of the lagoon.

When enough water has evaporated, the semidry waste is shoveled from the lagoon and piled onto the adjacent disposal area. A bulldozer then crushes the discarded pipe; the semidried sludge is mixed with the crushed pipe, and the mixture is spread uniformly on the disposal pile. The crushing operation is performed for approximately 1-1/2 days of an 8-week period.

There are actually two adjoining disposal sites. Site A is approximately 20 meters high, 90 meters wide, and 150 meters long (ca. 60 feet high, 300 feet wide, and 500 feet long), while Site B is approximately 6 meters high, 90 meters wide, and 210 meters long.

A waste disposal site located southwest of Plant A at the Nicolet facility has been inactive for about 4 years and covers approximately 40,000 m^2 (ca. 10 acres) (Figure 1). The type of waste material deposited at the site differs from the material currently being disposed of at the other two sites. Trees, grass, shrubs, and weeds cover approximately 75 to 90 precent of surface area, but little vegetation grows on the north bank of the pile, which borders one side of a playground and is close (within 15 meters) to occupied dwellings. This bank is approximately 180 meters long, approximately 15 meters high, and has a slope of about 60 degrees.

Over a period of years, starting in 1971, both Nicolet and Certain-teed have been challenged on state laws concerning solid waste management. Investigation has also determined that the landfill is causing a discharge of pollutants into the Wissahickon Creek.

On December 2, 1971, Nicolet Industries applied for permission to continue dumping (Permission required by Solid Waste Management Act of 1968). Pending approval, Nicolet continued to dump. On March 2, 1972 Certain-teed applied under the same Act. However, they discontinued dumping upon application.

Pressure to close the landfill due to high levels of asbestos air emissions began in about 1973. Concern was voiced by Dr. Irving Selikoff, Mt. Sinai Environmental Sciences, Jack Farmer, EPA, and others. An air monitoring program conducted by the U.S. Environmental Protection Agency in October, 1973, indicated ambient background levels of asbestos to be 6 ng/m^3. An asbestos level of 9.6 ng/m^3 was found at a playground near the largest waste pile. Values obtained near active disposal piles range from 114 to 1745 ng/m^3. It has been reported that citizens have been removing material from the piles for driveways.

In 1973 the Pennsylvania Department of Environmental Resources (DER) ordered Nicolet to cease and desist dumping, to cover and stabilize the dumps. The firm reapplied for a solid waste management permit. In February 1974, a disposal permit was denied by the Pennsylvania Department of Environmental Resources; Nicolet Industries and Certain-teed were directed to cease disposal activities immediately and cover and abandon the site by May 1974. In February 1974, a second application was denied and disposal operations were directed to cease in August 1975. As of November 1975 the Pennsylvania DER reported that Certain-teed Products was complying with the court order regarding dumping. Nicolet had complied in part, with one phase of their operations still producing asbestos wastes. Nicolet was exploring alternative remedies; however, the asbestos piles had been neither planted or removed.

Although the initial pressure which resulted in the permit denials was due to asbestos air emissions, justification for permit denial and site closure was given as water pollution due to leachate contamination of an adjacent stream. The DER orders did not mention the air emissions problem!

A similar asbestos waste pile exists at Hyde Park, Vermont. The pile dimensions were approximately 400 feet high, approximately 2600 feet long, approximately 1000 feet wide as of September 1973. At that time the site contained 20 million metric tons of tailings. The site had been in use for 15 years at that time. Percentages of chrysotile asbestos in samples of debris from the tailings pile ranged from 12.7 to 21.1. Ambient concentrations (away from the site) ranged from 3 to 13,600 ng/m^3; average concentration was about 1300 ng/m^3. Windblown emissions from the tailings pile averaged 500 ng/m^3. In this case emissions from mining, milling, and roadways probably contributed significantly to ambient concentrations.

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Appendix B

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Resource Conservation and Recovery Act

Subtitle C - Hazardous Waste Management

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

DRAFT

BACKGROUND DOCUMENT

Section 250.43 General Facility Standards

U.S. Environmental Protection Agency
Office of Solid Waste
December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being made available as a draft for comment. As new information is obtained, changes may be made in the regulations, as well as in the background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

Timothy Fields, Jr.
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Office of Solid Waste
Hazardous Waste Management Division (WH-565)
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1.0 Introduction

1.1 RCRA Mandate and Authority

1.2 Definitions

2.0 Rationale for Regulations

2.1 Actual Damage Incidents

2.2 Potential Damage

3.0 Identification of Regulatory Options

4.0 Analysis of Regulatory Options

5.0 Identification of Chosen Regulation and Associated Rationale

1.0 Introduction

1.1 RCRA Mandate and Authority

The Congress of the United States via Section 3004 of Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 (Pub. L. 94-580) mandates that the Administrator of the U.S. Environmental Protection Agency promulgate regulations establishing performance standards applicable to owners and operators of hazardous waste treatment, storage and disposal facilities as may be necessary to protect human health and the environment. These standards are to include, but need not be limited to requirements respecting: (1) operating methods, techniques, and practices; (2) location, design, and construction; and (3) contingency plans for effective action to minimize unanticipated damage that might occur at these facilities.

All provisions of this Act (including Section 3004) must be integrated with the Clean Air Act (42 USC 1857 and following), the Federal Water Pollution Control Act (33 USC 1151 and following), the Federal Insecticide, Fungicide, and Rodenticide Act (7 USC 135 and following), the Safe Drinking Water Act (42 USC 300f and following), the Marine Protection Research, and Sanctuaries Act (33 USC 1401 and following) and such other Acts of Congress as grant authority to the EPA Administrator. A stated purpose of the above requirement was to avoid duplication

to the maximum extent possible. Such integration, however, is to be effected only in a manner consistant with the goals and policies expressed in RCRA and the above-listed Acts.

1.2 Definitions

The following definitions are from 250.41 of the proposed regulations and from RCRA.

"Active portion" means that portion of a facility where treatment, storage, or disposal operations are being conducted. It includes the treated area of a landfarm and the active face of a landfill, but does not include those portions of a facility which have been closed in accordance with the facility closure plan and all applicable closure standards. (250.41(b)(3))

"Closed portion" means that portion of a facility which has been closed in accordance with the facility closure plan and all applicable closure requirements in this Subpart. (250.41(b)(11))

"Closure" means the act of securing a facility pursuant to the requirements of Section 250.43-7. (250.41(b)(13))

"Contamination" means the degradation of naturally occuring water, air, or soil quality either directly or indirectly as a result of man's activities. (250.41(b)(19))

"Disposal" means the discharge, deposit,

injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters. (RCRA 1004 (3))

"Disposal facility" means any facility which disposes of hazardous waste. (250.41(b)(24))

"Hazardous waste" has the meaning given in Section 1004(5) of the Act as further defined and identified in Subpart A. (250.41(b)(39))

"Hazardous waste management" means the systematic control of the collection, source separation, storage, transportation, processing, treatment, recovery, and disposal of hazardous waste. (RCRA 1004 (7))

"Leachate" means the liquid that has percolated through or drained from hazardous waste or other man emplaced materials and contains soluble, partially soluble, or miscible components removed from such waste. (250.41(b)(47))

"Monitoring" means all procedures used to systematically inspect and collect data on operational parameters of the facility or on the quality of the air, groundwater, surface water, or soils. (250.41(b)(55))

"Navigable waters" means "waters of the United

States, including the territorial seas". This term includes, but is not limited to:

(i) All waters which are presently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide, intermittent streams, and adjacent wetlands. "Wetlands" means those areas that are inudated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds.

(ii) Tributaries of navigable waters of the United States, including adjacent wetlands;

(iii) Interstate waters, including wetlands; and

(iv) All other waters of the United States, such as intrastate lakes, rivers, streams, mudflats, sandflats, and wetlands, the use, degradation or destruction of which would affect or could affect interstate commerce, including, but not

limited to:

(a) Intrastate lakes, rivers, streams, and wetlands which are or could be used by interstate travelers for recreational or other purposes; and

(b) Intrastate lakes, rivers, streams, and wetlands from which fish or shellfish are or could be taken and sold in interstate commerce; and

(c) Intrastate lakes, rivers, streams, and wetlands which are used or could be used for industrial purposes by industries in interstate commerce.

(v) All impoundments of waters of the United States otherwise defined as navigable waters under this paragraph. (250.41(b)(57)

"Non-point source" means a source from which pollutants emanate in an unconfined and unchannelled manner, including, but not limited to the following:

(i) For non-point sources of water effluent, this includes those sources which are not controllable through permits issued pursuant to sections 301, and 402 of the Clean Water Act. Non-point source water pollutants are not traceable to a discrete identifiable origin,

but result from natural processes, such as nonchannelled run-off, precipitation, drainage, or seepage.

(ii) For non-point sources of air contaminant emissions, this normally includes any landfills, landfarms, surface impoundments, and basins. (250.41(b)(58))

"Point source" means any discernible, confined, and discrete conveyance, including, but not limited to, the following:

(i) For point sources of water effluent, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated feeding operation, vessel, or other floating craft from which pollutants are or may be discharged; and

(ii) For point sources of air contaminant emissions, any stack, duct, or vent from which pollutants are or may be discharged. (250.41(b)(64))

"on-site" means on the same or geographically contiguous property. Two or more pieces of property which are geographically contiguous and are divided by public or private right(s)-of-way are considered a single site. (250.41(b)(59))

"Open burning" means the combustion of any material without the following characteristics:

(i) Control of combustion air to maintain adequate temperature for efficient combustion,

(ii) Containment of the combustion-reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and

(iii) Emission of the gaseous combustion products through a stack duct or vent adequate for both visual monitoring and point source sampling. (250.41(b)(60))

"Owner/operator" means the person who owns the land on which a facility is located and/or the person who is responsible for the overall operation of the facility.

"Partial closure procedures" means the measures which must be taken by facility owners/operators who no longer accept hazardous waste for treatment, storage or disposal on a specific portion of the site. (250.41(b)(62))

"Permitted hazardous waste management facility (or permitted facility)" means a hazardous waste treatment, storage, or disposal facility that has received an EPA permit in accordance with the requirements of Subpart E or a permit from a state authorized in accordance with Subpart F. (250.41(b)(63))

"Post-closure care" means the monitoring and facility maintenance activities conducted after closure. (250.41(b)(65))

"Publicly owned treatment works" or "POTW" means a treatment works as defined in Section 212 of the Clean Water Act (CWA), which is owned by a State or municipality (as defined by Section 502(4) of the CWA). This definition includes any sewers that convey wastewater to such a treatment works, but does not include pipes, sewers, or other conveyances not connected to a facility providing treatment. This term also means the municipality as defined in Section 502(4) of the CWA, which has jurisdiction over the indirect discharges to, and the discharges from, such a treatment works. (250.41(b)(66))

"Run-off" means that portion of precipitation that drains over land as surface flow. (250.41(b)(75))

"Spill" means any unplanned discharge or release of hazardous waste onto or into the land, air or water. (250.41(b)(79))

'Storage', when used in connection with hazardous waste, means the containment of hazardous waste, either on a temporary basis or for a period or years, in such a manner as not to constitute disposal of such hazardous waste. (RCRA 1004 (33))

"Storage facility" means any facility which stores

hazardous waste, except for genrators who store their own waste on-site for less than 90 days for subsequent transport off-site, in accordance with regulations in Subpart B. (250.41(b)(83))

"Treated area of a landfarm" means that portion of a landfarm that has had hazardous waste applied to it, to include the zone of incorporation. (250.41(b)(88))

'Treatment', when used in connection with hazardous waste, means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume. Such term includes any activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it nonhazardous. (RCRA 1004 (34))

"Treatment facility" means any facility which treats hazardous waste. (250.41(b)(89))

"24-hour, 25-year storm" means a storm of 24-hour duration with a probable recurrence interval of once in twenty-five years as defined by the National Weather Service in Technical Paper Number 40, "Rainfall Frequency Atlas of the United States",

May 1961, and subsequent amendments, or equivalent regional or state rainfall probability information developed therefrom. (250.41(b)(92)

2.0 Rationale for Regulations

2.1 Actual Damage Incidents

Numerous damage incidents involving contamination of surface water, noxious air emissions and uncontrolled movement of wastes from disposal facilities have been documented by EPA.

Main sources of damage incident information are:

1) Damage Incident Files within the EPA Assessment and Technology Branch, HWMD - OSW, 401 M Street, S.W. Washington, D.C. 20460.
2) U.S. EPA Report to Congress. Disposal of Hazardous Waste. Publication SW-115. Office of Solid Waste Management Programs 1974.
3) U.S. EPA, Site Location and Water Quality Protective Requirements for Hazardous Waste Treatment, Storage, and Disposal Facilities. Office of Solid Waste (Contract 68-01-4636).
4) U.S. EPA, Surface Impoundments and Their Effects on Groundwater Quality in the United States. Office of Water Supply (Contract 68-01-4342).
5) U.S. EPA, Evaluation of Emission Control Criteria for Hazardous Waste Management Facilities. (TRW Contract No. 68-01-4645) March, 1978.
6) State of Maryland, Water Resources Administration. A Field Reconnaissance Investigation of Sanitary Landfills in Maryland with Respect to Impacts on

Surface Waters, March, 1978.

7) Individual Background Documents within the series of twenty-seven produced for specific treatment, storage and disposal standards.

2.2 Potential Damage

The general facility standards contain provisions in five areas:

1) Integration with the Clean Water Act provisions for
   a) Point Sources
   b) Pretreatment Standards
   c) Non-Point Sources
   d) State Water Quality Management Plans
2) Prohibition of open burning, with certain reservations.
3) Control of removal of hazardous waste from facilities.
4) Requirement for knowledge of the chemical composition of waste.
5) Requirement for closure of noncomplying portions of facilities.

Potential damage to human health and the environment may be very large indeed, but no overall assessment can be reliably quoted as yet. A November 21, 1978 statement by EPA on the regional survey of hazardous waste dump sites reported that EPA Regional Offices estimated in a recent survey that over 32,000 landfill, storage and other sites which may contain hazardous waste in any quantity which now or potentially could cause adverse

impact on public health or the environment.

The Regional Offices also provided an inventory and description of 103 sites for which the Regional Offices had more than circumstantial evidence, of which the public (at least locally) was already aware, and publicly accessible information was already on file.

An EPA contractor attempted to specify potential damages and their likely consequences for a number of damage scenarios. The report is:

IR&T and Dames & Moore. Hazardous Waste Management Issues Pertinent to Section 3004 of the Resource Conservation and Recovery Act of 1976. September, 1978.

The damage scenarios are reproduced as Appendix 1 to this document.

Individual damage incidents are cited within RCRA 3004 Background Documents and are referenced here.

1) CWA Integration

General Site Selection (5)

Groundwater and Leachate Monitoring (12)

Storage (14)

Landfills (17)

Surface Impoundments (18)

Basins (19)

Landfarms (20)

Surface Water Human Health and Environmental Standard (2)

2) Open Burning

Air Human Health and Environmental Standard (3)

Incineration (16)

3) Removal of Hazardous Waste

RCRA 3002 Background Document

4) Waste Analysis

Chemical, Physical, and Biological Treatment Facilities (21)

Standards for Treatment Disposal (15)

Groundwater and Leachate Monitoring (12)

5) Closure of Noncomplying Portions of Facilities

Closure and Post Closure (11)

3.0 Identification of Regulatory Options

The reader is referred to specific background Documents as cited in 2.2 of this document and to the discussion of each adopted regulation under 5.0 of this document.

4.0 Analysis of Regulatory Options

Analysis of regulatory options is incorporated into Section 5.0 of this document.

5.0 Identification of Chosen Regulation with Rationale

Regulations are grouped as in Section 2.2, into five subject areas.

For each chosen regulation, authority, options and analysis, rationale including precedents, and protection provided are given. Due to the broad nature of the general facility standards, the reader must also consult applicable background documents.

I. Clean Water Act Integration

A. Point Sources

1. Chosen Regulations

250.43 (a) All facilities with point source discharges to navigable waters, including discharges from leachate collection systems and/or surface water run-off collection systems, shall comply with all applicable regulations promulgated under the Clean Water Act (Pub. L. 92-500, as amended by Pub. L. 95-217). Additionally, facilities with discharges to municipal sewer systems shall meet applicable Clean Water Act pretreatment standards and have the approval of the municipal treatment system authority for that discharge.

2. Authority

RCRA Sec. 1003 (42 USC 6902), Sec. 1006 (a) and (b), (42 USC 6905), Sec. 3004 (42 USC 6924).

3. Options

Inasmuch as Sec. 1006(a) requires consistency with the (Clean Water Act, as amended (33 USC 1151) options were centered on the division of surface water control into point and non-point source controls.

Option 1: Control entirely under Section 402 of the Clean Water Act: NPDES Permit System.

Option 2: Control of point sources under CWA Sec. 402 and development under RCRA of non-point source controls.

Option 3: Control of point sources under CWA Sec. 402 with specification of special areas of concern and development under RCRA of limited non-point source controls.

Option 4: Control under CWA of point sources and development of regulations under RCRA of special controls as needed.

4. Analysis of likely or possible discharges from hazardous waste management facilities included consideration of available authorities under the Clean Water Act.

Discharges considered included those from

1) leachate collection systems
2) spills
3) surface run-off collection systems including
   a) contaminated and
   b) uncontaminated discharges
4) diverted run-off
5) leachate seeps and standing water
6) indirect discharges to sewer systems.

Analysis of regulatory authority available and in place under the Clean Water Act indicated that discharges at facilities could be regulated in whole or in part under Sections 208, 302, 303, 304, 307, 311, and 402. In view of the necessity to integrate all provisions of RCRA with CWA, and recognizing the prime responsibility

of CWA in this area only certain aspects of surface water control are emphasized in these RCRA 3004 rules. Additional clarification of how the general requirements of the CWA apply to individual treatment, storage and disposal facilities are provided in the individual regulations and their suppporting rationales

Avoidance of unnecessary duplication is reinforced by the proposed integration of the RCRA and NPDES permitting procedures.

B. Pretreatment Standards

1. Chosen Regulation

250.43 (a) All facilities with point source discharges to navigable waters, including discharges from leachate collection systems and/or surface water run-off collection systems, shall comply with all applicable regulations promulgated under the Clean Water Act (P.L. 92-500, as amended by P.W. 95-217. Additionally, facilities with discharges to municipal sewer systems shall meet applicable Clean Water Act pretreatment standards and have the approval of the municipal treatment system authority for that discharge.

2. Authority

RCRA Sec. 1003 (42 USC 6902), Sec. 1006(a) and (b) (42 USC 6905), Sec. 3004 (42 USC 6924).

3. Options

The same general options identified under

5.0.A.3. apply, however, suboptions were developed for indirect discharges to sewers.

Suboption 1: Defer authority to CWA.

Suboption 2: Highlight RCRA concern.

Suboption 3: Specify RCRA concern and establish standards directly applicable to hazardous waste facilities independent of CWA.

In view of the high percentage of hazardous waste discharged to sewers in certain localities by certain industries, the Agency agreed that immediate application of pretreatment standards to indirect dischargers was consistent with the CWA and the self policing aspect of RCRA. Full deference to CWA was decided against on the grounds that municipalities, in the interest of the public health, should have the earliest possible control over indirect dischargers from hazardous waste facilities; independently of the schedule for implementation of pretreatment standards for established point source categories. An additional factor was the lack of an existing effluent guideline for the off-site hazardous waste facility handling a wide variety of hazardous waste.

At the same time, additional public health protection is provided by alerting facility owners of the possible need to pretreat wastes which might contain untreatable toxics, or interfering substances. The option

chosen reinforces the existing authority of the CWA in a manner consistent with CWA and RCRA goals.

C. Non-Point Sources

1. Chosen Regulations

250.43 (b) Diversion structures to divert all surface water run-off from the active portions of a facility for the 24-hour, 25-year storm shall be constructed, properly maintained and operated.

Note: Owners/operators do not need to construct such diversion structures if they can demonstrate, at the time a permit is issued under Subpart E, that surface water run-off will not enter the facility and come into contact with the hazardous waste.

(c) Surface water run-off from active portions of a facility shall be collected and confined to a point source before discharge or treatment, as may be required by regulations promulgated under the Clean Water Act (P.L. 92-500, as amended by P.L. 95-217).

Note: Owners/operators do not have to collect and confine surface water run-off from active portions of a facility to a point source if they can demonstrate that alternatives will not allow the surface water and groundwater human health and environmental standards to be violated.

250.43 (1) Non-point source discharges from facilities into navigable waters shall not cause or contribute to the violation of water quality standards promulgated or approved under Section 303 of the Clean Water Act (P.L. 92-500, as amended by P.L. 95-217).

2. Authority

RCRA Sec. 1003 (42 USC 6902), Sec. 1006 (a) and (b) (42 USC 6905), Sec. 3004 (42 USC 6924).

3. Options

Full discussion of 250.43 (b) and (c) on the need for diversion structures and run-off collection is contained in the background documents for surface impoundments and basins, landfills, and landfarms.

The 24 hour, 25 year storm was chosen as the maximum design storm in view of the strong need for surface water control at facilities and because precipitation data for that storm are generally available. The note allows deviation to allow for local variations in typography and control.

Options for 250.43(e)

Option 1: No special controls on non-point source discharges. (208 Guidelines)

Option 2: Detailed design standards for control.

Option 3: General consistency with local receiving water requirements.

In view of a strong Agency concern for the control of surface seepage, and the control of contaminated run-off at facilities a solution was sought somewhere short of a blanket requirement to create new point sources permitable under Section 402 of the Clean Water Act in all cases. To alleviate the need for a case by case determination of non-point source controls, general guidance as to the level of control desired is given by relating control requirements to state receiving water standards established for the facilities location.

Specification is required (rejecting Option 1) because CWA does not effectively control non-point source discharges.

D. Water Quality Management Plans

1. Chosen Regulation

250.53 (j) All owners/operators shall comply with applicable requirements of State Water Quality Management Plans approved by the Administrator under Section 208 of the Clean Water Act (P.L. 92-500, as amended by P.L. 95-217).

2. Rationale

The general authority of the CWA for water quality planning is identified in this regulation. The inclusion of solid waste facility plans in the EPA's 208 programs is reinforced by the previously published proposed rules: "Guidelines for

Development and Implementation of State Solid Waste Management Plans. 40 CFR Part 256 (43 FR 38534, Monday, August 28, 1978).

II. Prohibition of Open Burning

1. Chosen Regulation

250.43 (d) Owners/operators shall not allow open burning of hazardous waste.

Note: Open burning of hazardous waste may be permitted provided that the owner/operator can demonstrate that alternative treatment and disposal methods, including recycling or salvaging of materials have been evaluated and determined to be technically or economically infeasible, or that the transport, treatment and disposal of such wastes poses a greater risk to human health and the environment than open burning.

2. Rationale

Full discussion of damage incidents, options, and rationale is given in the Air Human Health and Environmental Standard.

Prohibition of open burning as one criteria of an open dump is mandated by Congress, however, the Agency recognizes that open burning may be unavoidable in certain instances, or may be entirely appropriate in such instances as the safe disposal

of explosives, or the disposal of spilled materials.

III. Control of Removal of Hazardous Waste from Facilities

1. Chosen Regulation

250.43 (e) Any person who generates or removes a hazardous waste from a facility shall comply with the requirements of Subpart B.

Background and rationale for this requirement are to be found in the Background Document supporting the RCRA 3002 Standards for Generators.

It is recognized that the normal operation of a treatment, storage or disposal facility will result in the generation of new hazardous waste or require the transport from the facility of hazardous waste. The application of generator standards is deemed to be adequate for protection of human health and the environment.

250.43 (f) All owners/operators shall obtain a detailed chemical and physical analysis of each hazardous waste handled at the facility at the time of initiating management of the hazardous waste. This analysis shall identify the hazardous characteristics of the waste which must be known to enable the owner/operator to comply with the requirements of this Subpart, or with the conditions of a permit issued under the provisions of Subpart E.

Note: The chemical and physical analysis may be limited based upon the method of treatment, storage and/or disposal, and upon existing available evidence regarding the waste's composition.

250.43 (g) The analysis obtained of each waste stream shall be repeated as necessary by the owner/operator. (For example, a minimal analysis (pursuant to paragraph (h) below) of the waste might indicate a change in the waste stream characteristics, or the owner/operator might become aware of a modification in the manufacturing process generating the waste.) The detailed waste sampling frequency shall be no less than annually.

250.43 (h) All owners/operators shall sample each truckload or other shipment or batch of hazardous waste designated for treatment, storage, or disposal at the facility. Each sample, at a minimum, shall be analyzed for the following properties:

(i) Physical appearance, such as color and physical state (e.g., liquid, solid, semi-solid)

(ii) Specific gravity

(iii) pH

(iv) Vapor pressure, if applicable.

Note: In the case of on-site facilities, less frequent sampling and analysis may be allowed if the owner/operator can demonstrate that no loss in control over facility operations will occur.

2. Authority

RCRA Sec. 1003 (42 USC 6902), Sec. 1006 (a) and (b) (42 USC 6905), Sec. 3002 (4) (42 USC 6922), Sec. 3004 (42 USC 6924).

3. Options

Option 1: No Waste Analysis Requirement

Option 2: Detailed Analysis Requirement Imposed on Generator

Option 3: Limited Analysis Requirement on Generator and Full Requirement on Owner/Operator

Option 4: No Analysis Requirement on Generator and Limited Requirement on Owner/Operator.

4. Rationale

Analysis of the imposition of a waste analysis requirement on the generator is under the purview of the RCRA 3002 Background Document.

Analysis of certain requirements for chemical analyses prior to selection of a treatment method is given in the 3004 Background Document for Chemical Physical, and Biological Treatment Facilities.

Inquiries made of numerous commercial disposal facilities, and of certain industrial disposal facilities indicate that standard safe operating procedures include a limited chemical analyses as a check performed on material whose composition has been previously well characterized by a chemical analysis.

Where material has not been well characterized, whether by analysis, or from detailed knowledge of the source of a waste stream from a well defined process, off-site commercial disposers require a detailed analysis of the waste before the waste is accepted for disposal or a cost is agreed upon.

EPA seeks to recognize the validity of such well established practices at the same time as it provides for the enforcement of a reasonable level of knowledge of wastes disposed of on facilities which may not be up to generally accepted standards.

EPA has informally solicited comments from the National Solid Waste Management Association (NSWMA) on the likelihood of industry development of standards in this area. Pending full industry development, EPA has proposed the minimum check analysis and no less than annual comprehensive analysis of wastes received for disposal.

Such requirements are designed to be no more than are necessary for safe treatment, storage or disposal and are expected to vary according to the method of treatment, storage or disposal to be used. The standards therefore apply equally to all hazardous waste management facilities whether commercial or industry on-site.

The note, however, allows the use of other sources of information than a comprehensive chemical examination for uniform waste streams whose composition is well known. The choice of an annual repetition allows some latitude for very unchanging waste streams.

Although the main burden of analysis falls on the generator (as on-site disposer, and as contractor with a commercial disposer), the owner/operator is never relieved of the responsibility for adequate knowledge of the composition of and by extension, the hazards involved with management of all hazardous waste at his facility.

V. Closure of Noncomplying Portions of Facilities

1. Chosen Regulation

250.43 (i) Owners/operators shall close, in accordance with the requirements of Section 250.43-7, all portions of a facility which does not comply with the applicable requirements of this Subpart.

2. Rationale

This administrative provision is inserted to be consistent with general enforcement policy and to assure that owner/operators are not relieved of necessary closure responsibilities if they are found to be in non-compliance.

Detailed discussion of the technical aspects of closure are given in the Background Document for closure.

APPENDIX 1

DAMAGE SCENARIOS; INTRODUCTION

These damage scenarios were designed as a conceptual aid to focus attention on liability limits that may result from hazardous waste damage events. To date, there is not a compilation of damages that resulted from events at hazardous waste management facilities. Documented cases are largely limited to accounts of accidents, spills and leaks from various industries other than the disposal industry. Furthermore, these accounts do not cover the full range of potential damages.

Hazardous waste incidents on the scale of the mercury poisoning cases in Japan or the dioxin disaster in Italy have not occurred in the United States. Thus, to accurately reflect the true nature of the problem, these damage scenarios were designed. They are based on actual incidents that have occurred or are extensions of such incidents. While in a few technical areas, they may prove to be inaccurate, such inaccuracy will not detract from their overall utility in highlighting both potential damages and the consequences of these damages.

Incinerator Malfunctions

•Operating Characteristics

-An incinerator used to dispose of hazardous wastes has the following operating characteristics:

10 GPM Waste Tar

13,000 FT^3/MIN Combustion Air

20,000 FT^3/MIN TEMPERING AIR

300 GPM Fresh Water

2,300 GPM Recycled Water

•Failure Mode

-One hour undetected interruption in recycled water flow permitting flue gas exit with insufficient scrubbing - 2:30-3:30 PM .

At that time, one-third of tar content is:

MSMA: $CH_3 - \overset{\overset{O}{\|}}{\underset{OH}{As}} - ONa$

This compound is broken down during combustion to:

$$CH_3 - \overset{\overset{O}{\|}}{\underset{OH}{AS}} - ONa + 3O_2 \quad As_2O_3 + 2CO_2 + 3H_2O + 2NaOH$$

Based on air flow and full release of As_2O_3, the concentration at the stack is 1,118 PPM

•Dispersion

-Assume westerly winds at 5 MPG during period of release. The area of exposure is 2,356 SQ. MI.

• Receptor Interaction

-Small town of 500 families located 40 MI. down wind. 20 families located at closer distances 2,000 head of cattle located within 10 miles

• Ecological Impact

-In town: Skin Effects - Hyperkeratosis of palms and soles; Edema of Eyelids - 20 people - duration 2 months

-Closer families: Central Nervous System-Mental Confusion, Defective Control of Muscles-10 People; Skin Effects-20 People- Duration 6 Months

-Cattle: Nausea, Vomiting, Contaminated Milk-10 Cattle Die-Duration 3 Months

• Financial Impact

-Action for damages suits result in the following rewards:

Skin Effects - $50,000
Nervous System - $1,200,000
Cattle - $10,000
Total - $1,260,000

Class I Secure Landfill Disposing Petroleum Refinery Hazardous Materials On Site

•Operating Characteristics
- Segregation of Wastes
- Neutralization of Acids and Caustics
- Reduced Fluid Mobility Through Suitable Soil Mixture
- Daily Earth Covering of 6" Soil

•Failure Mode
- Explosion and Subsequent Fire Caused by Unknown, Unanticipated Chemical Reaction
- Toxic Cloud Includes Oily Wastes, Phenols and Some Tetraethyl Lead Vapors Toxic At .075 - .15 MG/M^3

•Dispersion
- Explosion Radius 115' ∴ Contained Within Site 10 MPH Wind
- Fire Lasts 2 Hours But Evacuation Successful After 1 Hour

Area of Exposure 10 Sq. Mi.

•Receptor Interaction
- Urban Area of 500 People/Sq. Mi. ∴ Total Exposed Population = approximately 5000 People.

•Ecological Impact
- Approximately 1000 people experience irritation including skin and lung problems. 45 people receive superficial skin burns from exposure to airborne toxics, 17 people experience nausea and vomiting, 5 experience recurring headache and dizziness over 3 month period. One elderly man is killed by a stroke during the evacuation procedures.

- Financial Impact

-Since many of the exposed people are employing in the local petrochemical industry only a small number file actions for damages against the refinery. Eight of the 62 people who recovered within 36 hours sued for a total of $100,000. Three of the recurring cases sue for $200,000 each and the widow of the stroke victim sues for 2 million dollars. To avoid negative publicity and although they are self-insured and deny liability, the refinery makes a quick out of court settlement for $150,000.

Explosion at Secure Landfill

•Operating Characteristics
-Segregation of Wastes
-Neutralization of Acids and Caustics
-Reduced Fluid Mobility through Suitable Soil Mixture
-Daily Earth Covering of 6" Soil

•Failure Mode
-During the compacting process a small explosion occurs that ruptures a nearby large pesticide temporary storage tank. A cloud of dioxin is released.

•Dispersion
-Wind velocity is 3 MPH. The site is located in a bowl shaped valley and there the cloud hovers over the valley for 36 hours.

•Receptor Interaction
-Alert to the experience in Italy evacuation procedures are triggered immediately. 8000 people are evacuated. Livestock herds totalling 2,500 animals are left behind.

•Ecological Impact
-Dioxin is one of the most toxic chemicals known. Based on animal studies, both the oral and dermal lethal doses are in the range of micrograms per kilogram body weight.

•Liability Assessment
-5000 people are allowed to return to their homes. The other 3000 are unable to return until the contamination level is reduced. The National Guard seals off the contaminated areas. All drinking water in the valley is contaminated and thus bottled water must be provided. All livestock is condemned and destroyed. Because of the prompt evacuation procedures, only 75 people in the immediate area of the site

are exposed. Law suits totalling 200 million dollars are filed against the facility by the 3000 dispossessed , the 75 people directly affected, the owners of the livestock, and the city government. The breakdown of this sum is as follows:

75 injured total	$120 million
2000 dispossessed total	70 million
livestock total	8 million
city government	2 million

The courts award settlements totalling $38 million.

Earthquake at Secure Landfill

•Operating Characteristics
-Segregation of Wastes
-Neutralization of Acids and Caustics
-Reduced Fluid Mobility Through Suitable Soil Mixture
-Daily Earth Covering of 6" Soil

•Failure Mode
-Mild earth tremor cracks liner at bottom of landfill allowing contact with groundwater. Tremor occurs at night and is not noted by site operators.

•Dispersion
-The slow leak of heavy metals including mercury and chromium into an adjacent aquifer continues for fifteen years before it is detected. 58 private wells draw upon this aquifer for water supply as well as one poultry processing plant.

•Receptor Interaction
-250 individuals are effected having consummed contaminated water for an estimated 5-7 years. No pass on of heavy metals is thought to have occured in the poultry plant.

•Ecological Impact
-10 individuals are found to have mild nose and throat problems, six more severe liver damage and one severe central nervous system damage attributed to mercury poisoning.

•Financial Impact

-A recovery of costs damage suit for $10,000 is filed by the poultry plant for installation of filter equipment. The 10 least affected individuals file suit for $100,000 each, the six more severe cases, $100,000 each, and the most severe case sues for 1 million dollars. The municipality sues for $500,000 for cost of supplying an alternative water supply to the area. The court awards a total of 1.1 million dollars.

Slow Leak at Secure Landfill

- Operating Characteristics
  - -Segregation of Wastes
  - -Neutralization of Acids and Caustics
  - -Reduced Fluid Mobility Through Suitable Soil Mixture
  - - Daily Earth Covering of 6" Soil

- Failure Mode
  - -The landfill is located above a dry aquifer. It is determined the aquifer has been dry since a nearby large river naturally changed its course 200 years ago. Development activities in the area including the construction of a dam and canal, the blacktopping of natural recharge sites, and large scale irrigation alters ground water channels and refills the aquifer. Slow erosion underneath the landfill allows infiltration of chemicals including potassium cyanide.

- Dispersion
  - -The potassium cyanide infiltrates the regional reservoir that provides the drinking water for 120,000 people as well as into 200 private drinking wells.

- Receptor Interaction
  - -Although monitors at the reservoir detect the potassium cyanide before the water is utilized by the public, numerous private well users are poisoned.

- Ecological Impact
  - -Potassium Cyanide is a very toxic chemical. 170 families are poisoned by drinking from their private wells. 18 deaths result (primarily very young and very old people) and 60 people are hospitalized for severe poisoning. 27 of these patients develop permanent damage.

•Liability Assessment

-17 of the 18 deaths result in law suits as do all 27 of the permanently impaired and 120 people who were seriously exposed. Suits totalling $134 million are filed. They include:

17 deaths total	$ 34 million
27 permanently impaired total	75 million
120 seriously exposed total	25 million

The courts award settlements totalling $40 million.

Tornado at Solvent Reclaiming Plant

•Operating Characteristics

-A small solvent reclaiming plant operates batch reclaiming operations. The toxic residue from the reclaiming process is stored in barrels in an on-site warehouse until sufficient quantities are accumulated to justify contracting an independent disposer to haul the barrels to a secure landfill. The independent disposer arrives about twice yearly.

•Failure Mode

-A tornado sweeps through the reclaiming site destroying 70% of the reclaiming plant and the entire storage warehouse.

•Dispersion

-Two types of hazardous wastes are dispersed into the environment; solvents prepared for the reclaiming process such as carbon tetra chloride and methyl chloroform, and toxic residue resulting from the reclaiming process. Within 300 yards of the site, 186 barrels are scattered along the path of the tornado. Most are ruptured and leaking. Located over a 2 sq. mile path are additional barrels in indeterminate numbers.

•Receptor Interaction

-On 3 private properties near the plant leaking barrels are located. The occupants are evacuated. Over a weeks time, the barrels scattered over the 2 sq. mile area are located and returned. However, 10 days after the storm, 5 small children are playing in a wooded area and discover one of the barrels. Attempting to role the barrel downhill the barrel leaks and fumes overcome one of the children and temporarily blind two others. Another individual finds one of the barrels, takes it home and tries to fabricate a home fireplace. The fumes send this individual to the hospital.

•Ecological Impact

-The duration of the exposure is brief and then only the short range effects of cramps, vomiting and temporary coma are experienced.

•Financial Impact

-The four individuals bring actions for damages totalling $80,000 and receive a settlement of $5,000 each.

Concrete Encapsulation of PCB Residue

•Operating Characteristics

-A chemical treatment facility disposes of large quantities of PCB residue by encapsulating the PCB in concrete and storing the concrete on site. These blocks are confused with a recent shipment of concrete to be used for an on-site construction project. The on-site construction is cancelled and the concrete sold. A highway construction firm purchases the concrete to use as road base for a new 15 mile section of superhighway without knowing about the PCB content. After one year of grading and laying the highway base, the project meets local opposition as citizens attempt to have the highway built elsewhere. After two years of court proceedings, the project is abandoned after sealing the road base with asphalt.

•Failure Mode

-Ten years later, a housing development is built amidst the abandoned highway. The broken up road bed rubble is hauled 3/4 of a mile away and used to fill a wetland area and flood plain. Over a fifteen year period the PCB's slowly leach into a tidal river.

•Dispersion

-The PCB percipitates into the bottom silt over a 7 mile length of river.

•Receptor Interaction

-No humans are directly affected but fish in the area start showing large quantities of PCB's in their tissue forcing the shutdown of a small, thriving fishing industry.

•Ecological Impact

-Fish and benthic organisms absorb the PCB's and pass them along the food chain.

- Financial Impact
  - -The original disposer, a large and financially secure organization, is still in business. They are sued for damages resulting in loss of revenue by the local fisherman for 8 million dollars and in an out of court settlement pay 1.5 million dollars.

Land Spreading on Contract Basis
of Industrial Wastes

•Operating Characteristics

-small land spreading and landfill company operating 4 trucks on contract basis servicing industries in 50 mile area

-oily wastes are land spread on cropland and sprayed on roads as dust control agent

-included in customer list is a chemical company that also produces insecticides and weed killers

•Failure Mode

-barrels containing arsenic residue (AS_2O_3) from the insecticide plant are accidently included with the oily waste barrels and instead of landfilled are used for landspreading

•Dispersion

-the arsenic is sprayed as a dust control agent at a local fairground's horse arena

•Receptor Interaction

-15 people, including seven children and four fairground employees, are adversely affected by exposure to the dust

•Ecological Impact

-severe skin, central nervous system and gastro-intestinal effects of 3 days to 9 months duration

•Financial Impact

-various actions for damages totalling 1.5 million dollars are filed against to disposer who is unable to pay the damage suits and is forced to sell its assets and declare bankruptcy.

RESOURCE CONSERVATION AND RECOVERY ACT
SUBTITLE C - HAZARDOUS WASTE MANAGEMENT

SECTION 3004 - STANDARDS APPLICABLE TO OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

DRAFT

BACKGROUND DOCUMENT

SECTION 250.43-1 STANDARDS FOR GENERAL SITE SELECTION

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE
DECEMBER 15, 1978

This document provides background information and support for regulations which have been designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulations. As new information is obtained, changes may be made in the regulations, as well as in this background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

Timothy Fields, Jr.
U.S. Environmental Protection Agency
Office of Solid Waste
Hazardous Waste Management Division (WW-565)
401 M Street, S.W.
Washington, D.C. 20460

I. Introduction

A. RCRA mandate for the Regulation:

The Congress of the United States, via section 3004 of Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 (P.L. 94-580), mandated that the Administrator of the Environmental Protection Agency promulgate regulations establishing performance standards applicable to owners and operators of hazardous waste treatment, storage and disposal facilities as may be necessary to protect human health and the environment. These standards are to include requirements pertaining to the location, design and construction of these facilities

This document will be concerned with the standards for site selection (Section 250.43-1) which have been proposed in order to ensure compliance with the aforementioned RCRA mandate.

B. Key Definitions:

The following definitions are pertinent to the establishment of site selection standards under Section 3004 of RCRA.

"Active Fault Zone" means a land area which, according to the weight of the geologic evidence, has a reasonable probability of being affected by movement along a fault to the extent that a hazardous waste facility would be damaged and thereby pose a threat to human health and the environment.

"Costal High Hazard Area" means the area subject to high velocity waters, including, but not limited to, hurricane wave wash or tsunamis as designated on a Flood Insurance Rate Map (FIRM) as zone VI-30.

"Five Hundred Year Flood" means a flood that has a 0.2 percent or one in 500 chance of recurring in any year. In any given 500 year interval, such a flood may not occur, or more than one such flood may occur.

"Floodplain" means the lowland and relatively flat areas adjoining inland and coastal areas and off-shore islands, including at a minimum, areas subject to a one percent or greater chance of flooding in a given year.

"One Hundred Year Flood" means a flood that has a one percent or one in 100 chance of recurring in any year. In any given 100-year interval, such a flood may not occur, or more than one such flood may occur.

"Recharge Zone" means an area through which water enters an aquifer.

"Regulatory Floodway" means the channel of a river or other water course and the adjacent land areas that must be reserved in order to discharge the 100-year flood without cumulatively increasing the water surface elevation more than a designated height.

"Sole Source Aquifers" means those aquifers designated in Section 1424(e) of the Safe Drinking Water Act of 1974 (Pub. L. 93-523) which solely or principally supply drinking water to large percentage of a populated area.

"Wetlands" means those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do or would support, a prevalence of vegetation typically adapted for life in saturated or seasonally saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river outflows, mudflats, and natural ponds.

II. Rationale for the Regulation

Numerous incidents of damage which have resulted from the location of hazardous waste facilities near environmentally sensitive areas are contained within EPA files.
Wetlands and/or Floodplain Related Damage Incidents:

°On September 27, 1972, heavy rains broke the earthen dike of a former refinery waste lagoon which is currently owned by Pleasant Township. The released sludge entered the Allegheny River and killed about 450,000 fish with an estimated value of $75,000 along a 60-mile stretch. Analysis of the discharge entering the river at that time indicated the following: pH 1.7; COD 116,112 ppm; iron 507.3 ppm; sulfates 56.5 ppm. To stop the leak, the town built up the lagoon bank and also has been adding clean fill as available. Monitoring wells dug near the lagoon show that the groundwater quality still is degraded.'

°On June 10, 1967, a dike containing an alkaline waste lagoon for a steam generating plant at Carbo, Virginia, collapsed and released approximately 400 acre-feet (493,400 cubic meters) of fly ash waste into the Clinch River. The resulting contaminant slug moved at a rate of 1 mile per hour (1.6 kilometers per hour) for several days until it reached Norris Lake in Tennessee, whereupon it is estimated to have killed 216,200 fish. All food organisms in the 4-mile (6.43-kilometer) stretch of river immediately below Carbo were completely eliminated.

°On October 27, 1968, a waste storage lagoon on the plant site of a Pennsylvania refining company broke, spilling waste sludge containing oils, acid wastes, and alkyl benzene sulfonate into the south branch of Bear Creek. The sludge flowed three miles downstream into the Allegheny River, killing an estimated 4.5 million fish valued at $108,000. Because the company was in poor financial condition, only a little over $20,000 in fines were levied to cover the damage.

°A holding pond and tanks at a chemical manufacturing plant in Saltville, Virginia, failed, spilling chlorine, hypochlorites, and ammonia into the north fork of the Holston River. River waters samples showed concentration levels at 0.5 part per million hypochlorite and 17.0 parts per million of fixed ammonia. Dead fish were sighted along the path of the flow in the river.

°On December 7, 1971, at a chemical plant site in Fort Meade, Florida, a portion of a dike forming a waste pond ruptured, releasing an estimated 2 billion gallons (7.58 billion liters) of slime composed of phosphatic clays and insoluble halides into

Whidden Creek. Flow patterns of the creek led to subsequent contamination of the Peace River and the estuarine area of Charlotte Harbor. The water of Charlotte Harbor took on a thick milky white appearance. Along the river, signs of life were diminished, dead fish were sighted, and normal surface fish activity was absent. No living organisms were found in Whidden Creek downstream of the spill or in the Peace River at a point 8 miles downstream of Whidden Creek. Clam and crab gills were coated with the milky substance, and in general all benthic aquatic life was affected in some way.[5]

°The U.S. Army Corp of Engineers built a plant at Foundry Cove by the Hudson River in 1953 to make nickel-cadmium batteries. In the 1960's the plant was sold to a private firm and since that time resold to another firm which manufactures airplane batteries. From 1953 to 1959 plant wastes were dumped at the edge of a marshy area at the back of the cove, which leads into the Hudson River. The plant was cited by the New York State Health Department for the "alkaline content" of its discharges as early as 1966 and was ordered to clean up its emissions. By 1970 pollution control equipment had been installed, but it was not being successfully operated. Because of this effective noncompliance with the clean-up order, the State demanded that a study of the effects of the cadmium-rich effluent be undertaken in 1971. As part of this study, New York University researchers checked the site for cadmium content, especially a 1-acre mudflat formed from effluent which was exposed between tides. Lack of vegetation on this area led them to suspect it was severly contaminated because all other

areas were heavily vegetated. Their analyses revealed concentrations of over 60,000 ppm cadmium on the dump with values of about 1000 ppm present in the surrounding land. When made aware of the problem, the company dredged the dump, partly in hopes of reclaiming the cadmium. Most of the cadmium, however, was in silt-size material and was instead spread over the cove by the dredging as a mud suspension. As a result, the cadmium is now spread over the bottom of the cove with concentrations locally reaching 50,000 ppm. At present, the high carbonate content of the cove's water keeps the pH well above 7. This keeps most of the cadmium from readily dissolving in the water. Since the company has ceased dumping at the cove and has resorted to lined land dumps, and since the New York Department of Environmental Conservation has required that it be consulted before any actions are taken which might further stir up the cove or affect its pH, the cadmium has stayed largely localized. Even so, the tides that sweep in and out of the cove daily are slowly flushing the cadmium out of the cove and into the Hudson. A bird sanctuary at the mouth of the cove is directly threatened by the transport of the cadmium from the cove, while preliminary laboratory analyses of fish which enter the cove with the tides indicate that they are concentrating cadmium in their tissues. Detailed results of these cadmium studies have been published.[6]

Five out of six of the damage incidents described above were attributed to the failure of surface impoundments. It could be argued that if the impoundments were properly constructed, the

riverine and coastal ecosystems cited above would not have been degraded. However, no design specification can ever provide 100% certainty that an impoundment, or any other type of treatment/storage/disposal facility will not fail. Therefore, facilities should not be located in wetlands or riverine or coastal floodplains because these areas are particularly susceptible to damage in the event of a release of hazardous waste.

The explanation for the selection of certain areas of the country as being environmentally sensitive is contained in Section V of this document. The purpose of Section II of this paper is not to reiterate the sensitive nature of these areas, but rather to show (through the citing of damage incidents) that environmentally sensitive areas (e.g. wetlands) have been degraded by the release of hazardous waste in the past, and that the potential for similar damage incidents to occur in the future does exist unless specific regulations are written to protect these areas.

III. Identification of Regulatory Options:

A. Standards mandated by RCRA:

Section 3004(4) of RCRA states that the standards to be promulgated by the EPA shall include requirements respecting "the location, design, and construction of hazardous waste treatment disposal or storage facilities".

B. Survey of Existing State Regulations:

The following are excerpts from regulations and/or guidelines in those states with programs which specifically address site selection in their solid and/or hazardous waste regulations:

Indiana: (Regulations SPC 18)

"No refuse deposit shall be made nearer than 600 feet to any dwelling without written consent of the occupant and owner of the dwelling."

Iowa: (IAC 3/23/77 - Chapter 28 Sanitary Landfills)

"The plans for all sanitary landfills shall include a report consisting of information verifying that the portion of the site to be filled is:

(1) So situated as to obviate any predictable lateral movement of significant quantites of leachate from the site to standing or flowing surface water or to shallow aquifers that are in actual use or are deemed to be of potential use as a water resource.

(2) So situated that the base of the proposed site is at least five feet above the high water table unless a greater separation is required to ensure that there will be no significant adverse effect on ground or surface waters or a lesser separation is unlikely to have a significant adverse effect on ground and surface waters.

(3) Outside a floodplain or shoreland, unless proper engineering and sealing of the site will render it acceptable and prior approval of the Iowa natural resource council and where necessary the U.S. Corps of Engineers is obtained.

(4) So situated as to assure no adverse effect on any well within 1000 feet of the site existing at the time of application for the original permit which is being used or could be used without major renovation for human or livestock consumption or at least 1000 feet from any such well unless hydrologic conditions are

such that a greater distance is required to assure that there is no adverse effect on the well.

(5) So situated to assure no adverse effect on the source of any community water system in existence at the time of application for the original permit within one mile of the site or at least one mile from the source of any community water system in existence at the time of application for the original permit unless hydrologic conditions are such that a greater distance is required to assure no adverse effect on the water system.

(6) At least twenty feet from the adjacent property line unless there is a written agreement with the owner of the abutting property. For new permit applications and associated reports submitted after April 27, 1977, the report shall verify that the portion to be filled is at least 50 feet from the adjacent property line. The written agreement shall be filed with the county recorder and shall become a permanent record of the property.

(7) Beyond 500 feet from any existing habitable residence unless there is a written agreement with the owner of the residence and the site is screened by natural objects, plantings, fences or by other appropriate means. The residence must be in existence on the date of application for the original permit from the department. The written agreement shall be filed with the county recorder and recorded for abstract of title purposes, and a copy submitted to the department".

Minnesota (HW-4 Location, Operation and Closure of a Hazardous Waste Facility)

"1. No person shall establish, construct, or operate a hazardous waste facility in a wetland, in a floodplain, or within a shoreland.

2. No person shall establish, construct, or operate a hazardous waste facility in a location where the topography, geology, hydrology, or soil is unsuitable for the protection of the groundwater and the surface water.

3. No person shall establish, construct, or operate a hazardous waste facility in a location where such activity would result in emissions of air contaminants causing the violation of the ambient air quality standards established in Minn. Reg. APC 1."

New York (Part 360, Solid Waste Management Facilities, May, 1977)

"All fill areas or excavations at a sanitary landfill shall terminate no closer than fifty feet from the boundary lines of the property on which the sanitary landfill is operated."

"Solid waste management facilities shall not be operated or constructed on flood plains unless provisions have been made to prevent the encroachment of flood waters upon said facility."

"No facility shall be closer than ten feet to groundwater table or bedrock." (For secure landfills)

"No facility shall be located over groundwater recharge areas serving public water supplies." (For secure landfills)

"Facilities shall be located at an elevation not less than five feet above a flood plain unless provisions have been made to prevent the encroachment of flood waters." (For secure landfills)

Oklahoma (Rules and Regulations for Industrial Waste Management, 197

"No site or facility located within a one-hundred-year flood plain shall be granted a permit, unless in the Department's judgement adequate flood control measures have been provided in the site or facility design and construction."

"No ultimate disposition of Controlled Industrial Waste shall be allowed within two hundred (200) feet of the permit boundary."

Oregon (DEQ 41, April 5, 1972)

"Modified landfills should be located a minimum of 1/4 mile from the nearest existing residence or commercial establishment other than that used by the landfill operator."

Pennsylvania (P.L. 788 (no. 241))

"A twenty-five (25) foot zone shall be established upon which no solid waste shall be deposited adjacent to perimeter property line. unless otherwise approved by the Department."

"The site shall not have a flooding hazard of greater frequency than once in 100 years."

Texas (Technical Guidelines for Solid Waste Management, May 3, 19

"Listed below are a number of factors that should be given consideration when trying to select a disposal site that will pose the least amount of threat to the environment."

Geology and Topography

(1) Low relief to minimize erosion and landslide or slumping potential.

(2) Impervious stable rock formations, such as thick, massive clay beds are preferable. Active faults, high seismic risk zones,

and highly permeable formations such as limestone and sand aquifer recharge zones, flood plains, and fluvial terrace deposits should be avoided.

Hydrology

(1) Bottom of the pit, pond or landfill should be well above the historical high groundwater table. Floodplains, shore lands, and groundwater recharge areas should be avoided.

(2) Significant hydraulic connection (surface or subsurface) between the site and standing or flowing surface water should be absent.

Climatology

(1) Outside the paths of recurring severe storms, such as tornados and hurricanes.

(2) Low air pollution potential (e.g., low inversion potential, good circulation, prevailing winds away from populated areas).

Environmental Health

(1) Locate away from private wells for human and/or livestock use and from municipal water supplies, reservoirs, or wells.

(2) Low population density.

Ecology

(1) Low fauna and flora diversity.

(2) Avoid wilderness areas, wildlife refuges, and migration routes.

(3) Avoid areas of unique plant communities or animal populations."

IV. Analysis of Regulatory Options:

Option 1: General regulatory language. For example, "All facilities shall be so situated as to assure no adverse affect on human health and the environment."

Advantages:

°Nonspecific regulatory language allows more latitude and flexibility in enforcement. Enforcement authorities would be able to decide on a case-by-case basis whether the siting of a particular facility in a particular location would pose a threat to human health and the environment. Such an evaluation could take into consideration such factors as local topography and climatology depth to groundwater and adajacent surface water courses, distance from private and municipal wells, anticipated impact on unique plant and animal populations, et cetera.

Disadvantages:

°Difficulty in compliance because of non-specificity of language (e.g. areas to avoid, distance required from environmentally sensitive areas).

°May result in non-uniform implementation.

°In the absence of specific national standards, there will be no means by which to assess or compare the equivalency of State hazardous waste programs to the federal program.

°States may find it difficult to develop adequate hazardous waste programs without the existence of specific federal standards as guidance.

Option 2: General regulatory language coupled with specific recommendations. For example, "All facilities shall be so situated as to assure no adverse effect on human health and the environment. Listed below are a number of factors that should be given consideration when trying to select a disposal site that will pose the least amount of threat to human health and the environment..." (see excerpts from Texas' guidelines on pg. 17 for an example of a list of factors to be considered).

Advantages:

°Clearly defines factors for owners/operators to be concerned with when they are looking for places to locate their facilities.

°Provides flexibility in enforcement.

°Recommendations, although bearing no legal weight, aid in enforcement because of the "as to assure no adverse effect on human health and the environment" criteria in the general statement.

°Aids enforcement officials in judging the adequacy of the site selected for facility location.

°Provides a basis for assessing the equivalency of state programs.

Disadvantages:

°Possible loophole in enforcement because suggestions are not legally enforceable.

Option 3: Specific regulatory language. For example, "Facilities shall not be located in an active fault zone."

Advantages:

°Specific and clearly defined duties which are not subject to broad interpretation, either in imposing liability or escaping liabi

°More easily enforceable, less discretionary.

°Provides a basis for assessing the equivalency of state programs.

Disadvantages:

°More difficult to formulate regulations in that specific areas where facilities should not be located would have to pinpointed.

°Variable geology may make certain aspects of these siting requirements inappropriate in some areas.

°Inflexibility of specific standard ~~it~~ discourages industry from developing new and innovative technologies.

Option 4: Specific regulatory language coupled with notes which provide a basis for deviation from the standard. For example, "active portions of facilities shall be located a minimum of 200 feet from the property line of the facility. Note: Facilit owners/operators may locate active protions of their facilities cl than 200 feet from their property line if it can be demonstrated that unexpected releases or discharges of hazardous waste resultin from fires, explosions, spills and underground leaks can be contro before they cross the facility property boundary."

Advantages:

°This approach has all the advantages of option 3, plus it affords a degree of flexibility which option 3 locks. That is,

the mechanism of the note provides a basis for deviation from the standard if the facility owner/operator can demonstrate that the proposed alternative method meets the objective of the standard.

Option 5. Promulgate no regulations pertaining to the siting of hazardous waste facilities.

Advantages:

°Saves time and personnel in enacting and implementing a regulation.

°selection of locations for facilities would be adequate in some states which already provide for specific siting requirements in their hazardous wate regulations.

Disadvantages:

°Facility locations may be inadequate in states not providing specific siting requirements.

°Requirement is mandated by the Act ("Such standards shall include... requirements respecting ... the location, design, and construction of ... facilities")

V. Identification and Rationale for Chosen Regulatory Option:

The purpose of the site selection standards is to reduce the potential for damage to human health and the environment which can arise from improperly located hazardous waste facilities.

Option 4, the regulatory format chosen for the proposed regulation, best protects human health and the environment by specifically delineating what is required of owners and operators regarding site selection factors, while at the same time, providing flexibility through the mechanism of the note.

The following regulations have been proposed under Section 250.43-1, General Site Selection:

Standard

(a) Facilities shall not be located in an active fault zone.

Rationale

Active faults, those on which repeated fault movements are in progress, may impose a serious threat of earthquake damage to hazardous waste facilities because practical engineering means do no currently exist to protect the integrity of a facility during a serious earthquake.

Damage to the integrity of a facility can result in the uncontrolled release of hazardous waste to the environment. To prevent this, hazardous waste facilities are prohibited from locati in these environmentally sensitive areas.

Standards (b), (c), and (d)

(b) In accordance with Executive Order 11988, "Floodplain Management", a facility shall not be located in a "regulatory flood as adopted by communities participating in the National Flood Insurance Program (NFIP), managed by the Federal Insurance Administration (FIA) of the U.S. Department of Housing and Urban Development. In cases where regulatory floodways have not

been designated by the FIA, the owner/operator shall obtain an analysis, using FIA-approved methods to determine whether the facility is located within a non-regulatory floodway (i.e., a floodway which is currently not regulated by the FIA). A facility shall not be located in an area determined by the analysis to be a regulatory floodway.

(c) In accordance with Executive Order 11988, "Floodplain Management", a facility shall not be located in a "coastal high hazard area" as defined on a Flood Insurance Rate Map (FIRM) by the FIA. In cases where a coastal high hazard area has not been designated by the FIA, the facility owner/operator shall obtain an analysis, using FIA-approved methods, to determine whether the facility is located within a coastal high hazard area. A facility shall not be located in an area determined by the analysis to be a coastal high hazard area.

Note: Facilities may be located in coastal high hazard area if it can be demonstrated that the facility is designed, constructed, operated, and maintained such that the facility will not be inundated by high velocity waters, including, but not limited to, hurricane wave wash or tsunamis (see definition of coastal high hazard area, Section 250.41).

(d) In accordance with Executive Order 11988, "Floodplain Management", a facility shall not be located in a 500-year floodplain.

Note: Facilities may be located in 500-year floodplains if it can be demonstrated that the facility is designed, constructed, operated, and maintained such that the facility will not be inundated by a 500-year flood.

Rationale for (b), (c), and (d)

Standards (b), (c), and (d) are concerned with the location of hazardous waste facilities in floodplains.

Disposal of hazardous waste in floodplains may have several significant adverse impacts: (1) If not adequately protected from flooding, wastes may be inundated by water and flow from the site, affecting downstream waters; (2) since floodplains generally have hydraulic connection to wetlands, surface water, and ground water, location of hazardous waste facilities in floodplains may result in leachate contamination of ground water; (3) filling in the floodplain may restrict the flow of flood waters, causing greater flooding upstream; and (4) filling in the floodplain may reduce the size and effectiveness of the flood-flow retaining capacity of the floodplain, which may cause a more rapid movement of flood waters downstream, resulting in higher flood levels and greater flood damages downstream.

The intent of the proposed regulation is to:

(1) To encourage the search for and siting of facilities out of the 500-year flood plain and coastal high hazard areas; and

(2) To prohibit facilities in regulatory floodways.

For the purposes of these standards, the minimum floodplain of concern is the 500-year floodplain defined as the area subject to inundation from a flood having a 0.2 percent chance of occurring in any given year. The U.S. Water Resources Council's Floodplain Management Guidelines for Implementing Executive Order 11988 suggests that the construction of a hazardous waste facility is a "critical action", which they define as those actions for which even a slight change of flooding would be too great. The guidelines further explain that a key question to ask in determining whether an action is critical is:

> If flooded, would the proposed action create an added dimension to the disaster as could be the case for liquiefied natural gas terminals and facilities producing and storing highly volatile, toxic, or water reactive materials?

Clearly, the establishment of a hazardous waste facility meets this description of a critical action.

500-year floodplains are shown as Zone B on the Flood Insurance Rate Maps issued by the Federal Insurance Administration. Such maps have been published by the FIA for over 1,300 communities, and maps for more communities continue to be published for FIA's program to provide maps of all flood prone areas by 1983. Additional agencies which furnish floodplain information are listed in Appendix.A of the WRC Floodplain

Management Guidelines.

Standard 250.43-1(d) discourages the location of facilities in 500-year floodplains, but it does not prohibit their location in such areas. That is, if the owner/operator can design, construct, operate and maintain his facility such that it will not be inundated by a 500-year flood, then the facility may be located in a 500-year floodplain.

Standard 250.43-1(c) provides a comparable degree of flexibility in that it allows the owner/operator to engineer a site to alleviate flood hazards. That is, although owners/operators are discouraged from locating their facilities in coastal high hazard areas, they are allowed to do so if they can demonstrate that the facility will not be inundated by the type of hazard (e.g. hurricane wave wash and tsunamis) associated with these areas. The reason why facilities are restricted from locating in costal high hazard area is because "these are the floodplain areas where flooding is not only most frequent and damaging, but where natural and beneficial values of the land and water interface are at their maximum."

Standard 250.43-1(d) prohibits the location of hazardous waste facilities in regulatory floodways. "These are the frequently flooded areas that become areas of major flood dynamics during large floods. Here flood-waters exert their maximum pressures, erosion is greatly accelerated and loss potential is increased." Because these areas are particularly susceptible to increased flood heights and consequent increased area subject to flooding resulting from impendence to flood flow due to man's occupancy, the Agency has proposed that facilities be banned from these portions of the floodplain.

Standard

(e) In accordance with Executive Order 11990, "Protection of Wetlands," a facility shall not be located in a wetland.

Note: A facility may be located in wetlands if:

(1) The facility obtains a National Pollutant Discharge Elimination System permit under Section 402 of the Clean Water Act (Pub. L.92-500, as amended by Pub. L. 95-217, 33 U.S.C. 1251 et seq.), and

(2) In the case where dredging or filling of the wetland is directly associated with the disposal facility, the owner/operator obtains a permit issued under authority of Section 404 of the Clean Water Act (Pub. L. 92-500, as ammended by Pub. L. 95-217, 33 U.S.C. 1251 et seq.).

Rationale

The intent of the wetlands standard is to minimize adverse impacts on wetlands. The nation's coastal and inland wetlands are vital natural resources of great hydrological, ecological, economic, and social importance. Wetlands provide natural flood and storm control, sediment and erosion control, recharge of aquifers, natural purification of waters, and flow stabilization of streams and rivers. Wetlands produce large quantities of nutrients which support complex ecosystems extending into estuaries and streams, well beyond the marshes and wetland areas. Wetland habitats support fish, shellfish, mammals, waterfowl, and other wildlife fauna and flora. Moreover, wetlands are used

in the production of many agricultural products (food and fiber) and timber, as well as for recreational, scientific, and cultural pursuits.

The alteration and destruction of the wetland resources through draining, dredging, filling and other means has had an adverse cumulative impact on wetlands and other aquatic resources. Recent estimates indicate over 40 percent of the 120 million acres of wetlands in the United States that existed 200 years ago have been irrevocably destroyed.

The appropriate mechanism to be used to protect the wetlands is the authority contained in the Clean Water Act (CWA). An objective of the CWA is to "restore and maintain the chemical, physical, and biological integrity" of the waters of the United States, and therefore wetlands are protected by the authorities of the CWA.

Section 402 of the CWA allows EPA to issue permits (NPDES) for the discharge of pollutants into the waters of the U.S. Since hazardous wastes are pollutants as defined by the CWA, the discharge of hazardous waste into wetlands requires a permit issued pursuant to the authority of Section 402 of the CWA.

Section 404 of the CWA requires the Army Corps of Engineers to issue permits for the discharge of dredged or fill material into the waters of the U.S. Therefore, if during the construction or operation of a hazardous waste facility in a wetland, there is a need to place fill material for a dike, levee, or other water containment structure, a permit issued pursuant to the authority of Section 404 must be obtained in addition to the NPDES permit issued pursuant to Section 402.

Standards

(f) A facility shall not be located so as to be likely to jeopardize the continued existence of Endangered and Threatened Species as listed pursuant to the Endangered Species Act of 1973 (16 U.S.C..1530 et seq.) in 50 CFR; nor result in the destruction or adverse modification of their Critical Habitat as contained in 50 CFR Part 17, Subpart F: Critical Habitat, 1760 et seq.

Note: A facility may be located in critical habitat areas if, after consultation with the Office of Endangered Species, U.S. Fish and Wildlife Service, Department of the Interior, it can be demonstrated that, at the time a permit is issued pursuant to Subpart E, the treatment, storage or disposal operations carried out by the facility will not jeopardize the continued existence of Endangered and Threatened Species located within the Critical Habitat areas listed in 50 CFR Part 17.

Rationale

Under Section 7 of the Endangered Species Act (ESA), all Federal departments and agencies, in consulation with the Secretary of the Interior or the Secretary of Commerce are required to utilize their authorities in furtherance of the purpose of the ESA. One of these purposes is "to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved.

The intent of this standard is to ensure that hazardous waste facilities do not jeopardize the continued existence of threatened or endangered species nor result in the destruction or adverse modification of their critical habitats. These species are listed pursuant to Section 4 of the ESA. The species and their critical habitats as covered by this criterion can be found in 50 CFR Part 17. The proposed regulation discourages the siting of hazardous waste facilities in critical habitats, but is flexible enough to allow those facilities which can be demonstrated not to threaten endangered species to locate in these environmentally sensitive areas.

Standard

(g) A facility shall not be located in the recharge zone of a sole source aquifer designated pursuant to Section 1424(e) of the Safe Drinking Water Act (Pub. L. 93-523).

Note: A facility may be located in the recharge zone of a sole source aquifer if it can be demonstrated, at the time a permit is issued pursuant to Subpart E, that the facility is located, designed, constructed, operated, maintained and monitored to prevent endangerment of the sole source aquifer.

Rationale

Aquifers are water-bearing, geologic formations which often yield significant quantities of water to wells or springs.

Fresh groundwater, estimated at about 65 quadrillion gallons, constitutes an important national resource. Some 69 billion gallons of fresh water are pumped out of the ground each day, equal to 21% of daily national use excluding hydroelectric power generation. Approximately, 123 million Americans rely on groundwater for drinking purposes. Groundwater also supplies 36% of all irrigation water and about 25% of the fresh water used by industries dependent on their own water supply facilities. Six States depend on groundwater for more than half on their water needs.

Aquifers are replenished through recharge zones which are permeable to rainfall and surface runoff and through which the aquifer is susceptible to contamination. The location of a hazardous waste facility in the recharge zone is undersirable because:

(1) Rendering areas unfit for recharge zones reduces the recharge and therefore reduces the amount of water available for use;

(2) It would increase the potential of groundwater contamination via infiltration of hazardous waste to the aquifer.

The purpose of this regulation, therefore, is to discourage the location of hazardous waste facilities in these environmentally valuable areas.

Standard

(h) Active portions of facilities shall be located a minimum of 200 feet from the property line of the facility.

Note: Facility owners/operators may locate active portions of their facilities closer than 60 meters (200 feet) from their property line if it can be demonstrated that unexpected releases or discharges of hazardous waste resulting from fires, explosions, spills, and underground leaks can be controlled before they cross the facility property boundary.

Rationale

The purpose of setting a minimum distance from which the active portion of a facility can be located from its boundary line is to provide a buffer zone between the public and the facility. The Agency believes that buffer zones reduce risks to public health and environment by allowing unexpected discharges resulting from fires, explosions, spills, underground leaks, et cetera, to dissipate before crossing the property boundary. In addition, buffer zones can be used for aesthetic purposes, such as noise reduction or concealment of facilities in order to preserve natural appearances.

The selection of 200 feet from the facility's boundary line as the required width of the buffer zone was based on the following premise:

The State Oklahoma prohibits disposition of industrial waste within 200 feet of the permit boundary, thus providing a precedent for the proposed RCRA regulation. Although other States have narrower width requirements for buffer zones (e.g. Wisconsin-20 feet; Pennsylvania-25 feet; and New York-50 feet), these regulations only pertain to municipal solid waste. Since hazardous waste poses a greater risk to public health and the environment than municipal solid waste, Oklahoma's more stringent regulation for industrial waste was adopted.

An actual distance was specified in order to facilitate enforcement and to provide a tangible point of reference.

Environmentally Sensitive Areas not included in discussion of locations for hazardous waste facilities:

The Agency has chosen not to restrict the location of hazardous waste facilities in the following environmentally sensitive areas for the reasons stated below:

(1) Shorelands: can be subsumed under the wetland criteria, and hence are regulated under mandatory standard 250.43-1(e). In most instances shorelands would also be regulated under the floodplain standard 250.43-1(c).

(2) Wilderness areas and refuges: protection of these areas is already provided by the Wilderness Act.

(3) High population density areas: A hazardous waste facility can be safetly engineered and operated in high density areas; therefore, it in not necessary to restrict their location to low density areas. In addition, public hearings are required for proposals for new sites, and people affected by a hazardous waste facility would have an opportunity to contest the location of the facility in their neighborhood. The setting of minimum distances from which the active portion of a facility may be located from its property line will also serve to minimize, the need for this requirement.

(4) Active volcanoes, active sand dune areas and active glacial areas,. These three areas would be undesirable locations for hazardous waste treatment storage and disposal facilities due to their instability and value as natural resources. However, all such volcanoes and glaciers in the U.S. are located in state or national parks and thus already protected. Most active sand dunes are also within parks or adequately protected by the coastal high hazard area restriction.

(5) Permafrost areas: Permafrost areas are very fragile ecosystems with very significant potential erosion and groundwater contaminant problems.

Disposal of hazardous waste in permafrost areas presents three environment problems. First, any disturbance of the delicate plant and moss cover insulation increases the depth of annual thaw. Since permafrost is commonly

composed of supersaturated soils and ice, an increased depth of thaw can alter the surface contour, create lakes, and cause significant erosion. Moreover, any activity to control erosion by surface and subsurface waters tends to increase the thaw and erosion problem.

Second, disposal of hazardous waste in the active permafrost zone may cause difficult water pollution problems. All seasonal water movement occurs in this active zone and leachate contamination is very likely. Since the active zone of permafrost areas is commonly the only source of drinking water, prevention of contamination is essential in order to preserve this vital resource.

Third, waste disposed of in permafrost areas is generally deposited on the surface, undergoes very little change over time, and therefore accumulates and remains as a hazard to future generations.

For the above reasons, the Agency first considered writing regulations which would restrict the location of hazardous wastes facilities in permafrost areas.

However, because permafrost is, for the most part, confined to the State of Alaska, the management of permafrost is not "national" in scope, as is true of the other environmentally sensitive areas regulated in the general site selection section of these regulations. It is the opinion of the Agency that the State of Alaska, rather than the Federal Government, should decide what is feasible and necessary to protect these remote areas in their state. Therefore, specific regulations

related to facility location in permafrost areas have not been included in these rules.

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BD-15

Resource Conservation and Recovery Act

Subtitle C - Hazardous Waste Management

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

DRAFT

BACKGROUND DOCUMENT

Section 250.43-2 Standards for Security

U.S. Environmental Protection Agency
Office of Solid Waste
December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulation. As new information is obtained, changes may be made in the regulations as well as in this background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

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I. Introduction

Section 3004 of the Resource Conservation and Recovery Act gives the Administrator authority to promulgate regulations establishing such performance standards, applicable to owners/operators of facilities for the treatment, storage, or disposal of hazardous waste, as may be necessary to protect human health and the environment. Section 3004 does not specifically require regulations relevant to security measures at facilities, however, there does exist a hazard to human health resulting from the unauthorized/unknowing entry of persons and/or entry of domestic livestock on to the active portions of hazardous waste treatment, storage or disposal facilities as documented by numerour incidents. Therefore, it is necessary to establish certain minimum requirements for security provisions at facilities sufficient to prevent unauthorized/unknowing entry of persons and/or entry of domestic livestock onto the active portions of a facility.

For the purpose of this document, the pertinent terms are defined as follows:

"Scavenging" means the unauthorized or uncontrolled removal of hazardous waste materials from a facility.

"Facility" means any land and appurtenances thereto used for treatment, storage, and/or disposal of hazardous waste.

"Active Portion" means that portion of a facility where treatment, storage, or disposal operations are being conducted. It includes the treated area of a landfarm and the active face of a landfill, but does not include those portions of a facility which have been closed in accordance with the facility closure plan and all applicable closure standards.

"Disposal Facility" means any facility which disposes of hazardous waste.

"Storage Facility" means any facility which stores hazardous waste, except generators who store their own wastes for less than 90 days for subsequent transport off-site.

"Treatment Facility" means any facility which treats hazardous waste.

II. Rationale for the Regulations.

The rationale for regulations relevant to security measures at facilities is obvious as so illustrated by the following damage incidents.

A. Damage Incidents

Grant County, Washington. In 1972, mercury-treated grain was found at the Wilson Creek dump in Grant County, Washington, by an unsuspecting farmer. He hauled it to

his farm for livestock feed. The episode was discovered just before the farmer planned to utilize the grain.

In 1969, three children in a New Mexico family sustained serious alkyl mercury poisoning after eating contaminated pork. A fourth child suffered congenital mercury poisoning after his mother consumed the contaminated pork in her first trimester of pregnancy. The hog had been fed grain treated with methyl mercury type seed dressing. The grain originated from a seed company, where the father of the children obtained the floor sweepings without charge and subsequently fed these to the hogs he was raising. About 100 bags of similarly treated grain were discovered subsequently at the community dump of another town in New Mexico. It was established by public health authorities that some of this dumped grain - which originated from a different source than in the previous case - had been scavenged and used as animal feed in the area. As a result, a large number of hogs, chickens, and other animals had to be quarantined.

Four cattle died and four others were adversely affected when cows broke through a fence to a junk pile on which there was an old bag of lindane. Lab results showed 4400 ppm lindane in the rumen contents of the dead animals. The incident occurred in Jasper, Newton County, Iowa, in September 1974. The carcasses and remaining lindane were buried.

The following incident did not occur on the active portion of a hazardous waste facility, however, this incident does illustrate the curiosity children may have regarding an "attractive nuisance" associated with hazardous waste. Three boys become ill after playing in a 55-gallon drum which they had filled with water. The drum formerly contained De-Pester Parathion. One boy, age 6, died from the dermal entry of parathion; the others, ages 7 and 6, were hospitalized, administered Atropine, and released fully recovered. The incident occurred on June 29, 1968, in Dunning, Nebraska.

The hazard associated with each of the wastes named in the aforementioned damage incidents is ever present. However, the means for controlling accessability to the active portions of a hazardous waste facility, for human health and environmental protection, is accomplished via the proposed 3004 draft regulations, Section #250.43-2. Planned, organized and implemented security management provisions will undoubtedly either prevent or minimize the unmitigated damage to human health and the environment resulting from the absence of these proposed regulations.

III. Identification of Regulatory Options.

A. Specific Standards Mandated by RCRA

Specific standards addressing security provisions have not been mandated by RCRA. However, the statement in the Act, as may be necessary to protect human health and the environment," strongly implies that no provision which

protects human health and the environment be eliminated from the 3004 requirements.

B. Existing Federal, State or Local Regulations that could be adopted.

State of Washington Security Requirements.

WAC 173-302-290 SECURITY REQUIREMENTS. (1) The operator shall maintain all fences.

(2) The operator shall insure that controlled entry by authorized persons is maintained at all times by:

(a) Having appropriate personnel on duty 24 hours a day;

(b) Requiring identification and logging in of all persons entering; and

(c) Securing all facilities during non-operating hours.

(3) The operator shall maintain facilities for telephone and radio contact with the Hanford Reservation Security Patrol.

(4) The operator shall maintain all warning signs.

Proposed and existing regulations of several States regarding security requirements are summarized below:

Minnesota proposed regulations (HW-4 and HW-8) require:

(1) A hazardous waste facility shall control access to the site. This shall include adequate fences, gates, and other necessary features.

(2) A chain link fence enclosing the storage area together with other appropriate measures to secure the area against unauthorized entry or damage shall be constructed for all outside storage areas.

(3) The storage area shall have a secure access and, when unattended, be locked.

(4) Scavenging shall not be allowed at a hazardous waste facility.

Pennsylvania's Rules and Regulations for Solid Waste Management require:

(1) Access to the site shall be limited to those times when an attendant is on duty.

(2) Hours of operation and other limitations shall be prominently displayed at the entrance. The sign shall be a minimum size of 3 feet by 4 feet.

(3) A gate or barrier and fencing as approved by the Department shall be erected to block access to the site during times when an attendant is not on duty.

(4) Access by unauthorized vehicles or persons shall be prevented.

(5) Scavenging shall be prohibited.

In addition, they require in the permit application:

(6) All fencing and barriers to be constructed at a facility shall be shown on the plans in full elevation, fully dimensioned, and type of construction materials shall be identified and specified.

Oregon

(1) Access to landfills which are not attended on a twenty-four hour basis shall be controllable by means of gates which may be locked, and the site shall be completely enclosed by a perimeter fence unless access is adequately controlled by the natural terrain features of the site.

(2) Signs shall be posted at a sludge spreading area as required. Signs which are clearly legible and visible shall be posted on all sides of a sludge lagoon, stating the contents of the lagoon and warning of potential hazard to health.

Texas

(1) To avoid abusive use of facilities or indiscriminate dumping of wastes into a facility by persons other than those responsible for the facility's proper use, a 4 foot (or higher) fence, wall, impassable ditch or similar device should be provided around the site or facility.

(2) Where hazardous (toxic, flammable, corrosive, etc.) materials or conditions exist, care must be taken to ensure that stock, pets, children or other persons cannot have easy access to these stored or disposed of materials or conditions, especially when the site or facility is unattended. A six-foot woven mesh fence or the equivalent is usally considered adequate for this purpose.

The California draft hazardous waste regulations state:

(1) The hazardous waste facility shall have posting and fences as necessary to protect public health and safety, domestic livestock or wildlife.

(2) Storage of hazardous waste shall be in a secure enclosure, including but not limited to a building, room, or fenced area, which shall be adequate to prevent unauthorized persons from gaining access to the waste. A caution sign shall be posted and visible from any direction of access of view of hazardous waste stored in such enclosure. Wording of caution signs shall be in English, "CAUTION - HAZARDOUS WASTE STORAGE AREA - UNAUTHORIZED PERSONS KEEP OUT", and Spanish, "CUIDADO' ZONA DE RESIDUES PELIGROSOS. PROHIBIDA LA ENTRADA A PERSONAS NO AUTORIZADAS".

IV. Analysis of Regulatory Options.

A. Human Health and Environmental Protection Provided.

The State regulations as listed under (III) (B) provide for human health and environmental protection, however, the degree of protection provided is determined by the structure and content of the various state requirements.

Advantages & Disadvantages of various options are as follows:

Option I Specific requirements.

Adoption of state regulatons of a specific nature, (e.g. State of Washington, Security requirements #2(a) (b) (c).

(1) The operator shall insure that controlled entry by authorized persons is maintained at all times by:

(a) Having appropriate personnel on duty 24 hours a day;

(b) Requiring identification and logging in of all persons entering; and

(c) Securing all facilities during non-operating hours,

State of Pennsylvania #2...

Hours of operation and other limitations shall be prominently displayed at the entrance. The sign shall be a minimum size of 3 feet by 4 feet.

#5 Scavenging shall be prohibited.

State of California #5...

Storage of hazardous waste shall be in a secure enclosure, including but not limited to a building, room, or fenced area, which shall be adequate to prevent unauthorized persons from gaining access to the waste. A caution sign shall be posted and visible from any direction of access or view of hazardous waste stored in such enclosure. Wording of caution signs shall be in English, "CAUTION - HAZARDOUS WASTE STORAGE AREA - UNAUTHORIZED PERSONS KEEP OUT," and Spanish, "CUDADO' ZONA DE RESIDUES PELIGROSOS. PROHIBIDA LA ENTRADA A PERSONAS NO AUTORIZADAS".

Advantages:

1) Simplifies regulatory program.
2) Industry knows exactly what is necessary for compliance.
3) Enforcement is less difficult.

Disadvantages:

1) Inflationary
2) Does not take into account unique problems and situations.

3) Inhibits innovative and creative thinking.

Option II - Performance standard with general minimum requirements.

State of Minnesota...

1) A hazardous waste facility shall control access to the site. This shall include adequate fences, gates, and other necessary features.

2) A chain link fence enclosing the storage area together with other appropriate measures to secure the area against unauthorized entry or damage shall be constructed for all outside storage areas.

State of Oregon....

1) Access to landfills which are not attended on a twenty-four hour basis shall be controllable by means of gates which may be locked, and the site shall be completely enclosed by a perimeter fence unless access is adequately controlled by the natural terrain features of the site.

Advantages:

1) Provides for minimum protection.

2) Terms... adequate, necessary and appropriate allows for site specific design, operation and/or construction.

Disadvantages:

1) Terms... adequate, necessary and appropriate are vague and subjected to individual interpretation.

2) Enforcement may be a problem.

3) Person making determination as to what is adequate, necessary and appropriate may lack the necessary expertise.

Option III - Proposed 3004 Draft Regulations.

Specific requirements... Notes allowing for deviation.

V. Identification of Chosen Regulation and Associated Rationale.

250.43-2 Security

(a) Facilities shall have 6 foot (2m) high fencing completely surrounding the active portion of the facility capable of preventing scavenging, unpermitted treatment, storage or disposal activity, the unknowing entry of persons, domestic livestock or any other unauthorized entry.

Note: Facilities do not have to comply with the above standard (250.43-2(a)) if the owner/operator can demonstrate that the active portion of the facility in question is surrounded by a natural or artificial barrier capable of preventing scavenging, unpermitted treatment, storage or disposal activity, the unknowing entry of persons, domestic livestock or any other unauthorized entry.

(b) Ingress through each gate or other access shall be controlled by an attendant, mechanical or electromechanical device whenever the facility is in operation, (e.g., security personnel, key cards, or television monitors, respectively). Each gate or other access shall be secured whenever the facility is not in operation.

(c) A sign, in the English language and any other predominant language of the area surrounding a facility (e.g., facilities in states bordering Mexico and Canada shall have signs posted in Spanish and French respectively), having the following legend - (WARNING - Unauthorized Personnel Keep Out) shall be posted about the active portions of the facility. The sign shall consist of block letters not less than four (4) inches in height. The

letters shall be of a color offering high contrast with the background color of the sign.

Note: Facilities may deviate from the specified four (4) inch block letters and legend of the sign as specified in Standard 250.43-2(d) provided that the facility owner/operator can demonstrate that the proposed alternative sign in question is legible and clearly visible from each and every access on to the active portions of a facility and that the sign warns against unauthorized entry or is unnecessary in light of the standards, the particular sites operation, wastes handled, etc., in making this determination.

Advantages:

1) Industry knows exactly what is necessary for compliance.

2) Regulation with attached note allows for innovative and creative thinking.

3) The regulatory process is simplified.

4) Enforcement is less difficult.

Disadvantages:

1) Specific regulations may be costly.

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Resource Conservation and Recovery Act

Subtitle C - Hazardous Waste Management

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

DRAFT

BACKGROUND DOCUMENT

Section 250.43-3 - Contingency Plan and Emergency Procedures

DECEMBER 15, 1978

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being made available as a draft for comment. As new information is obtained, changes may be made in the regulations, as well as in the background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

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I. BACKGROUND

The Resource Conservation Recovery Act (RCRA) gives the Administrator the authority to promulgate regulations establishing such performance standards, applicable to owners/operators of facilities for the treatment, storage or disposal of hazardous waste identified or listed under Subtitle C, as may be necessary to protect human health and the environment. Such standards must include requirements respecting contingency plans for effective action to minimize unanticipated damage from any treatment, storage or disposal of any such hazardous waste. The contingency plans required are meant to be a plan of action which can be implemented following an accidental discharge, fire, or other emergency which threatens human health or the environment. They are to be implemented by a responsible official of the company and all employees are to be trained in carrying them out. Off-site emergency services, e.g. fire departments, rescue squads, etc, are to be included in the plan.

An analysis of the Agency's hazardous waste damage case files (Appendix I) readily identifies the emergency situations which the contingency plans should address. Clearly, the plans must provide procedures for minimizing impacts from emergencies involving spills, explosions, fires, and toxic gas emissions. In addition however, the contingency plans should outline procedures to be followed in the event groundwater is polluted.

II. IDENTIFICATION AND ANALYSIS OF REGULATORY OPTIONS

A. Who Species Contingency Plans?

This is the first question the Agency faced in preparing these regulations. There are two possible approaches.

(1) The Agency prepares a plan based on data submitted by the applicant.

(2) The applicant prepares the plan as part of his permit application; the Agency approves.

Option (2) was chosen because the applicant is in a better position to judge the potential for various types of problems and to design procedures for minimizing impacts. Agency permit writers on the other hand would, of necessity be guided by documents from Headquarters which would not provide needed flexibility to tailor procedures to the specific problems peculiar to any given facility. The probable result would be contingency procedures which do not provide adequate response to the emergency.

B. How Specific Should the Requirements Be?

The issue to be addressed here concerns the level of detail to be contained in the uniform contingency plan standards. Specific requirements would provide uniformity in application, thus providing uniform response level. However, due to the wide variety in facility designs and sizes, site characteristics, and local emergency services available at each location, it is difficult to design specific standards which can be made applicable to all kinds of facilities. Additionally, considering the relatively brief history of the hazardous waste management industry, many

innovations in techniques of treatment, storage and disposal, as well as emergency response and remedial action are expected. These developments would require constant revision of specific standards governing contingency plans.

Flexible more general requirements could state the objective of the standard without specifying the technique to be employed. These requirements enable the tailoring of contingency plans to individual facilities and encourage innovation. However, evaluation of the adequacy of contingency plans becomes more difficult, requiring extensive review by qualified regulatory authorities.

On balance, the Agency's goal was to provide requirements as specific and detailed as possible consistent with the necessity to have them cover all kinds of facilities. Permitting officials will receive guidance on how to evaluate contingency plans developed by applicants and how to identify shortcomings and deficiencies,

C. Should Standards be Tailored for Different Types of Facilities?

This issue is similar to the last since both involve uniformity in regulations. The concept here is that more specific standards might be designed on a facility loss basis and, as stated above, more specific standards are desirable.

On the other hand, the response one takes to an emergency is more closely associated with the nature of the emergency rather than the design of the facility. Remedial action for groundwater pollution is generally the same regardless of the design of the source. One fights a fire in much the same manner

regardless of whether a storage tank or landfill is burning. In this case, it depends more closely on the nature of the waste than on the facility design.

Because of the peculiarities of differing facilities and the differences, in the wastes handled, the Agency has concluded that tailoring standards for contingency plans and emergency response to classes of facilities would probably do little to improve the regulatory program. On the negative side, such an approach would cause the regulations to be much more complex.

D. Should Facilities be Limited in the Volume Handled?

By establishing limits on the handling capacity of individual facilities, the overall threat to human safety and the environment might be reduced for two reasons. By limiting the amount of hazardous waste at a given facility, the magnitude of the maximum possible accidental release would be reduced; and handling limitations would force an increase in the number of on-site facilities, possibly resulting in an overall reduction in transport of the wastes, and therefore the number of transportation-related accidental releases. However, there are also a number of disadvantages.

(1) An increased risk of accidental release would result from the greater number of facilities.

(2) A policy of requiring small facilities would also increase the problem of finding enough suitable sites. Geological and hydrological constraints will limit the potential number of suitable sites. Popular opinion may

be a factor also in that it may be more difficult, in terms of citizens resistance, to establish many small sites than a few large ones, and development of adequate capacity poses a potentially serious hindrance to successful implementation of these regulations.

(3) A multitude, small facilities would be administratively more difficult to permit monitor, and enforce against.

(4) Limiting size may also preclude achieving economics of scale in facility design, thus driving up costs and economic impacts.

In sum, the Agency has concluded that the advantages of limiting site capacity will be more than off-set by the disadvantages. In effect, poorer oversight, more facilities, and difficulties in siting facilities may cause added environmental damage.

III. COMPATIBILITY OF CONTINGENCY PLAN STANDARDS WITH EXISTING FEDERAL LAWS AND REGULATIONS

Section 1006 of the Resource Conservation and Recovery Act of 1976 requires that the provisions of the Act be integrated with the appropriate provisions of the Clean Air Act, the Clean Water Act, the Federal Insecticide, Fungicide and Rodenticide Act, the Safe Drinking Water Act, the Marine Protection, Research, and Sactuaries Act of 1972 and other such acts which grant authority to the EPA administrator, to avoid duplication among the acts and enable their efficient administration and enforcement. The purpose of this section is to review the provisions of the above laws which deal with areas related to emergency response requirements or contingency plans in order to establish the extent of existing laws with regard to contingency plan requirements.

A. Clean Air Act

Section 112 of the Clean Air Act authorizes the Administrator of EPA to set standards for hazardous air pollutants at any level "which in his judgment provide an ample margin of safety to protect the public health". Specifically, asbestos, beryllium and mercury are three hazardous pollutants for which emission limits have been promulgated. However, emergency response requirements for the accidental release of hazardous pollutants above these levels are not addressed in the act. Hazardous waste facilities which handle substances for which emission standards have been set under this act must meet these emission standards. However, any contingency plan standards promulgated under RCRA would be outside the scope of the Clean Air Act regulations, and are thus compatible.

B. Clean Water Act

In response to the President's request for the Council on Environmental Quality to carry out subsection (c) (2) of section 311 of the Clean Water Act, as amended, (33 U.S.C. 1251, et seq.), the Council developed the National Oil and Hazardous Substances Pollution Contingency Plan. The objectives of the Plan are "to provide for efficient, coordinated and effective action to minimize damage from oil and hazardous substance discharges, including containment, dispersal and removal." The Plan is effective "for the navigable waters of the United States and adjoining shorelines and for the contiguous zone and the high seas where a threat to the United States waters, shoreface, or shelfbottom exists."

The most significant provision put forth under the Plan potentially related to hazardous waste management facilities is the requirement that any person in charge of an onshore facility shall, as soon as he has knowledge of any discharge of oil or a hazardous substance into navigable waters, immediately notify the nearest EPA or United States Coast Guard office of such discharge. In the event the responsible party is unable to eliminate the threat to the U.S. waters, shoreface, or shelfbottom, the Federal government is assigned the task of undertaking response activities to minimize damages from such discharge. The Federal government is then authorized to bring suit against the party responsible for the discharge for costs incurred in the response effort.

In summary, the National Oil and Hazardous Substances Pollution Contingency Plan imposes two requirements on hazardous waste facilities if an accidental release from such facilities threatens navigable waters: notification of EPA or the Coast Guard, and recovery of the release. Since both these requirements are included in the contingency plan standards discussed earlier, there is no incompatibility between the contingency plan standards promulgated under RCRA and the National Oil and Hazardous Substances Pollution Contingency Plan.

C. <u>The Federal Insecticide, Fungicide and Rodenticide Act</u>

Under the authority of the Federal Insecticide, Fungicide and Rodenticide Act, as amended by the Federal Environmental Pesticide Control Act of 1972, the EPA promulgated "Regulations for the Acceptance of Certain Pesticides and Recommended

Procedures for the Disposal and Storage of Pesticides and Pesticide Containers" (40 C.F.R. 165). The following guidelines pertinent to accidents at hazardous waste management facilities were published:

1. "All accidents or incidents involving the storage or disposal of pesticides, pesticide containers or pesticide related wastes should be reported to the appropriate Regional Administrator."

2. "Containers should be checked regularly for corrosion and leaks. If such is found, the container should be transferred to a sound, suitable, larger container and properly labeled. Materials such as adsorptive clay, hydrated lime and sodium hypochlorite should be kept on hand for use as appropriate for the emergency treatment or detoxification of spills or leaks."

3. A number of accident prevention measures are suggested.

4. The use of protective clothing and respirators is recommended for all employees handling pesticides.

5. "Where large quantities of pesticides are stored, or where conditions may otherwise warrant, the owner of stored pesticides should inform the local fire department, hospitals, public health officials and police department in writing of the hazards that such pesticides may present in the event of a fire."

In all likelihood, most pesticide-related wastes will fall into the category of "hazardous waste " in the classification to be promulgated under RCRA. However, all of the above requirements are included in the contingency plan standards discussed earlier. Therefore, no conflicting requirements would be introduced through adoption of the contingency plan standards proposed in this report.

D. The Occupational Safety And Health Act Of 1970

This Act authorizes the Secretary of Labor to set mandatory standards to protect the occupational safety and health of all employers and employees of businesses engaged in interstate commerce. Section 6(b)(5) deals specifically with toxic materials and other harmful agents requiring the Secretary to "set the standard which most adequately assures that no employee will suffer material impairment of health or financial capacity" from regular exposure to such hazards.

Specific requirements issued under this Act pertinent to contingency plan standards include:

1. Emergency response requirements have been issued for any facility which handles, processes, releases, or stores 4-nitrobiphenyl, alpa-Naphthylamine, 4, 4'Methylene bis (2-chloroaniline), Methyl chloromethyl ether, 3,3'-Dichlorobenzidine (and its salts), bis-Chloromethyl ether, beta-Naphthylamine, Benzidine, 4-Aminodiphenyl, Ethyleneimine, beta-Propiolactone, 2-Acetylaminofluorene, 4-Dimethylaminoazobenzene, or N-Nitrosodimethylamine. In the event of an accidental release which may result in exposure to or contact with any of the above substances:

a. The potentially affected area shall be evacuated as soon as the emergency has been determined.

b. Hazardous conditions created by the emergency shall be eliminated and the potentially affected area shall be decontaminated prior to the resumption of normal operations.

c. Special medical surveillance by a physician shall be instituted within 24 hours for employees present in the potentially affected area at the time of the emergency.

d. An incident report on the emergency shall be made within 24 hours to the nearest OSHA Area Director.

e. A written report shall be filed with the nearest OSHA Area Director within 15 calendar days of the event and shall include:

   i. A specification of the amount of material released, the amount of time involved and an explanation of the procedure used in determining this figure;

   ii. A description of the area involved and the extent of known and possible employee exposure and area contamination;

   iii. A report of any medical treatment of affected employees and any medical surveillance program implemented; and

iv. An analysis of the circumstances of the incident and measures taken or to be taken, with specific completion dates, to avoid further similar release.

2. Similar emergency response requirements have been issued for facilities handling vinyl chloride.

The contingency requirements issued by OSHA for facilities handling the aforementioned carcinogens concur with those presented earlier for all hazardous waste facilities, with the additional requirement of filing reports with the OSHA Area Director. There are no incompatible provisions between the existing OSHA regulations and those proposed under RCRA.

E. Other Regulations

In addition to the laws described above, the following acts which deal either directly or indirectly with hazardous waste were reviewed to determine if they contained provisions related to contingency plans for hazardous waste management facilities:

-Safe Drinking Water Act (P.L. 93-523)

-Marine Protection, Research and Sanctuaries Act of 1972 (P.L. 92-532)

-Atomic Energy Act of 1954 (42 USC 2011)

-Toxic Substances Control Act (P.L. 94-469)

-Transportation of Explosives Act (18 USC 39)

-Hazardous Materials Transportation Act of 1970 (P.L. 91-458)

None of the preceeding acts were found to have applicability regarding contingency plan standards for the hazardous waste facilities to be regulated by EPA under the Resource Conservation and Recovery Act. Specifically, Section 3004 of RCRA does not mandate regulations concerning transportation related accidents (as do the Transport of Explosives Act, the Hazardous Materials Transportation Act of 1970 and the Marine Protection, Research and Sanctuaries Act of 1972) or accidents involving the release of radioactive wastes regulated under the authority of the Atomic Energy Act of 1954. Neither the Safe Drinking Water Act nor the Toxic Substances Control Act grant authority to EPA to promulgate regulations concerning contingency plan standards.

Conclusion

In conclusion, none of the contingency plan standards proposed for implementation under RCRA were found to be incompatible with existing Federal regulations, or in conflict with the authorities granted under other acts. However, facility operators may find that contingency plans must meet supplementary requirements of other governmental regulations, such as OSHA safety standards requiring supplementary fire equipment other than mentioned in the "Contingency Plan and Emergency Procedures" standards (Section 250.43-3).

Bibliography

1. U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Hazardous Waste Disposal Damage Reports.

2. International Research and Technology Corporation, Final Report, IRT-492-R, September, 1978.

3. Clean Air Act
(42 U.S.C. 1857)

4. The Federal Water Water Pollution Control Act, Section 311 (33 U.S.C. 1151)

5. The Federal Insecticide, Fungicide and Rodenticide Act, 1972 (7 U.S.C. 135)

6. The Occupational Safety and Health Act of 1970.
(29 U.S.C. 651)

IV. APPENDIX I - Analysis of Damage Cases

On the afternoon of December 8, 1977, a series of explosion and fires occurred at a waste treatment facility in New Jersey. The initial explosion, occurring at approximately 2:15p.m., was followed by between two and five additional explosions. The ensuing major fire period lasted about 1 1/2 hours, during which time approximately 12 storage tanks and two tank trucks exploded and/or burned. Personnel began fire fighting operations until the Local Volunteer Fire Department arrived. Within a short time, seven fire fighting units from nearby towns had responded to the alarm with about 200 men. Shortly thereafter, the N.J. State Police arrived on the scene and assumed overall coordination of activities. Within 2 hours of the initial explosion, various Federal and State agency personnel were also on the scene.

Representatives of the N.J. Department of Environmental Protection (NJDEP), the U.S. Environmental Protection Agency (EPA), the Center for Disease Control (CDC), the U.S. Occupational Safety & Health Administration (OSHA), the U.S. Treasury Bomb Squad and state and local police worked with the local public safety officers and company personnel to minimize the immediate and longer-term damage from the fire and explosions. Of immediate concern was whether the toxicity and quantity of the chemicals involved in the fire would necessitate the evacuation of the nearby town. Although it had been determined that evacuation of the town was not necessary, State and Federal authorities warned all persons

who were in direct contact with the explosion scene to take extra precautionary measures with clothing and equipment because of possible toxic contamination.

The incident claimed 6 lives and injured 12 from the work force on site at the time; all were from various contractors who were doing specialized maintenance work. In addition, about 40 firemen were admitted to the local hospital for smoke inhalation and released after treatment.

A load of empty pesticide containers was delivered to a disposal site in Fresno County, California. Unknown to the site operator, several full drums of an acetone/methanol mixture were included in the load. When the load was compacted by a bulldozer, the barreled waste ignited, engulfing the bulldozer in flames. The operator escaped unharmed, but the machine was seriously damaged. The ensuing fire, which also involved pesticide wastes, was extinguished by local firemen. Afterwards, the firemen had to be examined at a local hospital to ensure that they suffered no exposure to pesticide fumes or dusts.[1]

A hauler was unloading drums of flammable waste from a truck at a disposal site in California. One of the drums, when disturbed, exploded or ruptured and the truck was immediately engulfed in flames. The truck was a total loss, but no one was hurt.[2]

While burying drums containing an unknown waste, a bull-

dozer operator at a Waste disposal landfill in Genessee County, Michigan began experiencing dizziness and eye irritation. As a result, he left his bulldozer and upon returning found the machine in flames. Evidently, some of the drums contained volatile and flammable substances, which ignited while he was gone. The operator was not injured, but damage to his bulldozer was estimated at $10,000.[3]

On September 18, 1975, a man was fatally burned when the compacter that he was operating struck a 55-gallon drum of ethyl acetate. He died three days later from second and third degree burns. The machine that he had been operating (valued at $100,000) was a total loss.

The incident occurred after a scavenger/hauler had deposited a load at a landfill, in Cook County, Illinois. It is a 24-hour operation, and the delivery was made in the dark hours of the morning. The load had contained two 55-gallon drums of ethyl acetate, the first of which settled several feet into the fill and the second - the one struck by the employee's machine - settled on the surface. The identity of the waste generator and hauler was discovered from the label on the remaining drum.

CID was cleared of responsibility for the incident as the landfill had a supplemental permit for hazardous waste. The employees family has a civil suit pending against the waste generator and the waste hauler.4

Two serious fires occurred at Landfill in St. Claire County, Illinois during compaction operations On August 29, 1973 and on April 4, 1974. Both fires burned for several days and were difficult to extinguish. The specific cause is not known but the site has accepted various industrial wastes for more than ten years. Some of these wastes came from Chrysler Corporation and Mallinckrodt Chemical Works and included solvents (phenols) and wastes from plastics manufacture. The site no longer accepts barrels of unknown chemicals and has obtained a permit to dispose of nonhazardous industrial wastes.[5]

In October 1974, a bulldozer operator was killed in an explosion at an industrial landfill in Edison Township, New Jersey, as he was burying and compacting several 55-gallon drums of unidentified chemical wastes. The victim died as a result of burns covering approximately 85% of his body.[6]

These cases all display the same mode of occurrence. It appears, however, that actual handling of flammables is not the only way fires involving hazardous waste originate. Incompatible or highly reactive wastes in contact with combustibles which can act as fuel are also a source, as illustrated by the following two incidents.

At a dump in Contra Costa County, California, a large number of drums containing solvents were deposited in a landfill area along with leaking containers of concentrated mineral acid and several bags containing beryllium waste in dust form. The operators failed to cover the

wastes at the end of the day as is customary, and the solvents and acids interacted that night causing a large chemical fire. Firemen and a nearby community might have been exposed to beryllium dust during the fire.[7]

The Wonewac Dump, in Juneau County, Wisconsin, has been the site of many fires involving wastes. Fires would start when waste batteries shorted out and ignited surrounding combustible wastes. One such fire occurred on February 12, 1974, and was visible for three miles. Small explosions in the fire caused scraps of metal to strike an investigating police officer and his squad car.[8]

Apart from the direct ignition of flammable wastes, which appears to be the primary source of fires at H.W. facilities, there is always the possibility that an ordinary fire starting within some structure containing hazardous waste, for instance a building where wastes are treated or stored, may lead to the combustion of the waste themselves. While the following incident did not involve wastes, the stored material is no more hazardous than the components of many industrial wastes. Also, it serves to illustrate the potential for combustion of wastes due to a fire with its primary source elsewhere.

In April 1971, a fire occurred in a warehouse, Okanogen County, Washington, where about two tons of pesticides were stored, including guthion, parathion, endrin, dieldrin, DDT, and other chlorinated hydrocarbons.

Nearly 50 tons of fertilizer were also stored in the building. Toxic emissions from the burning of these chemicals forced the evacuation of nearby residents. Officials also feared the possibility of explosions caused by the fertilizers.

Nearly two million gallons of water were required to extinguish the fire. Much of this water spilled into the street and flowed through gutters and storm sewers to the Okanogen River 1/2 mile away. Endrin at a level of 8 ppm was detected in the run-off into the river in in early April. Also, a city well about 500 feet from the fire site showed a nitrate concentration of 34.4 ppm in early June. While this was still within the USPHS recommended drinking water standard of 45 ppm, expectant mothers and small children were cautioned to avoid drinking the city water for a period of two weeks after the incident.[9]

Spills have also been a major hazard to human health and environmental damage as documented by numerous incidents in HWMD's damage files.

Nuclear Fuel Service, Inc., disposes of containerized radioactive reactor wastes into large trenches in West Valley, New York, and buried them for indefinite storage. Most trenches are located in an impervious clay and do not permit water to percolate through the wastes. Three trenches, however, became waterlogged in early 1975 and discharged wastes containing radioactive strontium 90, cesium 137, and tritium into

the Cattaraugus River. The New York Department of Environmental Conservation ordered the company to stop receiving wastes until the problem was solved. Millions of gallons of water from the trenches were processed for strontium, cesium, and tritium and the leaking trenches abandoned. This prompt treatment prevented massive leakage into the river. The company has resumed operation and no further problems with its other trenches have been reported.

For several years, Mill Service, Inc. has operated a waste treatment and disposal facility at South Huntingdon Township, Pennsylvania, accepting approximately 90,000 gallons per day of spent pickle liquors from Pittsburgh area steel mills. In November and December of 1974, acid waste discharged from the supernatant on a sludge pond and poured into Sewickley Creek. The Pennsylvania Department of Environmental Resources ordered the company to shut down until the pond walls were built up and a new lined pond was constructed to receive wastes. The company has recently resumed operations.

On September 27, 1972, heavy rains broke the earthen dike of a former refinery waste lagoon which is currently owned by Pleasant Township, Pennsylvania. The released sludge entered the Allegheny River and killed about 450,000 fish with an estimated value of $75,000 along a 60-mile stretch. Analysis of the discharge entering the river at that time indicated the following: pH 1.7; COD 116,112ppm; iron 507.3 ppm; sulfates 56.5 ppm. To stop the leak, the town built up the lagoon bank and also has been adding clean fill as available. Monitoring

wells dug near the lagoon show that the groundwater quality still is degraded.

In February 1973, approximately 280,000 gallons of water and 75,000 gallons of latex paint sludge were released into Hilliard Creek from a waste disposal lagoon of the Sherwin Williams Company at Gibbsboro, New Jersey. The sludge contained high quantities of lead and mercury. The dike wall, made of sand, was washed out as a result of heavy rain. The sludge was detected in Hilliard Creek down to about 3/4 mile downstream from the source. No significant environmental damage was detected, although the recovered sludge contained 2,300ppm lead and 17.2 ppm mercury (both determinations on dry sludge basis). A successful cleanup operation was performed by the company.

In October 1973, Chemquid Disposal, Inc. was fined $24,000 by the Superior Court in Hackensack for spilling fish-killing chemicals into a small creek in the Hackensack Meadowlands of New Jersey. The spill had occurred during the previous New Year's weekend from a Chemquid truck parked behind company offices on Route 20. The company was in the business of dumping liquid wastes from chemical companies at landfills.

Agway, Inc., of Chemung County, New York, operated a fertilizer manufacturing plant at Big Flats, dumping waste nitrate materials into a lagoon. In the mid 1960's the lagoon discharged a large volume of nitrates into the surrounding soil. This discharge leached through the soil

to the water table, and contaminated nearby wells. Soon approximately 20 domestic wells had nitrate levels above 100 ppm and were unusable for drinking. The affected families had to drink bottled water for several years until a public water supply line became available to most residents. The others finally regained use of their wells as the nitrates flushed out of the aquifer. After this incident, Agway abandoned use of the lagoon, placing its wastes on agricultural lands as fertilizer.

On October 27, 1968, a waste storage lagoon ruptured on the plant site of the American International Refining Corporation in Butler County, Pennsylvania, spilling waste sludge-containing oils, acid wastes, and alkyl benzene sulfonate into the south branch of Bear Creek. The sludge flowed three miles downstream into the Allegheny River, killing an estimated 4.5 million fish valued at $108,000. Because the company was in poor financial condition, only a little over $20,000 in fines was levied to cover the damage.

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Resource Conservation and Recovery Act

Subtitle C - Hazardous Waste Management

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Treatment, Storage, and Disposal Facilities.

DRAFT

BACKGROUND DOCUMENT

Section 250.43-4 Standards for Training

U.S Environmental Protection Agency

Office of Solid Waste

December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being made available as a draft for comment. As new information is obtained, changes may be made in the regulations, as well as in the background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

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Background Document for Training

I. Introduction

The Congress of the United States, via Section 3004, Subtitle C, of the Resource Conservation and Recovery Act (RCRA) of 1976 (PL 94-580), mandates the Administrator of the U.S. Environmental Protection Agency (EPA) to promulgate regulations establishing standards applicable to owners and operators of hazarodus waste facilities for the "training for personnel" (employed at such facilities)" as may be necessary to protect human health and the environment.

Within the context of this docment, the pertinent terms are defined as follows:

"Training" means formal instruction, supplementing an employee's existing job knowledge, designed to protect human health and the environment via attendance and successful completion of a course of instruction in hazardous waste management procedures including contingency plan implementation relevant to those operations, at which the employee is employed, at the facility.

"Facility" means any land and appurtenances thereto used for the treatment, storage, and/or disposal of hazardous waste.

"Contingency Plan" means an organized, planned, coordinated course of action to be followed in the event of a fire, discharge, or explosion which has the potential

for endangering human health and the environment.

"Regional Administrator" means the Regional Administrator for the Environmental Protection Agency Region in which the facility concerned is located, or his designee.

II. Rationale for the regulations.

The need for a comprehensive training program in hazardous waste management is best supported by the fact that numerous incidents of human health and environmental damage have occurred. All of these incidents involve poor disposal and treatment techniques, errors in human judgements, or other forms of improper waste management resulting at least in part from a lack of training. Actual cases citing lack of training as a direct cause are rare because such admission would be embarrassing and possibly incriminating. Even in cases where lack of training is obviously involved, such as facility accidents, it is overshadowed by economic factors which encourage disposal to be performed via the cheapest (and usually most hazardous) method possible. Additionally when accidents do occur the acute effects are normally localized, involving employees and facility property, not immediately affecting public health or the larger environment. However, the chronic effects of such accidents (discharges, fires, explosions, etc.) have the potential

to damage or degrade human health and/or the environment, making such accidents an EPA concern. A facility that practices haphazard disposal (or more appropriately, hazardous waste mismanagement) and has a philosophy negligent of worker safety cannot be cognizant of public health and environmental concerns. The Kentucky State Department of Health (1971) observed that both employer and employee are willing to disregard known health hazards to achieve greater production and profit. The K.S.D.H. (Kentucky State Department of Health) concluded that in order to counter this tendency a systematic and large-scale educational program will be needed.

A) Actual Damage Incidents.

A notorious example of flagrant disregard for known health hazards is the New Jersey landfill, Kin-Buc, (U.S. EPA Publication No. 530/S.W. 151/June, 1975). In October 1974, a bulldozer operator was killed in an explosion there while burying and compacting several 55-gallon drums of unidentified chemical wastes. A subsequent investigation by OSHA revealed that explosions and fires on the lift (working face of the landfill) were commonplace. Workers complained that they received virtually no job or safety related training. The Kin-Buc situation is unfortunately not exceptional. Results of a 1974 investigation of 10 landfill sites by R.C. Keen (1975), showed that in many instances the operators were exposed to potential hazards due to the nature of the

operation and the dangerous materials handled. There was a noteable lack of supervision and knowledge on the part of the operators. Keen suggests that qualified supervision and training courses be provided at each site.

The following incidents did not occur on the active portion of a hazardous waste facility, however, these incidents do illustrate the resulting damage to human life associated with the lack of training.

The truck looked like hundreds of others that pass through this tiny south Georgia town. It was on fire, and the volunteer firefighters were there quickly to put it out. But they ignored - or the flames obscured - the signs on the sides of the truck. The signs warned of "explosives," and within minutes, the cargo of dynamite blew up, killing the entire fire department.

Two years ago in Waverly, Tennessee, a train derailed. When nothing exploded immediately, crews cleared the track and train traffic resumed. Two days later, a propane gas tanker - its walls damaged by the accident - exploded without warning and killed those nearby. They happened to be the fire department chief, the police chief and a number of firemen.

The victims of increasingly frequent spills of hazardous substances are most often firemen and other rescue workers. Many officials explain that the firemen usually arrive first and don't know what to do when they get there. The Chief of the Jacksonville Fire Department's Hazardous Materials Team stated that - "The fire service as a whole is not prepared for hazardous materials incidents. "We do lack in many areas of training in hazardous materials," said the Hillsborough County Fire Marshal, "I don't think any of us really feel adequate in handling these hazardous materials," said Hillsborough County director of emergency preparedness.

The aforementioned damage cases have common a denominator - training, or more specifically, the lack of training. If, in fact, training is non-existent at the professional emergency response team level, this further reinforces the need for training at Hazardous Waste Management Facilities which treat, store and dispose of a variety of wastes capable of creating a disastrous condition which has the potential to severely damage human health and the environment.

The passing of RCRA, by Congress, provides an excellent rationale and impetus for developing training regulations. Hazardous waste management will, by necessity, experience new technological advances and will correspondingly increase in sophistication.

Such advances, as well as increased demands for improved operating efficiency, will tremendously increase the need for a more highly-skilled and expanded work force at both the professional and subprofessional levels.

B) The potential damage to human health and the environment resulting from a lack of training, which is subject to regulation, is best illustrated in the aforementioned damage incidents.

III. Identification of regulatory options.
(State, Federal, Local)

A) Specific Standards mandated by RCRA.

Congress has authorized the Administrator to promulgate regulations establishing such performance standards, applicable to owners and operators of facilities for the treatment, storage, or disposal of hazardous waste identified or listed under Subtitle C, as may be necessary to protect human health and the environment. Such standards shall include, but need not be limited to, requirements respecting training for personnel.

B) Existing Federal, State or local regulations that could be adopted.

State of California...

60247. Personnel Requirements for Operator. (a) The operator of a hazardous waste facility shall maintain personnel at the facility as necessary to provide effective and timely action with regard to operation, maintenance, environmental controls, records, emergencies and health and safety.

(b) The operator shall provide at the facility at least one qualified person who is able to conduct field tests of wastes for at least pH and flammability if appropriate, when hazardous waste is accepted, except when the characteristics of the waste have been represented by sampling of previously accepted loads of waste from the same source.

(c) The operator of a hazardous waste facility shall provide adequate supervision to ensure that the operation of the facility and the activities conducted at the facility are in compliance with all applicable laws, regulations, permit conditions and other requirements. The Department and local fire authority shall be kept currently advised of the names, addresses and telephone numbers, including emergency telephone numbers, of the operator, station manager and supervisor.

State of New York...

SECTION 360.7 Facility Operator Requirements

(a) Within 18 months after the effective date of this Part,

employees in responsible charge at existing sanitary landfills, secure landburial facilities, incinerators and other facilities as directed by the Department, shall have attended and successfully completed a course of instruction in solid waste management procedures relevant to the facility at which they are employed. Such courses shall be provided or approved by the Department.

(b) Employees in responsible charge at new facilities of the types listed in (a) above, and new employees in responsible charge at existing facilities of the types listed in (a) above, shall have 12 months from their date of employment to attend and successfully complete a course of instruction.

(c) The Department shall issue a certificate of attendance to each employee successfully completing a training course. Attendance at a Department approved course prior to promulgation of these rules and regulations shall adequately satisfy these training requirements.

State of Washington...

WAC 173-302-320 PERSONNEL REQUIREMENTS. The operator shall maintain adequate numbers of qualified personnel at the disposal site to provide effective and timely action for operation, maintenance, environmental controls, records, emergencies, health and safety, according to the approved yearly operating plan.

//

As a minimum, the operator shall provide personnel having knowledge and background in the following areas:

(1) Inspecting and checking manifests for completeness and accuracy;

(2) Applied chemistry as it relates to reactivity, explosiveness, and flammability; and

(3) Industrial hygiene and/or toxicology of industrial, commercial, and agricultural chemicals, and emergency procedures.

State of Minnesota has the following proposed training regulation.

The facility permittee shall have facility personnel trained and instructed as specified in the operations manual, shall make available to the Director records that document that such training and instruction has been given to facility personnel, and shall take all reasonable efforts to insure that procedures outlined in the operations manual are carried out by facility personnel.

IV Analysis of regulatory options.

Option I...

Adoption of proposed or implemented state regulations or guidelines from:

A) California

B) New York

C) Minnesota

D) Washington

Option II...

Personnel must take a specified minimum amount of training relevant to hazardous waste management.

This regulatory option is prescriptive on a temporal basis. It guarantees that hazardous waste facility personnel will receive an as yet to be specified minimum amount of training on hazardous waste management (e. g. 80h). Establishing a minimum, time period will be difficult because EPA does not have a sufficient data base to either justify or accurately specify one. Development of a supportive data base in the time period alotted would be difficult to accomplish. Furthermore, the minimum amount and kinds of training needed varies widely between personnel and therefore cannot be generalized. Consequently, any number chosen would either require too much training for some people or too little for others.

One advantage of this option is its flexibility. The training period can be increased to encompass new subject material. Additionally, no subject areas are specified, therefore both course content and length can be tailored to the needs of the trainees. This is desireable since the needs of the trainees vary by job position, facility and geographic location. Ideally, designation of course curricula and length of program will be the responsibility of the permitting officials, who are in a position to best assess the needs of their areas.

Although training programs might vary from one Region or State to the next, enforcement would not be difficult because on a national level the specified minimum training period would be uniform, making compliance easy to ascertain. Determining the effectiveness of the program would pose a problem under these circumstances.

Another problem with this approach is that the length of a course is at best only a rough indication of the value of a training program. For example, all 2 week courses, even in the same subject, will not provide equal amounts of training. Subjective items such as instructor quality and course organization can greatly affect the value of the training and cannot be quantified as part of a regulation.

Option III...

Personnel must be trained to perform their job(s) with a degree of proficiency and awareness that ensures protection of public health and the environment.

This option can be categorized as a general performance standard. It explicitly cites the objective to be achieved by training; "job performance with a degree of proficiency and awareness that ensures protection of human health and the environment." This has the advantage of reducing misinterpretati and circumvention of the designated objective.

Option III is similar to Option II in that neither specify subject areas therefore both possess the same advantages. Additionally, Option III does not designate a required minimum training period, making it more flexible than the previous option. Specifying a minimum amount of training may not be necessary if the stated objective (in Option III) can be fulfilled.

The flexibility of Option III encourages the innovation needed to improve and develop methods of training capable of achieving the desired objective. The drawback is that a uniform method of determining whether or not the training program is reaching its goal is not specified. The burden of developing such a method would be on the permitting official. Because flexibility may breed curricular diversity combined with variable training it may not be possible to ascertain the effectiveness of the program on a uniform scale. Accordingly, this regulation could be implemented in a nonuniform and unfair manner.

Option IV

Personnel must be trained to perform their job(s) with a degree of proficiency that insures protection of public health and the environment. Training shall include but shall not be limited to the following areas:

A) Environmental awareness

B) Contingency procedures

C) Environmental sampling and monitoring

D) Basic skills

E) Treatment processes and systems

F) Equipment operation and maintenance

G) Regulations

H) Handling procedures

Option IV is the same as Option III except it specifices subject areas thought to be essential in reaching the objective of "job performance with a degree of proficiency and awareness that ensures protection of public health and the environment." It has the same advantages and disadvantages, as Options II and III that are associated with not specifying the length of the course. This will allow for a tailoring of the program to meet the varied needs of the trainees.

The designation of required subject areas lends uniformity to the training program. Uniformity facilitates program implementation. Ascertaining the effectiveness of the program may be difficult due to diffences in program length and level of subject presentation. This disadvantage seems unavoidable if the diverse needs of the trainees are to be catered to.

Another problem associated with specifying the course curriculum is that the subject areas identified may be incomplet or some may be unnecessary. The general consensus from meetings

with industry and government suggests that the subject areas identified are viable.

A variation of Option IV would be to implement the specified subject areas as guidelines. Compensation for addition or deletion of courses would be greatly facilitated. However, if compliance is not mandatory this option may be no better or worse than Option III.

Option V

Adoption of the proposed 3004 regulations.

V The chosen regulations with applicable rationale are as follows:

250.43-4 Training.

(a) Within six (6) months after the effective date of these regulations, or date of employment, personnel at new and existing facilities shall have attended and successfully completed a course of instruction in hazardous waste management procedures, as prescribed in EPA's "Training Manual" for owners/operators of facilities relevant to those operations, at which the employee is employed, at the facility.

The intent of the above regulation is to identify the course of instruction administered and to ensure that

the training has been satisfactorily completed.

(b) Owners/Operators of facilities for the treatment, storage or disposal of hazardous wastes shall

(1) maintain the following records, and make them available to the Regional Administrator upon request:

(i) a list of the job titles of all positions at the facility related to hazardous waste management.

(ii) a written job description for each position listed under (b)(1)(i) which shall include the requisite skill, education, responsibilites and duties related to each position;

(iii) a written description of the type and quantity of introductory and continuing training that will be administered to each person filling a position listed under (b)(1)(i).

(iv) records that document that the training required under (a), has been administered to facility personnel;

The intent of the above regulation is to identify the position associated with hazardous waste management; discern the training needs of each position; maintain recorded evidence that training had been administered.

(2) have their personnel trained in contingency procedures as prescribed in the facility's contingency plan required under Section 250.43-3, and

(3) have their personnel take part in an annual review and update of their initial training in contingency procedures, and other hazardous waste management procedures relevant to those operations, at which the employee is employed, at the facility.

Section 250.43-3 provides for a Contingency Plan and Emergency Procedures at facilities. To ensure positive implementation of the Plan, training relevant to the procedures of the Plan and annual physical participation is essential.

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Resource Conservation and Recovery Act
Subtitle C - Hazardous Waste Management
Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

DRAFT

BACKGROUND DOCUMENT

Section 250.43-5 Manifest System, Recordkeeping, and Reporting

U.S. Environmental Protection Agency
Office of Solid Waste
December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulations. As new information is obtained, changes may be made in the regulations as well as in this background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

Timothy Fields, Jr.
U.S. Environmental Protection Agency
Office of Solid Waste
Hazardous Waste Management Division (WH-565)
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Washington, D.C. 20460

Legislative Authority

Subtitle C of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (Pub. L. 94-580, hereinafter called the Act), creates a framework to control hazardous waste. Congress has found that such waste presents "special dangers to health and requires a greater degree of regulation than does nonhazardous solid waste" (Sec. 1002(b)(5). Because of the seriousness of this waste problem. Congress intended that the States develop programs to control it. In the event that States do not choose to operate this program, the U.S. Environmental Protection Agency (EPA) is mandated to do so.

Subtitle C creates a management control system which for those wastes defined as hazardous requires "cradle-to-grave" cognizance, including appropriate monitoring, recordkeeping and reporting throughout the system. Section 3001 requires EPA to define criteria and methods for identifying and listing hazardous wastes. Those wastes which are identified or listed

as hazardous by these means are then included in the management control system constructed under Section 3002-3005 and 3010. Those that are excluded will be subject to the requirements for nonhazardous solid waste being carried out by States under Subtitle D under which open dumping is prohibited and environmentally acceptable practices are required.

Background and Alternatives

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

Section 3004 standards define the levels of environmental protection to be achieved by hazardous waste treatment, storage, and disposal facilities (hereinafter referred to as hazardous waste facility(ies) or facility(ies) and provide the criteria against which EPA officials will measure applications for permits.

These facility standards are key provisions in the structure regulating the handling of hazardous waste. The manifest is initiated by the generator, carried by the transporter and is completed when such wastes are received by those who treat, store, or dispose of hazardous waste and is confirmed by return of the original manifest to the generator.

Congress mandated that the facility operator would maintain records of all hazardous waste handled, comply with the manifest system established under Section 3002, and periodically report to the Administrator. 1,2

Each facility is to keep the following information on file as part of its record from which periodic reports may be required:

(1) A copy of the manifest, which accompanied each shipment of hazardous waste received; and

(2) An operating log.

Each facility must also report periodically as specified:

(1) An annual report summarizing the information on manifests received; and

(2) A quarterly report of all shipments of hazardous waste which are not accompanied by a manifest or delivery document.

Congress realized that the major problems to be addressed in the hazardous waste area are the lack of information concerning the components, volumes, sources, and disposition of hazardous waste. To date, available information on hazardous waste generation and disposal is limited to the narrow investigation of a handful of States. This has resulted in a lack of knowledge about the actual volume of hazardous waste being generated and disposed, of the geographical distribution of the facilities, and the extent to which hazardous wastes are transported.

Section 3002 (Standards Applicable to Generators of Hazardous Waste) applies standards to persons producing hazardous waste. These standards require the creation of a manifest, reporting, and recordkeeping system which will track the wastes from the point of generation to their ultimate disposition at hazardous waste facility.[5,6]

Manifest

The basis of section 3004 requirements for reporting and recordkeeping is the manifest system established under section 3002. There data provide the Administrator with the information necessary to close the loop on hazardous waste movement.

The manifest format (see Table IV for a sample manifest format) was modeled after the Department of Transportation's requirements for shipping papers. Each shipment of hazardous waste regulated by EPA must be accompanied by a copy of the manifest just as each shipment of hazardous material regulated by the Department of Transportation (DOT) must be accompanied by a shipping paper. The manifest is not a federal form but a format containing information necessary in providing safe transport of the waste. The manifest is the tracking document which traces the waste from the generator, to the transporter, and to the hazardous waste facility. Ultimately, the manifest is used by the facility operator to develop the annual summary report.

Reporting

The report (see Table I for a sample facility report form) will be submitted by mail to the EPA Regional Office within which region the hazardous waste facility is located. The type of reporting required of the generator is a quarterly "exception report and an annual "summary" report.

The quarterly exception report is only submitted if a shipment of hazardous waste is not accompanied by a manifest.

The quarterly exception report will contain the following information:

(a) The facility's identification code, name, and address;

(b) The closing date of the annual reporting period;

(c) The word "unmanifested" under the column titled "Manifest Document Number."

(d) The name and address of the source, if known, or transporter.

(e) The name and common code of the hazardous waste (under "Shipping Description"), by its Department of Transportation (DOT) proper shipping name (49 CFR 172), or by the U.S. Environmental Protection Agency (EPA) name (as listed under Section 250.14 of Subpart A of this Part), if the DOT proper shipping name is not applicable. However, if the DOT proper shipping name contains the words "NOT OTHERWISE SPECIFIED" (NOS) the EPA name and common code (as listed under Section 250.14 of Subpart A of this Part) must also be designated on the manifest after the ~~NOS;~~

(f) The quantity of each hazardous waste received;

(g) The units of volume or weight of each quantity in pounds (P), tons (T), gallons (G), million gallons (MG), or cubic yards (CY), and

(h) The certification: "I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."; and

(i) The signature of an authorized representative of the facility owner or operator, and the date.

The annual summary report will contain the following information:

(a) The facility's identification code, name, and address;

(b) The closing date of the annual reporting period;

(c) The identification code of each hazardous waste generator from which a hazardous waste was received during the reporting period (For international shipments, the name and address of the generator shall be designated.);

(d) The name and common code of each hazardous waste appearing on the manifest under "Shipping Description" which was received from each hazardous waste generator;

(e) The quantity of each hazardous waste received from each generator;

(f) The units of volume or weight of each quantity in pounds (P), tons (T), gallons (G), million gallons (MG), or cubic yards (CY);

(g) The method of treatment, storage, or disposal for each specific waste;

(h) The certification: "I have personally examined and am familiar with the information submitted in this certication, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalities for submitting false information, including the possibility of fine and imprisonment."; and

(i) The signature of an authorized representatives of the facility ownwe or operator and the date.

Several States (Texas, California, Illinois, etc.) have hazardous waste management programs in operation today. In most cases the frequency of the reporting is on a shipment by shipment basis or on a monthly basis where each shipment occurring during the month of that report is listed (see Table II Reporting, for a discussion of State reporting requirements). The potential paper work impact on EPA and on the regulated community make these alternate requirements unsatisfactory compared to the Federal Program being proposed. The Agency also investigated the possibility of a quarterly or a semiannual report listing all shipments of hazardous waste. This style of reporting potentially could facilitate enforcement, but the task of managing such a large data base with present and predicted resources would be difficult (see Table III for paper flow impacts). Therefore, it was determined that

if enforcement is to be effective and if a manageable reporting program is to be instituted only reports on shipments not accompanied by a manifest should be submitted on a quarterly basis and only a summary report on all hazardous waste treated, stored, or disposed of be made annually.

Each facility owner or operator also must prepare the following other kinds of reports and submit them by mail to the EPA regional office within which region the facility is located.

(1) A quarterly report based on monitoring data and a report within 7 days after the discovery of any problem detected by the monitoring system (see Table V Monitoring Records and Reports, for State reporting requirements and Tables VI and VII for samples of monitoring data report formats);[15,16] and

(2) A one time report on closure plans and procedures before hazardous waste activities commence (see Table V Closure Reports, for State Reporting requirements). This report shall include a description of how the facility shall be closed, possible uses of the land after closure, and anticipated time of closure. Then, 15 days before partial closure of any treatment or landfill operation and 90 days before final closure of a treatment facility or 180 days before final closure of a treatment facility or 180 days before final closure of a disposal facility the administrator must be notified.17

In addition to reporting, the facility owner or operator is to call the National Response Center, U.S. Coast Guard, toll free number or the government office predesignated in the applicable regional contingency plan pursuant to 40 CFR 1540 immediately after discovery or any incident which has the potential for human health or environmental damage or which requires initiation of a contingency plan.[18,19]

These reports, many of which are developed from the facility's records and are required for many of the same reasons, will assist the Administrator in the prevention of harm to the facility personnel, the general public, and the environment. This is accomplished by balancing the facility operations against its permit which was established prior to the facility being allowed to handle hazardous waste and which specifies the conditions under which such operations can be conducted safely.[20,2]

In the event that the permit was in error and human health or environmental damage occurs, the reports act as a source of information which can be used to prevent future problems in new and existing facilities.22

Recordkeeping

The recordkeeping requirement for quantities of hazardous waste received and treated stored or disposed of at facilities is the retention of the manifest for a period of three years.

The recordkeeping requirement was modeled after state requirements for similar situations and after industrial practices (see Table V Recordkeeping, for State recordkeeping requirements). It was found that records, such as shipping papers and other related documents are retained for a period of years ranging from one to ten. In the majority of cases, however, such documents are retained for three or more years. Because the manifest is the operator's only certification that the hazardous waste was received at the facility and properly handled, and in order to allow the minimum time for enforcement proceedings to occur; a three year recordkeeping requirement was chosen.

OPERATING LOG

The operating log is a record used by the facility owner or operator to develop periodic reports mailed to the EPA regional office within which region the facility is located. These reports will be used to determine if the facility is in compliance with its permit established under section 3005 (permits for Treatment, Storage and Disposal Facilities) and to assist the Administrator in making inspections.

The operating log will contain the following information:

(1) A description and analyses of each hazardous waste and its location in the facility if stored or landfilled. This information is necessary to ensure that the waste described on the manifest is what is being received at the facility and that only compatible wastes are stored or landfilled together in order to prevent fires and explosions. In addition to the prevention of haphazard disturbance of very reactive wastes, the ability to locate and to retrieve the waste from the landfill is important. In the event that new technology is developed which can reprocess or reuse such waste, landfills may in the future become areas of new resources. Further, if a public health or an environmental

damage incident occurs the source of the problem in the facility can be pinpointed and corrected. Thus, it is important that this part of the operating log be retained until closure of the facility at which time it will be turned over to the Administrator (see Table V Waste Location, records for State recordkeeping requirements);7

(2) Groundwater and leachate monitoring data will be recorded and filed on a quarterly and annual basis (see Tables VI and VII for sample formats for monitoring data records). The retention of monitoring data is necessary in order to measure and to control the release of hazardous waste from the facility into the environment. This safeguard can prevent public health and environmental damage. These records will remain on file for a period of three years. The three year recordkeeping requirement for monitoring data is based on current state regulations and industrial practices (see Table V Monitoring Records and Reports, for State recordkeeping Requirements):8,9

(3) The results of daily visual inspections, facility operating conditions (i.E., temperature, pressure, fedrate, etc.). and incidents requiring the initiation of a contingency plan or resulting in human health or environmental damage will be recorded and filed for a period of three years.10,11 Inspections, operating conditions, and incident records are key in predicting problem areas at the facility. This information is not only useful in predicting problems and in determining if a facility is in compliance with its permit but also acts as a source of needed data for the creation of new facilities. If problem areas are documented new facilities will pose less of a threat to public health and the environment;12 and

(4) Training records of facility personnel siving job title, skills, education, job related responsibilities, and on the job training will be retained until facility closure. It has been documented in EPA damage files, that in the past, persons handling hazardous waste have been unaware of the dangers involved in their job.13 Congress has specifically mandated that personnel working at such facilities be trained and made aware of such risks.14 In order that facility personnel be protected, as provided for by the Act, such training and records will become a permanent part of an employee's file.

FOOTNOTES

1 Resource Conservation and Recovery Act, U.S. Code, Vol. 42, sec. 3004 (1976).

2 U.S. Congress, House, Report of the Committee on Interstate and Foreign Commerce, H. Doc. 94th Cong., 2d sess., 1491, pp. 28, 57.

3 U.S. Congress, House, Report of the Committee on Interstate and Foreign Commerce, H. Doc. 94th Cong., p. 28.

4 Ibid, pg. 26.

5 Ibid, pp. 2, 26, 56.

6 Resource Conservation and Recovery Act, U.S. Code, Vol. 42, sec. 3002 (1976).

7 U.S., Congress, House, Report of the Committee on Interstate and Foreign Commerce, H. Doc. 94th Congress, 2d, sess., 1491, pp. 6, 18, 57.

8 Ibid, pp. 28, 57.

9 Resource Conservation and Recovery Act, U.S. Code, Vol. 42, sec. 3004 (1976).

10 Ibid.

11 U.S. Congress, House, Report of the Committee on Interstate and Foreign Commerce, H. Doc. 94th Cong., 2d Sess., 1491, pp. 6, 28.

12 Ibid, pp. 7.

13 U.S. Environmental Protection Agency, "Damage Cases," (EPA Docket, 1978).

14 Resource Conservation and Recovery Act, U.S. Code, Vol. 42, sec. 3004 (1976).

15 U.S. Congress, House, Report of the Committee on Interstate and Foreign Commerce, H. Doc. 94th Cong., 2d sess., 1491, pg. 28.

16 Resource Conservation and Recovery Act, U.S. Code, Vol. 42, sec. 3004 (1976).

17 Resource Conservation and Recovery Act, U.S. Code, Vol. 42, sec. 3004 (1976).

18 Ibid.

19 U.S. Congress, House, Report of the Committee on Interstate and Foreign Commerce, H. Doc. 94th Cong., 2d sess., 1491, p. 28.

20 Ibid, pp. 7, 28.

21 Resource Conservation and Recovery Act, U.S. Code, Vol. 42, sec. 3004 (1976).

22 U.S. Congress, House, Report of the Committee on Interstate and Foreign Commerce, H. Doc. 94th Cong., 2d sess., 1491 p. 6.

Form Appox.
OMS No.

TABLE I

TSDF (TREATMENT, STORAGE OR DISPOSAL FACILITIES) REPORT

IDENTIFICATION

NAME

ADDRESS

TSDF IDENTIFICATION CODE

CLOSING DATE

WASTE INFORMATION

GENERATOR NO. CODE	MANIFEST DOCUMENT NO.	SHIPPING DESCRIPTION	QUANTITY	UNIT OF MEASUREMENT

COMMENTS

CERTIFICATION

I certify that the above information is correct to the best of my Knowledge and belief.

Signature

Date

TABLE II

Reporting

Several States currently have regulations respecting reporting, based on manifests as described below:

The Texas Water Quality Board requires receivers of Class I waste to compile a monthly Receipt Summary from their copies of shipping tickets. These reports are to be transmitted to the Texas Water Quality Board by the 25th day of each month for all shipments originating (shipped) during the prior month. The quantity and classification of waste shall be itemized by shipping ticket number on reporting forms provided by the Board. Generators (persons producing hazardous waste) who dispose of Class I wastes on-site may also be required to compile an Annual Disposal Summary from their records of these activities to be submitted to the Board. If such a summary is required, the dates of reporting are determined by the Executive Director of the Board.

Minnesota's proposed regulations for hazardous waste management would require a facility permittee to submit a monthly summary to the Director of the Minnesota Pollution Control Agency for all wastes which have been managed during the previous month as specified in the Agency permit.

California's proposed regulations require operators of hazardous waste disposal sites to send legible copies of all completed hazardous waste manifests to the Department on a monthly basis. Also, under these regulations, operators of off-site hazardous waste disposal sites are required to submit to the Department by the 15th day of each month a report which includes the following:

1. the amount of fees due and paid to the owner the previous month,

2. information on hazardous waste delivered to him during the previous month other than by pipeline, consisting of a legible copy of the complete manifest for each load of hazardous waste accepted, and a report that summarizes the numbers of loads of hazardous waste received, disposed of on land, and applied to land.

3. Information on hazardous waste delivered to him during the previous month by pipeline, consisting of a record of each hazardous waste disposed of during the previous month, showing the identity, source, chemical composition, weight or volume, physical state, hazardous properties, and method used to dispose of each waste.

Operators of on-site hazardous waste disposal sites will be required to submit a monthly report to the Department by the 15th day of each month. These reports must include:

1. a record of each hazardous waste disposed of during the previous month, showing the identity, source, chemical composition, weight or volume, physical state, container type, hazardous properties and method used to dispose of each waste;

2. a report that summarizes the amount of fees due and paid to the Department for that month.

Regulations of Washington's Department of Ecology would require hazardous waste facilities to report the original manifests collected during the previous month, complete financial reports during the previous year, and copies of all written requests for disposal of waste at a site within one week of their receipt.

Regulations of New York's Department of Environmental Conservation require simply that reports on forms acceptable to or provided by the Department be submitted at a frequency specified in the operation permit.

TABLE III

Paper Flow Impacts

The Hazardous Waste Management Division of EPA "Notification System Supportive Services" study, contract No. 68-01-4631 Published December 21, 1977, listed approximately .38 million generators of hazardous waste. The study "Characterization of Potential Permittees under Section 3005 of the Resource Conservation and Recovery Act" Contract No. 08-01-4456 published June 8, 1977 estimated .45 million generators of hazardous waste, Assume (1) the average of the two estimates to be the number of hazardous waste generators regulated under Subtitle C Section 3002,

$$\frac{(.38 + .45) \times 10^{\emptyset}}{2} = .42 \times 10^{\emptyset}$$

and (2) that these generators are uniformly distributed among the States.

The Texas Water Quality Board has indicated that in the month of May 1977 approximately 2500 tickets (manifests) were issued by 600 to 1200 industrial generators.

Assuming the Texas experience is typical, and 3 manifests per generator per month as an average, then if the manifest were used as the report;

$.42 \times 10^6$ generators X 3 manifests/generator/month =

1.26×10^6 manifests/month

EPA would receive 1.26 million manifests per month or 126,000 manifests per Region per month if no States assumed the hazardous waste program.

On the other hand assuming one monthly summary report per generator or one quarterly summary report per generator, then

1 report/generator X $.42 \times 10^6$ generators =

$.42 \times 10^6$ report/month or quarter

Thus, EPA would be receiving 420,000 monthly or quarterly summary reports or 42,000 monthly or quarterly report per Region assuming no States assume the hazardous waste program.

Paper flow impact on a typical EPA Regional Office when comparing manifest reporting to monthly, summary reports:

$$\frac{126{,}000 \text{ manifest} - 42{,}000 \text{ reports}}{126{,}000} \times$$

100 = 66.7% decrease in paper flow impact when using a monthly, summary report instead of the manifest as the report.

Paper flow impact on a typical EPA Regional Office when comparing manifest reporting to quarterly, summary reports:

126,000 manifest X 3 month/quarter = 378,000 manifest/quarter

then,

$$\frac{378{,}000 \text{ manifest} - 42{,}000 \text{ reports}}{378{,}000}$$

X 100 = 88.9% decrease in paper flow impact when using a quarterly, summary report instead of the manifest as the report.

Paper flow impact on a typical EPA Regional Office when comparing monthly, summary reports to quarterly, summary reports:

42,000 reports/month X 3 months/quarter = 126,000 reports/quarter

then,

$$\frac{126{,}000 \text{ reports} - 42{,}000 \text{ reports}}{126{,}000}$$

X 100 = 66.7% decrease in paper flow impact when using a quarterly, summary report instead of a monthly, summary report.

Paper flow impact on a typical EPA Regional Office when comparing quarterly, summary reports to annual, summary reports:

42,000 reports/quarter X 4 quarters/year = 168,000 reports/year

$$\frac{168{,}000 \text{ reports} - 42{,}000 \text{ reports}}{168{,}000} \times 100 =$$

75% decrease in paper flow impact when using an annual, summary report instead of a quarterly, summary report.

TABLE IV

HAZARDOUS WASTE MANIFEST

MANIFEST DOCUMENT NUMBER

IDENTIFICATION

	I.D. CODE	NAME	ADDRESS	DATE SHIPPED OR RECEIVED
GENERATOR				
TRANSPORTER				
TSDF (TREATMENT, STORAGE OR DISPOSAL FACILITY)				

WASTE INFORMATION

SHIPPING DESCRIPTION	HAZARD CLASS	QUANTITY	(Complete Applicable Column) UNIT	CONTAINER TYPE

EMERGENCY INFORMATION

IEDIATE RESPONSE INFORMATION — PHONE NUMBER

ECIAL HANDLING INSTRUCTIONS

MMENTS

CERTIFICATION

his is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, d are in proper condition for transportation according to the applicable regulations of the Department of Trans- rtation and the U.S. Environmental Protection Agency.

GENERATOR SIGNATURE — DATE

his is to certify acceptance of the hazardous waste shipment.

TRANSPORTER SIGNATURE — DATE

ts is to certify acceptance of the hazardous waste for treatment, storage, or disposal.

TSDF SIGNATURE — DATE

Form 3700-11 (4-73)

Recordkeeping

Common and contract carriers, as required by the Interstate Commerce Commission for interstate transport and the State Public Utility Commission or the State Public Service Commission (PUC/PSC) for intrastate transport, require that a record be kept in the form of a bill of lading, waybill, invoice, etc... These documents contain the following information: the shipper's name, address, etc., the transporter's name, etc., the consignee, the quantity of the material, and description of the material. Since these types of records are currently being kept, EPA has developed the record-keeping standards so as not to create additional unnecessary paper handling and storing. The intent is to require that a record be kept, which would contain information on the source and delivery points of each shipment of the waste, date of pick-up and delivery, quantity of waste transported, and description of waste. The record, therefore, could be a copy of the manifest (which may take the form of the bill of lading, waybill, etc.,) thus requiring in most cases the retention of records already being kept.

The retention of the records should coincide with the statute of limitations, or with existing Federal and State requirements. State requirements for retention of shipping documents for intra-state transport vary widely from one to to ten years (see Attachment I) bored on the State Public Utility Commission (PUC) and Public Service Commission (PSC) requirements reviewed. When these State Commissions had no recordkeeping requirement, the State Health Department or Department of Natural Resources regulations were reviewed. Sixteen State PUC's and PSC's require the period of retention of records to be three years. In those States with no PUC and PSC requirements, two State Health Departments require retention of records by waste haulers for a period of five years or longer. Therefore, a total of twenty-seven States require retention of records for at least three years. Of the remaining twenty-four States, ten have no recordkeeping requirements either by the PUC or Health Department; four have a one year retention requirement.

Two States, Texas and Washington, currently have regulations specificly requiring the retention of records for shipments of hazardous waste:

Texas requires hazardous waste shipping tickets to be kept by facility operators, but does not specify the time period for which such tickets whould be maintained. Draft regulations of

Washington would require hazardous waste facility operators to retain at least one copy of the manifest at the disposal site. No deadline for how long the manifests must be kept is specified. No other states require the maintenance of copies of hazardous waste manifests.

ATTACHMENT I

State Recordkeeping Requirements (Period of Retention in Years)

State	Agency Requirement Public Utility Comm. Public Service Comm.	Other Agency Requirements
Alabama	*6	
Alaska	**6	
Arizona	2	
Arkansas	3	
California	3	
Colorado	2	
Connecticut	2	
District of Columbia	N.A.	N.A.
Delaware	N.A.	*10 Health Dept.
Florida	1	
Georgia	3	
Hawaii	2	
Idaho	5	
Illinois	N.A.	3 IEPA
Indiana	**2	
Iowa	**10	
Kansas	1	
Kentucky	5	
Louisana	N.A.	N.A.
Maine	3	
Maryland	N.A.	1 Health Dept.
Massachusetts	3	
Michigan	N.A.	2 Dept. of Natural Resource
Minnesota	3	
Mississippi	3	
Missouri	N.A.	N.A.
Montana	3	
Nebraska	3	
Nevada	3	
New Hampshire	N.A.	N.A.
New Jersey	N.A.	*5 DEP
New Mexico	3	
New York	3	
North Carolina	3	
North Dakota	N.A.	N.A.
Ohio	3	
Oklahoma	N.A.	N.A.
Oregon	***2	
Oennsylvania	3	
Rhode Island	1	
South Carolina	2	
South Dakota	2	
Tennessee	N.A.	3 Health Dept.
Texas	2	

Utah	N.A.	N.A.
Vermont	N.A.	N.A.
Virginia	N.A.	N.A.
Washington	3	
West Virginia	5	
Wisconsin	6	
Wyoming	N.A.	N.A.

*State Regulations Pending
**Statute of Limitation
***Records held for Audit

Waste Location Records

Several States currently have regulations requiring records on waste location as described below:

Texas requires waste generators who dispose of hazardous waste on-site to maintain records of their on-site disposal activity, As a minimum, these records are to include information regarding the quantity, characteristics and classification of the waste, and the method and location of disposal. These records must be kept a minimum of three years from the date of disposal or shipment. These facilities are also required to maintain copies of shipping tickets. The Texas Water Quality Board also provides guidelines on the proper techniques of recording waste disposal at hazardous waste management facilities. These guidelines are:

1. Waste Disposal Records

   Purpose: In addition to any internal operational information that a disposer may need, this information may be needed for:

   a. Periodic reports to the Texas Water Quality Board as required in regulations (Board Order No. 75-1125-1).

   b. Entry to county deed records as required by Texas Water Quality Board regulations. Validation of entry to county records will be kept available by the disposer.

California presently requires operators of Class I and Class II-1 sites (generally those accepting hazardous wastes) to maintain at their business address legible records of the volume and type of Group I waste received at the site and the manner and location of disposal. Such records are required to be maintained for a period of a least 10 years on forms used for liquid waste hauling. If disposal operations cease, the records have to be forwarded to the regional Water Resources Control Board.

California draft regulations are more explicit in their recordkeeping requirements. In these proposed standards, hazardous waste operators are required to maintain at their business addresses for a minimum of 3 years the following information:

1. The names, addresses and telephone numbers of the waste producer, hauler, processor and disposal site operator.

2. The source, identity, chemical composition, volume, physical state, container type and hazardous properties of each load of waste received, hauled or stored at the site.

3. The method used to process or dispose of each waste.

4. The date that each hazardous waste was received for storage. Copies of completed manifests may serve this purpose.

Additionally, the operator of a hazardous waste disposal site where solid and hazardous wastes are not co-mingled will be required to record on a grid or other suitable map the general location where hazardous wastes have been disposed of. The hazardous waste types shall be identified on the grid or map by at least the following separate types of waste where applicable: acid solution, alkaline solution, pesticides, paint sludge, solvent, tetraethyl lead sludge, chemical toilet waste, tank bottom sediment, oil drilling mud, contaminated oil and sand, and latex waste.

Several states have drafted regulations respecting the disposition and location of wastes at hazardous waste management facilities.

The Washington Department of Ecology has proposed regulations requiring hazardous waste operators to maintain records at the site for each burial trench and evaporation pond referenced to the nearest USGS bench mark to define the exact location and boundaries of each trench or pond. A current copy of all such survey records would have to be kept at the County Auditor's office. The survey records would have to contain the following information:

1. dimensions of the trench,

2. its relation to the marker,

3. volume and type of waste buried, and

4. dates of beginning and of completion of burial operations.

Draft regulations of the Minnesota Pollution Control Agency (MPCA) would require records for both stored and disposed hazardous wastes. Under these regulations a facility permittee would have

to maintain a log of the date that each waste shipment arrives, the name of the generator of the shipment, the name of the transporter who delivered the shipment, the identity of the row or tank in which the waste is stored, and the date that the shipment arrived from the facility (or date of processing). For land disposal facilities, a log or ledger will be required for each cell and shall document the name of the generators of the wastes, the date of acceptance of each shipment and amount in gallons or tons, and the composite chemical composition. The summarized ledger is submitted to the MPCA Director at the closure of each cell, or before such time, if requested by the MPCA Director.

Monitoring Records and Reports

Currently, only the State of Texas has some regulations concerning recordkeeping or monitoring data (see attachment II for sample form):

Texas generally requires hazardous waste disposal facilties to maintain such a groundwater monitoring recordkeeping/reporting system. The Texas Water Quality Board provides guidelines for such a system:

This system should include a record system whereby samples are regularly taken and analyzed. The parameters analyzed would normally include static water depths in wells (where applicable), pH and total dissolved solids as well as other ions that would be expected to be generated by the disposal activity.

For each of these parameters a chart should be originated with samples dates shown from left to right on the horizontal axis and parameter concentrations shown on the vertical axis. Parameter concentrations determined by analysis should be posted on the chart. Background concentrations of the parameters to be analyzed should be established prior to any waste disposal at the site. Normally a more complete analysis of the groundwater at the site which includes parameters that will not be monitored on a regular basis should be completed. This will provide background information on those parameters which have not been selected to monitor the quality of the groundwater in the vicinity of the disposal site.

When and if a significant increase from background concentrations is detected, the disposer should notify the Texas Water Quality Board district office by telephone within 24 hours and confirm the notification by letter within 48 hours.

TOPIC: Records

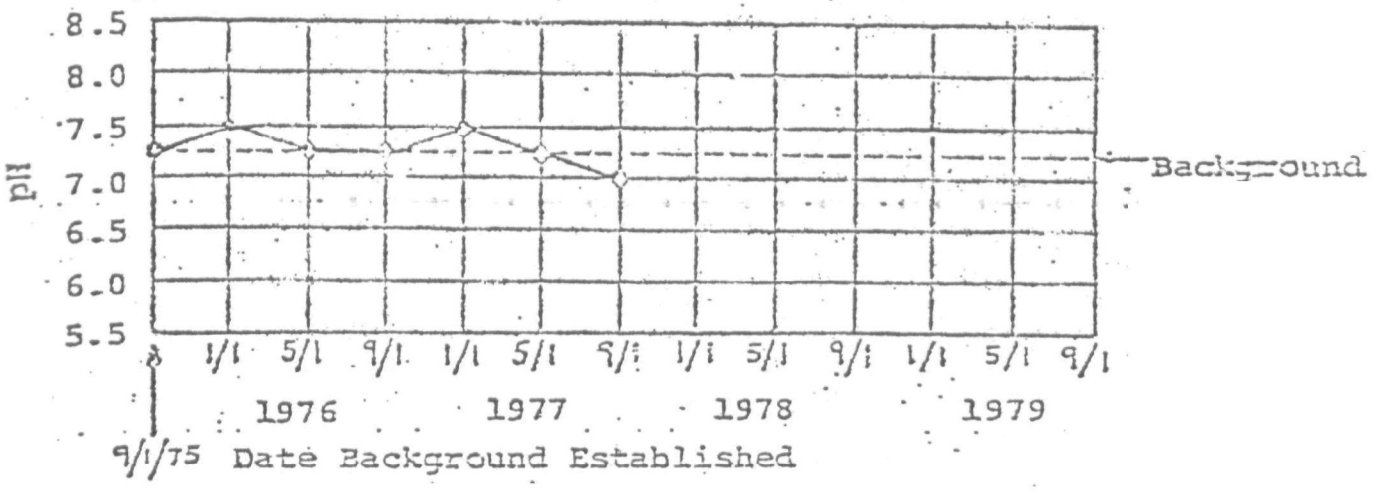
ATTACHMENT II

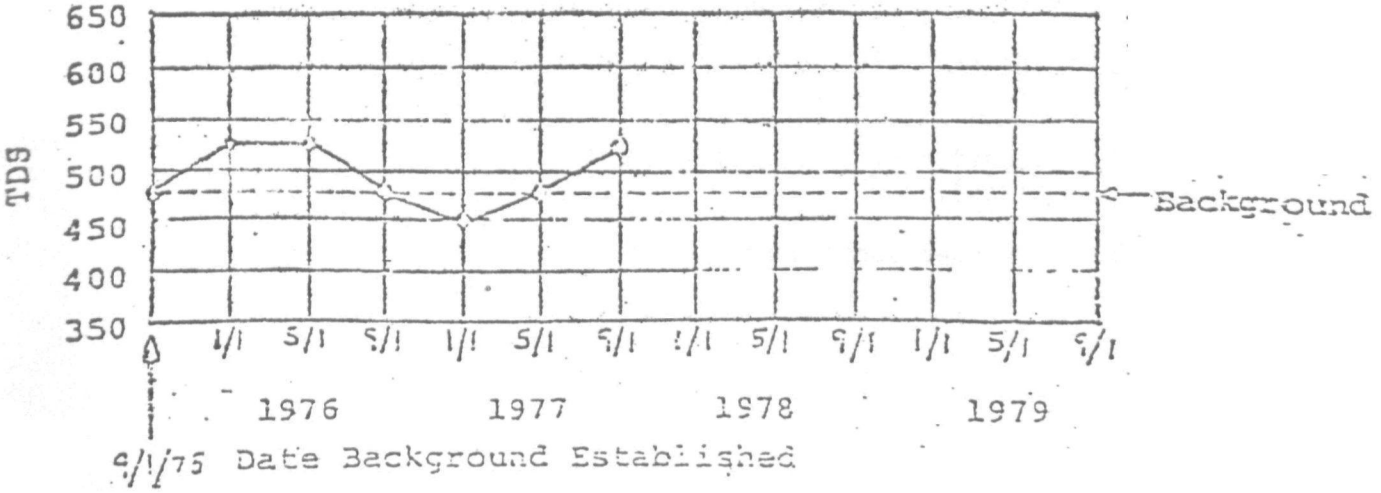
GROUNDWATER MONITORING RECORD

Disposal Site: ABC Disposal Company, Inc.

itor Well-No.: 4

Parameters Monitored: pH, TDS





Closure Reports

Currently, two States, Illinois and California, have requirements respecting such reports.

The Illinois EPA requires hazardous waste landfill owners or operators, upon completion or closure, to file a detailed description of the site, including a plot with the appropriate county land recording authority for the county in which the site is located.

California requires that an operator of a waste disposal site must, prior to cessation of disposal operations, submit a technical report to the appropriate regional board describing the methods and controls to be used to assure protection of the quality of surface and ground waters of the area during final operations and with any proposed subsequent use of the land.
The report must be prepared by or under the supervision of a registered engineer or a certified engineering geologist. The regulations also request that the technical report be furnished to the regional board 90 days prior to cessation of disposal operations. The report, accompanied by a map of the disposal site, should describe the following:

1. the boundaries of areas used for waste disposal,
2. control of surface drainage flow through the site,
3. evaluation of the anticipated settlement due to decomposition and consolidation of the wastes,
4. manner of surface drainage control in waste disposal areas,
5. thickness of cover and physical properties, including permeability, expansion characteristics and erodibility,
6. relationship of disposal area to underlying groundwater quality,
7. location of groundwater monitoring points (Class II sites),
8. proposed subsequent use of land.

TABLE VI

MINIMUM MONITORING ANALYSIS

A minimum analysis shall quantify the following characteristics:

(A) Specific Conductivity, mho/cm at 25o C

(B) Temperature, oC (Field and Laboratory)

(C) Total dissolved Solids (TDS), mg/liter

(D) Chloride, mg/liter

(E) pH

(F) Dissolved Organic Carbon (DOC), mg/liter

(G) Two principal metals (ones found in the waste in the largest quantities or which best serves as indicators), mg/liter.

TABLE VII

COMPREHENSIVE MONITORING ANALYSIS

A comprehensive analysis shall quantify the following characteristics:

(A) Specific Conductivity, mho/cm 250 C

(B) Temperature, C (Field and Laboratory)

(C) pH

(D) Total dissolved Solid, mg/liter

(E) Total suspended Solid, mg/liter

(F) Total Setteable Solid, mg/liter

(G) Disolved Organic Carbon (DOC), mg/liter

(H) Total Chlorinated Hydrocarbons, mg/liter

(I) Phenolic Compounds (as Phenol), mg/liter

(J) Metals

Aluminum, mg/liter

Arsenic, mg/liter

Beryllium, mg/liter

Cadmium, mg/liter

Chromium, mg/liter

Copper, mg/liter.

TABLE VII (cont.)

Iron, mg/liter

Magnesium, mg/liter

Manganese, mg/liter

Mercury, mg/liter

Nickel, mg/liter

Selenium, mg/liter

Silver, mg/liter

Zinc, mg/liter

(K) Ammonia (as N), mg/liter

(L) Chlorides, mg/liter

(M) Cyanide, mg/liter

(N) Fluoride, mg/liter

(O) Nitrate, mg/liter

(P) Nitrite, mg/liter

(Q) Phosphate, Total, mg/liter

(R) Ortho-phosphate (as P), mg/liter

(S) Organic Contamination scanning by Gas Chromatography.

Note: After the baseline level has been established the comprehensive analysis may be reduced so as to eliminate any compounds not found in the waste handled at the facility.

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BACKGROUND DOCUMENT

RESOURCE CONSERVATION AND RECOVERY ACT
SUBTITLE C - HAZARDOUS WASTE MANAGEMENT

SECTION 3004 - STANDARDS APPLICABLE TO OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

SECTION 250.43-6 STANDARDS FOR VISUAL INSPECTION

DECEMBER 15, 1978

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE

This document provides background information and support for regulations which have been designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulations. As new information is obtained, changes may be made in the regulations, as well as in this background material.

This document was first drafted months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

Timothy Fields, Jr.
U.S. Environmental Protection Agency
Office of Solid Waste
Hazardous Waste Management Division (WH-565)
401 M Street, S.W.
Washington, D. C. 20460

Introduction

Section 3004 of RCRA gives to the Administrator the authority to promulgate regulations establishing performance standards applicable to hazardous waste treatment, storage or disposal facilities, as may be necessary to protect human health and the environment. These regulations shall include requirements respecting satisfactory reporting, monitoring and inspection of hazardous waste facilities by owners and operators.

An effective way to achieve compliance with Congress' mandate might be to require treatment, storage or disposal facility owners and operators to conduct periodic inspections which would discover short-term and potentially dangerous situations. These types of incidents should be remedied immediately before their effects are compounded and result in a condition which adversely affects human health and the environment. The term "owners and operators" refers to owners of hazardous waste management facilities as well as operators, supervisory personnel or other qualified personnel delegated by the owner to perform certain inspection duties.

Some aspects of this document may overlap with the background document supporting monitoring regulations. This document, however, addresses only the issue of monitoring

by visual inspection. The regulatory options discussed in this document are requirements for inspections to be conducted by facility owners and operators under Section 3004(2).

Inspection regulations cannot be strictly enforced due to manpower restrictions. It would be virtually impossible to check for actual compliance with the regulations at each facility. Their function would be to encouage the use of inspections as an efficient facility practice. Several possible means exist for achieving compliance. One would be to require inspection plans to be submitted to the permitting agency. Another possibility would be to require the results of the inspections to be reported on a routine basis.

State Survey

Minnesota

The criteria for operating hazardous waste storage areas (HW-4-E) require that all tanks be regularly inspected and maintained so that no leakages occur.

Proposed hazardous waste regulations require facilities to submit final plans regarding all aspects of the facility including an operations manual giving the operator guidance and direction on how the facility should be operated and maintained, etc. The operations manual requires that inventory control procedures include maintenance and inspection schedules for insuring that containers in storage are labeled properly, marked and not leaking.

Additional requirements are placed on owners and operators of hazardous waste land disposal facilities, land spreading facilities and noncontainerized storage facilities. Provisions for a construction and operations manual which would contain inventory control procedures including, when applicable, a maintenance and inspection schedule insuring that containers in storage are properly labeled, marked and not leaking, a thorough description of the type and frequency of inspection or maintenance that shall be done on storage areas, dikes, equipment storage tanks, liners, cover materials, the leachate collection system, etc. are required.

Illinois

No visual inspections by owners and operators are required. State authorities inspect site facilities monthly.

Texas

No visual inspections by owners and operators are requir State regulatory authorities inspect sites on a monthly basis or more frequently if there are problems or if the facility is large or handles extremely hazardous waste.

California

No visual inspections by owners and operators are req Inspections by the solid waste board, water quality board or local regulatory authorities occur on a monthly basis.

Oregon

No visual inspections by owners and operators are required. State regulatory officials conduct visual inspections approximately ten times per year.

Washington

No visual inspections by owners and operators are required. Proposed regulations set frequency of inspections by the state at "no less frequently than quarterly". The frequency of inspection, however, varies if there are problems in existence at the facility, etc.

Summary of State Inspection Requirements

With the exception of Minnesota, most of the surveyed states have only general maintenance regulations, e.g., requiring submission of an operation plan which includes procedures that will ensure compliance with permit conditions, without designating specific requirements. This implies that periodic inspections should be conducted at the facility, but does not lay out with specificity the frequency of inspection or the areas to inspect. Most of those regulations do not impose any duty on the owner or operator to make inspections of certain things at certain times.

Regulatory Options

Option I: General regulatory language. "Owners and operators of facilities shall conduct inspections of facility

conditions as are reasonable and necessary to protect huma health and the environment."

Advantages:

. Nonspecific regulatory language allows more latitude and flexibility in enforcement. Enforcement authorities would be able to decide the scope of the actual inspecti as well as make the determination as to the length of time between inspections which are reasonable and necessary to protecting human health and the environment This could be done on a case-by-case basis according to the nature of the waste, etc.

Disadvantages:

. Difficulty in compliance because of nonspecificity of language (i.e., frequency of inspections, areas to inspect).

. May result in non-uniform implementation.

Option II: General regulatory language coupled with specific recommendations, such as: "An owner/operator of a facility shall conduct inspections of facility conditions as are reasonable and necessary to protect human health and the environment.

The following applicable areas are recommended for inspection:

(1) Storage areas for rust, corrosion, cracks in storage devices, missing or improper labels, and spills;

(2) Dikes for possible damage or structural weakening, and drainage systems for possible stoppage;

(3) Operating and monitoring equipment and readings to ensure normal operation and readings;

(4) Emergency response equipment to ensure that it meets the requirement specified in Section 250.43-4(1)(4);

(5) Fences or barriers surrounding the facility for possible damage;

(6) Vegetation on or around the facility for possible damage; and

(7) The active portion of the facility for fugitive air emissions.

Visual inspections should be conducted daily and the results recorded in the facility's daily operating log."

Advantages:

. Clearly defined duties for owners and operators.

. Flexibility in enforcement.

. Recommendations, although bearing no actual legal weight, aid in enforcement because of the "reasonable and necessary" criteria in the general statement.

. Aids enforcement officials in judging the adequacy of inspections.

Disadvantages:

. Possible loophole in enforcement because suggestions are not legally enforceable.

Option III. Specific regulatory language.

(a) "An owner/operator of a facility at least once a day, shall visually inspect the following:

(1) Storage areas for rust, corrosion, cracks in storage devices, missing or improper labels, and spills;

(2) Dikes for possible damage or structural weakening, and drainage systems for possible stoppage;

(3) Operating and monitoring equipment and readings to ensure normal operation and readings;

(4) Emergency response equipment to ensure that it meets the requirements specified in Section 250.43-4(1)(4);

(5) Fences or barriers surrounding the facility for possible damage;

(6) Vegetation on or around the facility for possible damage; and

(7) The active portion of the facility for fugitive air emissions.

(b) The observations made in each visual inspection shall be recorded in the facility's daily operating log."

Advantages:

. Specific and clearly defined duties which are not subject to broad interpretation, either in imposing liability or escaping liability.

. More easily enforceable, less discretionary.

Disadvantages:

. More difficult to formulate regulations in that specific areas for inspection must be pinpointed.

. Establishing a figure for frequency of inspections may be difficult and also tends to make the regulation more inflexible. (This would limit enforcement possibilities.)

. Varied nature of facilities may make certain aspects of these requirements inapplicable.

. Restricts flexibility of facility operating procedure.

Option IV: Promulgate no regulations for inspections by facility owners and operators.

Advantages:

. Saves time and personnel in enacting and implementing a regulation.

. Inspections would be adequate in some states which already provide for frequent (monthly) inspections.

Disadvantages:

. Inspections would be inadequate in states not providing for more frequent inspection.

. Requirement is mandated by the Act ("Such standards shall include ... requirements respecting ... inspection.").

Identification and Rationale for Chosen Regulatory Option:

The following regulations have been proposed under Section 250.43-6, Visual Inspections:

(a) An owner/operator of a facility at least once each day shall visually inspect the following:

(1) Storage areas for rust, corrosion, cracks in storage devices, missing or improper labels, and spills;

(2) Dikes for possible damage or structural weakening, and drainage systems for possible stoppage;

(3) Operating and monitoring equipment and readings to ensure normal operation and readings;

(4) Emergency response equipment to ensure that it meets the requirements specified in Section 250.43-4(1)(4);

(5) Fences or barriers surrounding the facility for possible damage;

(6) Vegetation on or around the facility for possible damage; and

(7) The active portion of the facility for fugitive air emissions.

Note: Visual inspections for certain aspects of facility operations may be conducted less frequently than daily if the facility owner/operator can demonstrate that lesser

requirements would still provide for adequate protection of human health and the environment.

(b) The observations made in each visual inspection shall be recorded in the facility's daily operating log.

The purpose of the visual inspection regulation is to require facilities to make routine checks for easily spotted potential environmental problems. The results of these daily inspections could then be recorded in a logbook similar to those used by many facilities to record the results of their daily operating procedures. Ideally, the inspections should be quick and simple so that they can be repeated frequently at little cost. The intent is to detect leakages, short-term accidents and equipment deterioration.

Option III, the regulatory format which we have chosen to implement in the regulation, is one which we feel best protects human health and the environment by specifically delineating what is required of owners and operators regarding visual inspection.

Comments were received on an earlier draft of the regulations which stated that it is unnecessary to conduct daily inspections of all the items listed under 250.43-6(a). It is the Agency's opinion that, in order for the intent of this section to be maximally achieved, it is necessary that these checks be made on a daily basis. However, in response to these comments, the standard has been rewritten to afford some flexibility through the mechanism of the note

added to standard 250.43-6(a). The revised standard now allows for a relaxation of the daily visual inspection requirement for certain aspects of the facility's operations if the owner/operator can demonstrate that lesser requirements would still provide for adequate protection of human health and the environment.

Response to Comments

1. Comment: More definition of the qualifications of owner and operators is necessary. Each site would have a different level of expertise. Therefore, the regulations should refer to the owner or operator, "registered professional engineer:, or other qualifie third party representative."

   Response: We feel that the level of expertise needed to perform the inspections we have recommended is not very high. Presumably, the owner, operator, supervisor personnel, or a person designated by the owner would be competent to handle the inspection. It would be in the owner's or operator's best interest to have someone of competence conducting the inspections. In addition, the qualifications necessary to perform such inspections cannot be generalized into a standard

2. Comment: "Inspections are well and good by facility owners and operators but certainly they must be requi

by permitting and controlling agencies."

Response: The Agency's current intent is to make visual inspection plans a permit condition.

3. Comment: "Proper operation requires these items to be performed daily during normal working hours. A routine daily operating log should include these items on a checklist."

Response: This requirement will be part of the recordkeeping regulation which is covered in Section 250.43-5 of the Section 3004 regulations.

4. Comment: a. How far beyond the facility should vegetation be checked for damage?

b. How is damage to be determined?

- What about low level, chronic impacts to vegetation? How are they determined?"

Response: The intent of the visual inspection regulation is to detect leakages, short-term accidents and equipment deterioration. Therefore, we do not feel it is necessary to outline with specificity the exact distance beyond the facility that vegetation should

be checked. The damage we are interested in detecting is that which is obvious to a person scanning the area around the facility, e.g., areas on the ground devoid of vegetation or where vegetation is dying, etc.

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Resource Conservation and Recovery Act Subtitle C-Hazardous Waste Management Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

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BACKGROUND DOCUMENT

Section 250.43-7 Standards for Closure and Post-Closure

U.S. Environmental Protection Agency
Office of Solid Waste
December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being made available as a draft for comment. As new information is obtained, changes may be made in the regulations, as well as in the background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

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IV. IDENTIFICATION OF CHOSEN REGULATION AND ASSOCIATED RATIONALE

I. Introduction

The Resource Conservation and Recovery Act of 1976 does not specifically mandate that regulations be written directing the closure or providing for longterm care of hazardous waste facilities. The language of Section 3004 (6) provides that the standards shall include, "but need not be limited" to the following areas, reporting, monitoring, ~~and~~ maintenance, and operation of such facilities. It can be implied that since Congress carefully provided for the operation and maintenance of hazardous waste facilities that they also intended for EPA to regulate in the area of closure and Post-closure care. The standards include partial closure of a facility, i.e., when one portion of a site will no longer be used, as well as the final closure of a facility.

The following definitions should aid the reader in understanding the area of concern covered by this document and the regulations for which this document is intended as background information.

When used in this document, the following terms have the meanings given in the Act:

(1) "Administrator" - Sec. 1004(1)

(2) "disposal" - Sec. 1004(3)

(3) "Federal Agency" - Sec. 1004(4)

(4) "hazardous waste management" - Sec. 1004(7)

(5) "open dump" - Sec. 1004(14)

(6) "person" - Sec. 1004(15)

(7) "resource recovery" - Sec. 1004 (22)

(8) "sanitary landfill" - Sec. 1004(26)

(9) "sludge" - Sec. 1004(26A)

(10) "solid waste" - Sec. 1004(27)

(11) "solid waste management" - Sec. 1oo4(28)

(12) "solid waste management facility" - Sec. 1004(29)

(13) "State" - Sec. 1004(31)

(14) "storage" - Sec. 1004(33)

(15) "treatment" - Sec. 1004(34)

Other terms used in this Subpart have the following meanings:

(1) "Act" means the Resource Conservation and Recovery Act of 1976, Public Law 94-580.

"Active Portion" means that portion of a facility where treatment, storage, or disposal operations are being conducted. It includes the treated area of a landfarm and the active face of a landfill, but does not include those portions of a facility which have been closed in accordance with the facility closure plan and all applicable closure standards.

"Cell" means a portion of waste in a landfill which is isolated horizontally and vertically from other portions of waste in the landfill by means of a soil barrier which meets criteria specified in Section 250.45-2(b) (14).

"Close Out" means the point in time at which facility owners/operators discontinue operation by ceasing to accept hazardous waste for treatment, storage, or disposal.

"Closed Portion" means that portion of a facility which has been closed in accordance with the facility closure plan and all applicable closure requirements in this Subpart.

"Closing Date" means the date which marks the end of a reporting quarter or reporting year.

"Closure" means the act of securing a facility pursuant to the requirements of Section 250.43-7.

"Closure Procedures" means the measures which must be taken to effect closure in accordance with the requirements of Section 250.43-7 by a facility owner/operator who no longer accepts hazardous waste for treatment, storage, or disposal.

"Contamination" means the degradation of naturally occurring water, air, or soil quality either directly or indirectly as a result of man's activities.

"Cover Material" means soil or other material that is used to cover hazardous waste.

"Direct Contact" means the physical intersection between the lowest part of a facility (e.g., the bottom of a landfill, a surface impoundment liner system or a natural in-place soil barrier, including leachate detection/removal systems) and a water table, a saturated zone, or an underground drinking water source, or between the active portion of a facility and any navigable water.

"Disposal Facility" means any facility which disposes of hazardous waste.

"Endangerment" means the introduction of a substance into groundwater so as to:

(i) cause the maximum allowable contaminant levels established in the National Primary Drinking Water standards in effect as of the date of promulgation of this Subpart to be exceeded in the groundwater; or

(ii) require additional treatment of the groundwater in order not to exceed the maximum contaminant levels established in any promulgated National Primary Drinking Water regulations at the point such water is used for human consumption; or

(iii) Reserved (Note: Upon promulgation of revisions to the Primary Drinking Water Standards and National Secondary Drinking Water Act and/or standards for other specific pollutants as may be appropriate).

"EPA means the U.S. Environmental Protection Agency.

"EPA Region" means the States and other jurisdictions in the ten EPA Regions as follows:

Region I - Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island.

Region II - New York, New Jersey, Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

Region III - Pennsylvania, Delaware, Maryland, West Virginia, Virginia, and the District of Columbia.

Region IV - Kentucky, Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, and Florida.

Region V - Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio.

Region VI - New Mexico, Oklahoma, Arkansas, Louisiana, and Texas.

Region VII - Nebraska, Kansas, Missouri, and Iowa.

Region VIII- Montana, Wyoming, North Dakota, South Dakota, Utah, and Colorado.

Region IX - California, Nevada, Arizona, Hawaii, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

Region X - Washington, Oregon, Idaho, and Alaska.

"Facility" means any land and appurtenances, thereon and thereto, used for the treatment, storage, and/or disposal of hazardous waste.

"Final Cover" means cover material that is applied upon closure of a landfill and is permanently exposed at the surface.

"Groundwater" means water in the saturated zone beneath the land surface.

"Hazardous Waste" has the meaning given in Section 1004(5) of the Act as further defined and identified in Subpart A.

"Incinerator" means an engineered device using controlled flame combustion to thermally degrade hazardous waste. Examples of devices used for incineration include rotary kilns, fluidized beds, liquid injection incinerators, cement kilns, and utility boilers.

"Incompatible Waste" means a waste unsuitable for comingling with another waste or material, because the commingling might result in:

(i) Generation of extreme heat or pressure,

(ii) Fire,

(iii) Explosion or violent reaction,

(iv) Formation of substances which are shock sensitive friction-sensitive, or otherwise have the potential or reacting violently,

(v) Formation of toxic (as defined in Subpart A) dusts, mists, fumes gases, or other chemicals, and

(vi) Volatilization of ignitable or toxic chemicals due to heat generation, in such a manner that the likelihood of contamination of groundwater, or escape of the substances into the environment, is increased, or

(vii) Any other reactions which might result in not meeting the Air Human Health and Environmental Standard.

"Leachate" means the liquid that has percolated through or drained from hazardous waste or other man emplaced materials and contains soluble, partially soluble, or miscible components removed from such waste.

"Leachate Monitoring System" means a system beneath a facility used to monitor water quality in the unsaturated zone (zone of aeration) as necessary to detect leaks from landfills and surface impoundments. (For example, a pressure vacuum lysimeter may be used to monitor water quality in the zone of aeration.)

"Liner" means a layer of emplaced materials beneath a surface impoundment or landfill which serves to restrict the escape of waste or its constituents from the impoundment or landfill.

"Monitoring" means all procedures used to systematically inspect and collect data on operational parameters of the facility or on the quality of the air, groundwater, surface water, or soils.

"Monitoring Well" means a well used to obtain water samples for water quality analysis or to measure groundwater levels.

"Navigable Waters" means "waters of the United States, including the territorial seas". This term includes, but is not limited to:

(i) All waters which are presently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide, intermittent streams, and adjacent wetlands. "Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds.

(ii) Tributaries of navigable waters of the United States, including adjacent wetlands;

(iii) Interstate waters, including wetlands; and

(iv) All other waters of the United States, such as intrastate lakes, rivers, streams, mudflats, sandflats, and wetlands, the use, degradation or destruction of which would affect or could affect interstate commerce, including, but not limited to:

(A) Intrastate lakes, rivers, streams, and wetlands which are or could be used by interstate travelers for recreational or other purposes;

(B) Intrastate lakes, rivers, streams, and wetlands from which fish or shellfish are or could be taken and sold in interstate commerce; and

(C) Intrastate lakes, rivers, streams, and wetlands which are used or could be used for industrial purposes by industries in interstate commerce.

(v) All impoundments of waters of the United States otherwise defined as navigable waters under this paragraph.

"Non-Point Source" means a source from which pollutants emanate in an unconfined and unchannelled manner, including, but not limited to, the following:

(i) For non-point sources which are not controllable through permits issued pursuant to Sections 301 and 402 of the Clean Water Act. Non-point source water pollutants are not traceable to a discrete identifiable origin, but result from natural processes, such as nonchannelled run-off, precipitation, drainage, or seepage.

(ii) For non-point sources of air contaminant emissions, this normally includes any landfills, landfarms, surface impoundments, and basins.

"On-site" means on the same or geographically contiguous property. Two or more pieces of property which are geographically contiguous and are divided by public or private right(s)-of-way are considered a single site.

"Owner/Operator" means the person who owns the land on which a facility is located and/or the person who is responsible for the overall operation of the facility.

"Partial Closure Procedures" means the measures which must be taken by facility owners/operators who no longer accept hazardous waste for treatment, storage, or disposal on a specific portion of the site.

"Permitted hazardous waste management facility (or permitted facility)" means a hazardous waste treatment, storage, or disposal facility that has received an EPA permit in accordance with the requirements of Subpart E or a permit from a State authorized in accordance with Subpart F.

"Point Source" means any discernible, confined, and discrete conveyance, including, but not limited to, the following:

(i) For point sources of water effluent, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated feeding operation, vessel, or other floating craft from which pollutants are or may be discharged; and

(ii) For point sources of air contaminant emissions, any stack, duct, or vent from which pollutants are or may be discharged.

"Post-Closure Care" means the monitoring and facility maintenance activities conducted after closure.

"Regional Administrator" means the Regional Administrator for the Environmental Protection Agency Region in which the facility concerned is located, or his designee.

"Run-off" means that portion of precipitation that drains over land as surface flow.

"Saturated Zone (Zone of Saturation)" means that part of the earth's crust in which all voids are filled with water.

"Soil Barrier" means a layer of soil of a minimum of 1.5 meters (5 feet) in thickness with a permeability of 1×10^{-7} cm/sec or less which is used in construction of a landfill or a surface impoundment.

"Sole Source Aquifers" means those aquifers designated pursuant to Section 1424(e) of the Safe Drinking Water Act of 1974 (P.L. 93-523) which solely or principally supply drinking water to a large percentage of a populated area.

"Storage Facility" means any facility which stores hazardous waste, except for generators who store their own waste on-site for less than 90 days for subsequent transport off-site, in accordance with regulations in Subpart B.

"Storage Tank" means any manufactured non-portable covered device used for containing pumpable hazardous waste.

"Surface Impoundment" means a natural topographic depression, artificial excavation, or dike arrangement with the following characteristics:

(i) it is used primarily for holding, treatment, or disposal of waste;

(ii) it may be constructed above, below, or partially in the ground or in navigable waters (e.g., wetlands);

(iii) it may or may not have a permeable bottom and/or sides. Examples include holding ponds and aeration ponds.

"Treatment Facility" means any facility which treats hazardous waste.

"Unsaturated Zone (Zone of Aeration)" means the zone between the land surface and the nearest saturated zone, in which the interstices are occupied partially by air.

"United States" means the 50 States, District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

"Underground Drinking Water Source" (UDWS) means:

(i) an aquifer supplying drinking water for human consumption, or

(ii) an aquifer in which the groundwater contains less than 10,000 mg/l total dissolved solids; or

(iii) an aquifer designated as such by the Administrator or a State.

"Underground Non-Drinking Water Source" means an underground aquifer which is not a UDWS.

"Water Table" means the upper surface of the zone of saturation in groundwaters in which the hydrostatic pressure is equal to atmospheric pressure.

II. Rationale for the Regulation

Regulations dictating the manner in which facilities shall be closed are necessary because the potential for abuse in this area is great and the probability of injury to human health and the environment in the event of such abuse is high, as was seen as a result of the Love Canal incident at Niagra Falls, N.Y. It is important that regulations be promulgated in this area in order to prevent such incidents and the abandonment or sloppy closure of hazardous waste sites. Regulations are also necessary to provide for an orderly and safe return of closed site land to acceptable future uses.

III. Identification and Analysis of Regulatory Options

A. Existing State Regulations and Guidelines

Most of those states reviewed required that closure methods and plans be included as part of the facility permit to be approved by the permitting Agency prior to facility operation. However, only a few of the states had specific regulatory language specifing specific method(s) of facility closure and/or responsibility and time of duration for post-closure maintainence. Some states have specific regulations and/or guideline for disposal sites only, some for facilities in general regardless of type and some had specific regulatory language or guidelines for both. All the states surveyed had addressed facility post-closure care apart from facility closure.

The following are excepts from regulations and/or guidelines in a few of the states with hazardous waste management programs which directly address facility closure and post-cloasure care. Other state programs or regulations are similar to the ones discussed here.

California: (Section 2535, Disposal Site Design and Operation Information, 1976)

California requires that an operator of a waste disposal site, must, prior to cessation of disposal operations, submit a technical report to the appropriate regional board describing the methods and controls to be used to assure protection of the quality of surface and ground waters of the area during final operations and with any proposed subsequent use of the land.

The report must be prepared by or under the supervision of a registered engineer or a certified engineering geologist. The regulations also request that the technical report be furnished to the regional board 90 days prior to cessation of disposal operations. The report, accompanied by a map of the disposal site, should describe the following:

1) the boundaries of areas used for waste disposal,
2) control of surface drainage flow through the site,
3) evaluation of the anticipated settlement due to decomposition and consolidation of the wastes,
4) manner of surface drainage control in waste disposal areas,
5) thickness of cover and physical properties, including permeability, expansion characteristics and erodibility,
6) relationship of disposal area to underlying groundwater quality,
7) location of groundwater monitoring points (Class II sites),
8) proposed subsequent use of land.

Additionally California address post-closure care and responsibility as follows.

"The owner of the waste disposal site shall have a continuing responsibility to assure protection of usable waters from the waste discharge, and from gases and leachate that are caused by infiltration of precipitation or drainage waters into the waste disposal areas or by infiltration of water applied to the waste disposal areas during subsequent use of the property for other purposes.

The owner of the property used for waste disposal is considered to be responsible in assuring protection measures are taken after completion of disposal operations."

In addressing site closure California has developed general regulatory language coupled with some specific recommendations which owners/operators must be concerned when closing the site which they feel would assure protection of the environment. However, when addressing post-closure care and maintainence no recommendations are provided to the site owner/operator as to what he must do to assure protection of human health and environment or how long such protection measures must continue after completion of the disposal operations. Such a situation could lead to enforcement problems and lack of long-term environmental protection.

Illinois: (General Refuse and Hazardous Waste Disposal Site Responsibility Act)

"Section 4. (Closing plan required). Every owner and operator of a hazardous waste disposal site or a general refuse disposal site shall file a closing plan with the (State) Environmental Protection Agency for approval. Such closing plan shall includes but not be limited to, final contours, berms, landscaping and protective screening of the hazardous waste disposal site or general refuse disposal site."

"Section 5. (Responsibility period for hazardous waste disposal sites). The owner and operator of a hazardous waste disposal site shall be responsible for the hazardous waste disposal site for a period of 3 years after closure of the site. The owner and operator shall monitor said site for gas migration, drainage problems, erosion, settling, ground and surface waste pollution and other environmental and safety problems which occur, and shall take whatever remedial action is necessary to solve any such problems which occur at the site during the 3 year period."

Illinois, like California, addresses site closure with general regulatory language with some specific requirements which must be addressed in a closure plan. But, again, does not give specific duties and requirements, which may be subject to broad interpactation.

Illinois does go beyond the above regulations for post-closure care and maintainence in California by specifying a specific period an owner/operator shall be responsible for the closed site and what the owner/operator must do to protect the environment during this period. This situation lends itself to easier enforcement situations and is less discretionary.

Illinois also has legislation which requires owner/operators to establish an Escrow fund for the purpose of completing final closure and/or post-closure maintainence if not done so by the owner/operator. Thus, providing insenitive for completion of site closure and post-closure care.

Maryland: (Senate Bill No. 977)

"(k) As condition to the issuance of a permit, the department may require a permit holder to:

(3) Restore to the extent reasonably practicable, the facility site to its original condition when use of the area for designated hazardous (waste) substances disposal is terminated;

(7) Maintain a surety bond in the name of the State in an amount estimated by the department to be sufficient to cover any costs for:

(I) The monitoring, maintaining, and (enclosing) closing the facility;

(II) The security of the facility after closure; and

(III) Guaranteeing fulfillment of all permit requirements; or

(m) The department pursuant to the applicable provisions of the real property article, may condemn any land or facility used for disposal of designated hazardous substances if it determines that:

(1) The condemnation is necessary to provide for proper perpetual care and monitoring of the facility;

(2) Future disturbances of the land poses a substantial treat to (humans, living organisms, or the environment) the natural resources of the state; or

(3) The facility poses a substantial threat to the public health . . ."

Maryland, in general regulatory language, address both facility closure and post-closure care and maintainence. Although substantial similar to Illinois, they are not as specific (e.g. do not establish time limit for post-closure care) and thus are prone to non-uniform implementation and difficulty in facility compliance because non-specificity of language (e.g., restore to extent practicable . . ., not specifying amount of surety bond). However, such an approach allows for more latitude and flexibility in enforcement, i.e., applying regulations on a case by case basis.

New Jersey: (Specific Engineering design requirements for Secure Chemical Landfills, Preliminary Draft)

"12. Hazardous Waste Management Facilities shall be closed in such a manner so as to negate their causing future hazards to human health or the environment.

Facility owners shall be responsible for terminating operations, closing the facility and continuing facility maintenance after closure in an environmentally safe manner.

13. Final Closure Plan: Prior to termination of operation of a Hazardous Waste Management Facility or commencement of closing operations, a final closing plan shall be submitted for approval to the New Jersey Solid Waste Administration, no later than six months and no earlier than one year prior to anticipated date of closure. This plan shall be consistent with the engineering design submitted to obtain a New Jersey Solid Waste Administration permit. In addition, said closing plan shall include the following:

i) A description of plans and procedures to be followed in the termination of operations at the facility indicating adequate protection of the public health and environmental concerns.

ii) A description of disposal methods for any residual waste or any other contaminated materials that remain at the facility at the time of closure;

iii) A description of the method of documentation for structures and equipment remaining at the facility after closure.

iv) A description of the methods to be used to limit public access to the closed facility.

In addition to the closure plan requirements listed, final closure plans for secure (chemical) landfill shall include the following:

i) Maps and drawings detailing original and final contours, site features and thesite location of different types of Hazardous Waste.

ii) Procedures for controlling disposal of leachate and prevention of leachate migration into the environment.

iii) Plans for final cover and sealing, and the means for runoff and soil erosion control.

iv) Procedures for correcting future emergencies or leachate or gas migration problems.

v) Groundwater and gaseous emission monitoring programs.

vi) A financial statement indicating an owner's ability to meet the requirements of Section 9 regarding site closure, perpetual care and future liabilities related to a closed site.

The closure plan shall be approved by the New Jersey Solid Waste Administration in total or in part before closing operations may commence. Closure shall be in accordance with the approved plan or any amendments thereto.

14. Closure Financing: The operator of any Hazardous Waste Management Facility shall establish an escrow account for the purpose of financing final closure and maintenance after closure. Such escrow account shall be maintained at a level sufficient to finance all foreseeable costs and liabilities associated with closure and perpetual maintenance of the site. Such cost may be amortized over the expected life of the facility. Contributors to ~~be~~ the escrow account shall adjust their contributions to reflect modifications of facility life expectancy and fluctuations of projected closure and maintenance costs. Escrow account status shall be reported to the New Jersey Solid Waste Administration annually.

15. Perpetual Maintenance (Reserved)

16. Future Use of Site

i. Prior to any new landfilling operation on the property the operator shall obtain from the Solid Waste Administration a new registration and engineering plan approval.

ii. No residential dwelling shall be constructed on an area previously use for the disposal of Hazardous Wastes.

iii. Any structures built on a Hazardous Waste disposal site subsequent to its closing shall be equipped with adequate gas and fume control or venting systems.

iv. All excavations on a site previously used for the disposal of Hazardous Waste shall be in accordance with the New Jersey Solid Waste Administration rules for disrupted landfill operations, N.J.A.C. 7:27-2.7."

New Jersey address final site closure and future use of the site, however, has not as yet developed regulations for post-closure care and maintainence. New Jersey addresses these issues with general regulatory language combined with specific requirements for site closure. Such language clearly defines duties which are not subject to broad interpretation, and ~~are~~ therefore more easily enforceable and less decretionary. Enforcement is aided through general statements ~~of~~ requiring methods which provide protection of public health and the environment, although this allows flexibility for compliance it gives the owner/operator no indication of how this is to be achieved.

Minnesota (HW-4)

D. Hazardous Waste Facility Closure Other than Hazardous Waste Land Disposal Facilities

1. The facility operator shall give the Agency a minimum of 90 days written notice prior to the closing of the facility. The written notice shall include:

a. Anticipated last day of operation;

b. The existing inventory count and the inventory reduction schedule; and

c. A discussion of how conditions of the Hazardous Waste Facility Permit will be met.

2. The facility operator shall remove, before the facility is closed, all hazardous waste from the facility unless otherwise authorized by the Hazardous Waste Facility Permit.

3. The facility operator shall meet the conditions of the facility's Hazardous Waste Facility Permit for closing the facility. This provision shall apply even if the Permit has expired or has been suspended or revoked.

4. The facility operator shall submit certification to the Agency by a registered professional engineer that the facility has been closed in accordance with the requirements of this regulation and the Hazardous Waste Facility Permit.

E. Hazardous Waste Land Disposal Facility Closure

1. The facility operator shall give the Agency a minimum of one hundred and eighty (180) days written notice prior to closing a Hazardous Waste Land Disposal Facility. The written notice shall include:

a. Anticipated last day of operation;

b. A discussion of how the requirements of this regulation shall be met; and

c. A discussion of how conditions of the Hazardous Waste Facility Permit shall be met.

2. The facility operator shall close the Hazardous Waste Land Disposal Facility in accordance with the following requirements:

a. The facility operator shall close access to the facility and prevent additional waste disposal.

b. The facility operator shall provide, construct, and maintain measures to protect groundwater and surface water and to control air emissions from the facility.

c. The facility operator shall cover the hazardous waste with an adequate amount of cover material to eliminate blowing of the hazardous waste and to minimize leachate production by the hazardous waste.

d. On all areas that have been covered with soil, the facility operator shall cover the area with adequate topsoil and provide vegetation that is sufficient to perevent erosion.

e. The facility operator shall establish and maintain a final grade that promotes surface water runoff without excessive erosion and shall divert surface water drainage around and away from the disposal area.

f. The facility operator shall construct, maintain and operate a gas monitoring system, a groundwater monitoring system, and a surface water monitoring system.

The facility operator shall record a detailed description, including a plat, with the county register of deeds. The description shall include a statement that the site has been used for the disposal of hazardous wastes,

the general types and location of wastes, depth of fill, and other information of interest to potential land owners.

h. The facility operator shall file with the Agency and with the appropriate county office a final plot plan and cross sections that delineate the location of each major type of waste disposed of at the facility..

3. The facility operator to whom a Hazardous Waste Facility Permit has been issued shall close the facility as required by the Permit. Such a facility operator shall submit certification to the Agency by a registered professional engineer that the Hazardous Waste Land Disposal Facility has been closed in accordance with the requirements of this regulation and the Hazardous Waste Facility Permit. This provision shall apply even if the Permit has expired or been suspended a revoked.

4. A facility operator who closes a Hazardous Waste Land Disposal Facility shall perform the following long term maintenance, monitoring, and surveillance of the facility:

a. Maintain the impervious liner and final cover.

b. Maintain surface water drainage in a manner that minimizes erosion.

c. Treat contaminated surface water runoff.

d. Collect and treat leachate.

e. Continue the gas monitoring system, the groundwater monitoring system, and a surface water monitoring system for the time period that the hazardous waste may pose a threat to the environment.

f. Remove hazardous waste from the facility in the event the hazardous waste poses a threat to air, land, or water resources of the state, or public health and safety. The facility operator shall perform such removal regardless of the cause of the threat.

5. A facility operator who closes a Hazardous Waste Land Disposal Facility shall establish and continue in effect financial arrangements that are adequate to finance the long-term maintenance monitoring and surveillance required by this regulation.

Minnesota, in addressing closure and post-closure care of a facility, has developed specific regulatory language which defines the duties the owner/operator must comply with for the protection of the environment. With such a regulatory approach these duties are not subject to broad interpetation, therefore, they are more easily enforceable and less decretionary. However, the inflexibility of such specific regulations discourage industry from developing new and innovative techniques to protect human health and the environment.

Wisconsin: (An Act - Relating to establishing a hazardous waste management program under Department of Natural Resources (DNR), . . ., 1977)

Major features of the hazardous waste management program established in this proposal are as follows:

"1. Procedures for site approval -

.....If the DNR finds that the site is suitable, the applicant is eligible to submit a plan of operation,

which details how the facility will be developed, operated and finally closed when waste is no longer accepted. The plan of operation covers all phases of a site life, including for disposal facilities long-term care necessary after the site is closed ...

4. Long-term care of closed facilities - The original plan or operation for a solid or hazardous waste disposal facility will contain provisions for long-term care of a closed facility. (Long-term care can include routing maintenance, monitoring, leachate collection and disposal and maintenance of surface contours.) This proposal also contains a procedure for eventual termination of the owner's or operator's responsibility to continue to provide long-term care. In the original plan of operation, the DNR can require up to 10 years of long-term care, unless the licensee for a particular facility agrees to a longer period of time. After this time period expires, a decision on termination is made by the DNR. There is provision for a hearing, and the burden is on the DNR in this proceeding to prove by a preponderance of the evidence that additional long-term care is necessary to adequately protect the environment. Additional long-term care, if required, can be of 2 types:

(a) If the additional long-term care is of a type not anticipated in the plan of operation, the costs of it are paid by the waste management fund (see item 5 below);

(b) If the additional long-term care was anticipated in the plan of operation, the DNR can require the owner or operator to provide it for up to an additional 10 years. If the latter determination is made, the owner or operator has the option to either provide the care, or offer to sell the closed facility to the DNR. If an offer to sell is made, the offeror and the DNR each select an appraiser, who jointly determine a fair market value of the facility. If they cannot agree, the appraisers select a 3rd appraiser, who establishes a binding valuation. Once valuation is completed, the DNR must make a 60-day offer to purchase at the established price. If the owner or operator instead chooses to continue to provide long-term care, another similar review is performed at the end of the additional time period."

Wisconsin has developed specific regulations for the establishment of a hazardous waste management program. Regulations specify that the DNR; "prepare and adopt minimum standards for the location, design, construction, sanitation, operation and maintenance of ...facilities." However, the state of Wisconsin has very specific regulations establishing the duties and responsibilities of facility owners and operators for long-term care of closed facilities. Such standards are clearly defined,

not subject to broad interpretation, easily enforcable, and less discretienary. Additionally, Wisconsin regulation sets a specific time period for duration of post-closure care. However, the DNR has establish an option to continue post-closure care based on evidence that such post-closure care is necessary to protect the public health and the environment. This approach would provide maximum protection of the environment without undue burden placed on the facility owner/operator. Further discussion on other such regulatory options for post-closure care and responsibility is addressed below.

The Agency recognizes that environmental hazards exist after closure of sites where wastes remain (i.e. landfills). Accordingly there is a strong need for post-closure care, maintenance, and monitoring. The problem is how long? This discussion suggests several options as to how this issue may be resolved, and presents the option the Agency adopted for regulation.

B. Options for Post-Closure Care and Maintenance

(1) Require Long-Term Care of Landfills Forever

Ideally, this option would provide the best human health and environmental protection possible. It would however, cause severe enforcement problems and legal battles. A disposal facility may dissolve upon closure and leave no individual, company, or state organization responsible for continuing post-closure maintenance. It would be an unfair obligation to a facility owner or operator since no one can predict the future with reasonable accuracy much more than about 100 years. This option is most like that established by the state of Maryland.

An alteration of this option may be to require long-term care for forever unless a facility can prove sometime shorter would be sufficient. This would require both site and waste specific evaluations and put the burden of proof on the facility.

(2) Require Long-Term Care for Some Finite Time

Setting a finite time makes enforcement procedures more practical and legal disagreements would be reduced. The question that needs to be answered is would the finite time adequately protect human health and the environment. The predetermined time would have to be both a waste and site specific determination. Several times which could be selected and the reason why are presented below:

20 years would match financial responsibility requirement

100 years may be the limit of reasonable prediction.

33 years which represents one generation.

3 years which represents the Illinois regulations.

10 year which represents the Wisconsin regulations.

(3) Require Long-Term Care for some finite time and then after that time re-evaluate to see if continued care is necessary.

This option would also make enforcement procedures more practical and tend to reduce legal disagreements. Waste and site specific criteria could also be used to re-evaluate the facility's condition after some finite time. It would incorporate any technological advances developed during the finite time which may allow a more accurate determination of the need for continued care and maintenance.

(4) Require Long-Term Care As Long As Waste Is Hazardous

Next to requiring long-term care forever, this option would provide the next greatest protection to public health and the environment. This approach is most like that of the state of Minnesota.

The difficulty in this approach would be in determining just how long landfilled waste remains hazardous. It has been proposed that hazardous waste which is deposited in a secure landfill would remain hazardous for such a long time that it might just as well be considered hazardous forever. The primary problem with this approach is that a detailed method for determining if the waste in a landfill is still hazardous has not been identified or demonstrated. It appears possible that soil core sampling techniques could be used to obtain samples of the waste which would then be analyzed to determine if it were hazardous according to the Section 3001 criteria. However, core sampling could cause problems such as puncturing a landfill liner or allowing infiltration. Perhaps technical advances in the future would make this determination easier.

Wisconsin uses an approach most similar to option (3). Under their regulations as discussed above, the facilities are responsible for long-term care and monitoring until the end of the 10-year period. The Agency is then required to hold a hearing on any decision to terminate the surveillance.

If it is demonstrated that additional care is necessary, the operator is given the option to provide it or sell the site to the State Department of Natural Resources.

EPA has adopted option 3 as a method to regulate post-closure care and maintenance. This option presents certain advantages and some disadvantages which are outlined below:

Advantages:

- o Owners/operators could request that, at the discretion of the Regional Administrator, a determination be made at any time after site closure, should data be submitted to warrant such review that some or all post-closure requirements be discontinued.
- o The standard would be flexible in that facilities posing a lesser human health and environmental risk will not have to comply with as stringent requirements as all other facilities.
- o As new technologies are developed and as more site data are collected, a more accurate determination may be made as to the need for continued care and maintenance.
- o Owners/operators would have the ability to be released from all or part of their maintenance operations, if determined to be no longer necessary.
- o The option facilitates implementation in that no facility-by-facility evaluation is necessary at the outset, and the burden is on the facility owner/operator to later show that post-closure care is no longer necessary.

Disadvantages:

- o May be burdensome for the Agency to make determinations every time owners and operators of facilities request them to do so. Reviewing and evaluating new data will become time consuming.
- o May provide less adequate protection of human health and the environment due to reductions in a maximum time period (option 4).
- o Unacceptable discharges may not occur until sometime after a facility has been released from its monitoring obligation.

In summary, this option prescribes a maximum time requirement for post-closure care and at the same time provides the flexibility and the incentive for new technology and data to decrease this time requirement for all or certain aspects of post-closure care. Should a problem occur after the time period or after the owners or operators of the facility have been released from post-closure requirements, the EPA could still respond using its imminent hazard authority under Section 7003 of RCRA.

Further discussion on post-closure care is presented in Section IV of this document. Rationale for the 20-year period required in these regulations from the date of closure, for owners/operators to provide long-term care and maintenance is also presented.

IV. Identification of Chosen Regulation and Associated Rationale

The purpose of the closure and post-closure standards is to reduce the potential for damage to human health and the environment which can arise from improper facility closure and inadequate post-closure care and maintenance.

The regulatory format which the Agency has chosen to implement in the regulation is one of specific regulatory language combined with notes which provide a basis for deviation from the standard. It is one which the Agency feels best protects the human health and the environment. It combines almost all of the advantages of the options discussed in Section III by specifically delineating what is required of owners and operators regarding closure and post-closure, while at the same time providing some flexibility through the mechanism of the note. However, not all of the standards are accompanied by notes. For some standards the Agency believes that it is not possible for the facility owner/operator to deviate from the standard and still protect human health and the environment.

The following regulations along with their associated rationale have been proposed under Section 250.43-~~7~~ 7, Closure and Post-Closure:

(a) In addition to complying with the requirements of this Section, an owner/operator of a facility shall also comply with the applicable Financial Requirements in Section 250.43-9.

- Examination of EPA data on recent damage incidents indicates that there is no reliable classification process by which the relative hazards from differing wastes and differing treatment, storage, and disposal processes can be established. The dollar values of damages in EPA files range from $100,000 to $40 million. However, it is not unrealistic to imagine claims considerably greater than $40 million. Clearly, the EPA cannot require every firm to maintain financial responsibility sufficient to cover the largest foreseeable claim. For this reason, the EPA has attempted to establish (with very little actuarial data and minimal experience with a regulated hazardous waste industry) a degree of coverage that provides [redacted] protection of human health and the environment and is not prohibitive in terms of cost.

The background document for Financial Requirements, Section 250.43-9 of Section 3004 of RCRA should be consulted for further rationale.

(b) An owner/operator of a facility from which hazardous waste will not be removed and will remain in the facility after closure (e.g., a landfill) shall record in the deed of the property on which the facility is located a stipulation that use of the property by the owner/operator or any future owner of the property after closure shall be conducted in a manner to prevent

disturbance of the integrity of the final cover, the liner, or the monitoring systems of the facility.

The objective of this standard is to minimize the possibility of hazardous waste remaining on site from escaping to the environment and deleteriously affecting the human health and environment. In order to maximally effectuate this end, residences should not be built on the site and agricultural operations should not be conducted. The potential for harm is particularly great in such areas. If farming were allowed on the land the additional danger of plant uptake of hazardous waste constituents and subsequent feeding of the crops to animals and humans would be present (either directly or indirectly). The uncontrolled construction of residential areas could disturb a disposal site allowing the release of wastes. Additionally, the drinking water wells commonly found in residential areas could be contaminated from disposal sites.

From a legal standpoint, restriction of future land use for other than residential or agricultural purposes can be justified by looking to Congressional intent as to what RCRA was supposed to achieve. Congress gave EPA broad authority to promulgate regulations which would protect public health and the environment. In order to maximally achieve this end, an approved plan for future use of the site must be determined.

The desire to retrieve a waste for purposes of recycling may arise. In such situations, the facility would be allowed to disturb the site if it can demonstrate that no harm will result to public health and the environment.

(c) The owner/operator of a facility shall submit a closure plan to the Regional Administrator prior to beginning treatment, storage, and/or disposal operations, or at the time of and as part of the application for a permit pursuant to Subpart E. The closure plan shall include, but not be limited to:

(1) A description of how the facility shall be closed.

(2) A description of possible uses of the land after closure.

(3) The anticipated time until close-out, the estimated time(s) required for closure and any anticipated partial closures.

The objective of submitting a closure plan prior to beginning treatment, storage, and/or disposal operations and as part of the application for a permit pursuant to Subpart E, is to assure that the site will be closed in an orderly and safe manner in compliance with these standards. It is important for the Regional Administrator to know in advance how a facility will be closed,

what safeguards and monitoring systems will be employed, etc. The purpose of these closure standards is to assure that facilities are secured, i.e., treated or isolated in a controlled manner such that human health or animal life will not come into direct or indirect contact with the waste and that no leaks or discharges of the waste into the environment occur subsequent to facility close-out.

Agency policy is not to have closed hazardous waste sites completely restricted from public use indefinitely. The Agency supports reclaiming such sites for some useful purpose after closure. Therefore, a description of possible uses of the land after closure has been completed is required in the closure plan.

An estimate of site life, i.e., the length of time anticipated to exhaust the treatment, storage, and/or disposal function of the facility, and the estimated time required for closure and anticipated partial closures is necessary in the closure plan to enable the Regional Administrator to evaluate the cost of final closure for the facility. This information will also be used as necessary in determining the size of the secured trust fund required by 250.43-9(a)(1,2) for the closure of the facility.

(d) An owner/operator of a facility other than a landfill shall notify the Regional Administrator:

(1) of intent to close out the facility at least 15 days before close-out; and

(2) of completion of closure at least 90 days before closure.

The objective of this standard is to allow time for inspection to assure compliance with the standards. The numerical time limits are established from the precedent set by the Minnesota Hazardous Waste Regulations and are set in order to give permitting officials some advance notice so that they can oversee the closure operations and insure that they have been done properly. It also provides a sufficient length of time in which future use of the land can be negotiated.

(e) An owner/operator of a landfill facility shall notify the Regional Administrator:

(1) of intent to partially close the facility (i.e., close a portion of the facility) at least 15 days before partial closure;

(2) of intent to close out the facility at least 15 days before close-out; and

(3) of completion of closure at least 180 days before closure.

The objective of this standard is to allow for time for inspection to assure compliance with the standards. The numerical time limits are established from the precedent set by the Minnesota Hazardous Waste Regulations and are set in order to give permitting officials some advance notice so that they can oversee the closure operations and insure that they have been done properly. It also provides a sufficient length of time in which future use of the land can be negotiated. The land disposal facility notice requirement is a slightly longer time period because these facilities present more of a threat to human health and the environment in their closed state than do biological and chemical treatment plants, lagoons and incinerators. In addition, there are more arrangements to be made concerning the closure of landfills, such as monitoring, covers, security, etc.

(f) - Within 90 days after close-out, all disposal operations shall be completed and all hazardous waste shall be removed from storage and treatment operations and disposed of in accordance with requirements in Subparts B, C, and D.

The objective of this standard is to require owners and operators of hazardous waste facilities, which are in the process of closure, to dispose of all hazardous waste and hazardous waste residues remaining on site after close-out, in an expeditious and safe manner for the protection of public health and the environment.

EPA's hazardous waste damage files contain numerous incidents of deleterious effects to air, ground and surface water resulting from hazardous waste facilities whose owners and operators failed to adequately dispose of wastes subsequent to the closing of a facility. A good example of such an incident is the now abandoned Silresim chemical treatment site in Lowell, Massachusetts. An estimated 20,000 leaking drums of hazardous chemicals and chemical treatment and processing equipment remained on this site for an extended period of time, posing a substantial threat to human health and the environment. Cost for adequate removal and disposal of these wastes will be in excess of $1.5 million.

The 90-day period after close-out for this standard was established by the Agency as being a reasonable

time frame for the completion of all disposal operations. It should be emphasized that this standard only requires that all disposal operations must be completed within this 90-day period following close-out; it does not require completion of the entire closure procedures specified in each facility's closure plan as submitted at the beginning of operation as part of the application for a permit pursuant to Subpart E.

The removal from storage of all hazardous waste for prompt disposal at facility close-out is necessary because these facilities are not usually designed to contain and/or store waste for an extended period of time without proper treatment and/or disposal. Thus, there is a high probability that such waste would escape to the environment if not removed.

(g) Closure shall be completed within three years after close-out.

The objective of this standard is to require that closure be limited to a finite time in order that the closed site can be put to some use other than for the perpetual storage and/or ultimate disposal of hazardous waste. The future land use of the closed site must be specified in the closure plan and completed within a reasonable period of time. Accordingly, the Agency feels that a specific time limit is necessary for the completion of closure to assure that site decontamination, removal of equipment, continued monitoring, and

an expeditious transition of the land to an acceptable purpose is accomplished without unnecessary delay.

The Agency has set a maximum three-year limit for the completion of closure. The Agency believes this allows more than adequate time for site closure, placing no undue burden on the owner or operator of the facility. It should be noted that it is to the owner's and/or operator's advantage to complete site closure without unnecessary delay in order to "start the clock" for post-closure care, which continues for 20 years from the completion of closure, unless the owner/operator can demonstrate otherwise, which would result in a shorter period for post-closure care and maintenance.

(h) At completion of closure, all equipment used in the operation shall be properly disposed of or decontaminated by removal of all hazardous waste and residues.

The objective of this standard is to eliminate the threat of contamination from hazardous waste to human health and the environment which might result from direct or indirect contact with waste residues or contaminated equipment used for the treatment, storage, and/or disposal of hazardous waste.

The disposal or decontamination of all equipment used in the operation, by the completion of closure is necessary to assure that discharges of waste harmful

to human health and the environment will not occur. Additional rationale pertinent to this standard is included in (f) and (g) of this section.

(i) At completion of closure, all facilities shall be secured so that humans or animal life cannot come into contact with hazardous waste, and so that discharges of waste harmful to human health or the environment will not occur.

The objective of this standard is to assure that all the procedures required for site closure, i.e., completion of treatment and disposal of on-site waste and decontamination and removal of equipment, will result in acceptable site closure at some future point in time. Thus, the Agency believes that completion of site closure is only acceptable if the owner/operator of a facility complies with the above standard; to render waste non-hazardous and/or isolate such waste in a manner which will not violate the human health and environmental objectives of RCRA.

(j) At completion of closure, all required equipment shall be provided and arrangements shall be made to continue post-closure monitoring as required in paragraph (n)(1.) at landfills and other facilities where hazardous waste has not been removed as part of closure.

At facilities from which the hazardous waste are not removed, there exists the potential for leakage and leaching; therefore, provisions for monitoring are a necessary requisite for closure.

For further rationale and discussion on the requirements concerning long-term monitoring and waste containment refer to the draft background documents for Sections 250.43-8, Groundwater and Leachate Monitoring; and 250.45-2, Landfills; also refer to rationale for (n)(1) in this document.

(k) At completion of closure, and again upon completion of post-closure care (in the case of a landfill and other facilities where hazardous waste is not removed as part of closure), the owner/operator shall submit to the Regional Administrator certification by the owner/operator and certification by a registered professional engineer that the facility has been closed in accordance with the requirements of this Subpart.

Certification by a registered professional engineer provides an added assurance that closure operations have been properly carried out, thereby reducing the need for inspection and facilitating enforcement.

(1) Within 180 days after completion of closure, the owner/operator of a landfill or other facility where hazardous waste is not removed as part of closure, shall file with the local land authority and the Regional Administrator, a survey plat, certified by a registered professional land surveyor, indicating the type and location of hazardous waste disposed of in the facility.

The filing of a plat is necessary to insure that there will be a properly recorded report of what was done on the site. This also helps to ensure that future use of land will be appropriate.

(m) An owner/operator of a landfill or other facility where hazardous waste is not removed as part of closure shall provide post-closure care for a period of at least 20 years from the date of closure.

Note: The owner or operator may request that, at the discretion of the Regional Administrator, a determination be made of whether some or all post-closure requirements may be discontinued earlier than 20 years after closure. The facility owner or operator shall bring forth evidence showing why post-closure care need not continue, i.e., no leaks have been detected, advanced technology was used, alternate disposal techniques were employed, etc.

Long-term care of hazardous waste landfills is very important because of the environmental hazards associated with these types of facilities after closure. Maintenance of monitoring and groundwater protection devices until the landfilled waste is no longer considered hazardous is necessary in order to adequately protect human health and the environment. The problem with this requirement is that methods for determining how long landfilled wastes remain hazardous after final

closure of the fill have not been developed in detail or demonstrated. This raises the question of how long post-closure care, maintenance and monitoring should be required. The plan adopted is modeled after Wisconsin's approach (see discussion in Section III). Long-term care would be required for some finite time, i.e., 20 years, after which time a re-evaluation would take place as to whether continued care would be necessary. Enforcement procedures would be greatly facilitated and legal disagreements would tend to be lessened. Time would be saved by setting a front end time limit because a facility-by-facility determination as to the length of time long-term care and maintenance would be required of each facility would not be necessary.

Waste and site specific criteria could also be used to re-evaluate the condition of the facility before or after the 20-year period. Technological advances developed during this period would allow a more accurate determination of the need for continued care and maintenance.

A 20-year period, as opposed to another time period, for post-closure care was established for many reasons. Foremost are the extreme financial and economic burdens which would be imposed on owners/operators of facilities if longer post-closure periods were required. Various

options were considered by the Agency (see Section III of this document and Financial Requirements background document) in which longer time periods were determined to be financially too burdensome on the industry. The monitoring requirements for landfills specify as a condition for issuance of a permit that the zones of aeration and saturation directly beneath and surrounding the facility, respectively, be monitored not only during post-closure but for the operating life of the facility. Thus, the Agency is confident that if no movement of hazardous constituents is detected within this time frame then the probability that movement will occur is small. Twenty years, to the best of the Agency's knowledge, provides adequate protection of the environment and human health. It should be emphasized that if accidents do occur after 20 years, the owner/operator is liable for damages to the third parties.

(n) Post-closure care shall consist of at least the following:

(1) Monitoring and reporting in accordance with the requirements of Section 250.43-8(c) (2,3, and 4) and (d)(1 and 2).

(2) Maintenance of facility security and waste containment devices.

Post-closure care, as specified in 250.43-7(m) is required for a landfill or other facility where hazardous waste is not removed as a part of the closure plan.

In nearly all cases, hazardous waste landfills have the potential to leak, thus creating a potential threat to human health and the environment. Therefore, such facilities should be monitored in such a manner as to indicate as early as possible the movement of contaminants so as to predict, as early as possible, the potential for endangerment of the groundwater.

The fundamental objective of monitoring landfill sites is to serve as a backup to waste containment structures and/or devices.

The waste containment structures at these facilities must be maintained in order to function properly, i.e., they must maximize waste containment and minimize escape of hazardous waste constituents to the environment. The EPA recognizes that the escape of small quantities of waste may not have deleterious effects to the environment, however, the Agency is unaware of any method to determine what release rates of what waste constituents would be acceptable. Therefore, these waste containment structures and devices must be maintained for as long as the waste is determined to pose a threat to human health and the environment.

Further rationale concerning the above standard may be found in the background documents for Groundwater and Leachate Monitoring (Section 250.43-8) and Landfills (Section 250.45-2).

(o) If the owner/operator of a facility transfers the ownership or operation of the facility during the 20-year post-closure care period, the new owner/operator shall comply with the requirements of this Section.

The objective of this standard is to assure that post-closure care is not discontinued because of transfer of ownership of a facility. There are numerous hazardous waste damage incidents within EPA files, resulting from a lack of responsible post-closure care due to numerous transfers of site ownership. This issue is further discussed in the background document for Financial Requirements (Section 250.43-7).

BD-21

BD-21

Resource Conservation and Recovery Act

Subtitle C - Hazardous Waste Management

Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

DRAFT

BACKGROUND DOCUMENT Section 250.43-8

Groundwater and Leachate Monitoring

U.S. Environmental Protection Agency

Office of Solid Waste

December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being made available as a draft to support the proposed regulations. As new information is obtained, changes may be made in the regulations as well as in this background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

Timothy Fields, Jr.
U.S. Environmental Protection Agency
Office of Solid Waste (WH-565)
Hazardous Waste Management Division
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GROUNDWATER AND LEACHATE MONITORING

I. Introduction

Section 3004 of the Resource Conservation and Recovery Act of 1976 (RCRA) mandates that the EPA Administrator promulgate regulations establishing such performance standards, applicable to owners and operators of facilities for the treatment, storage, or disposal of hazardous wastes as may be necessary to protect human health and the environment. The Act specifically requires that such standards be written that shall include requirements respecting satisfactory monitoring of such hazardous waste management facilities (HWMF). This document will be concerned with groundwater and leachate monitoring at hazardous waste management facilities, since improper disposal, storage, or treatment of hazardous wastes can pose a serious threat to human health and the environment.

The HWMF should be monitored in such a manner as to indicate as early as possible the movement of contaminants from the HWMF into the unsaturated zone so as to predict, as early as possible, the potential for endangerment of the groundwater or impact on specified groundwater quality. The fundamental objective of monitoring HWMF sites is to serve as a backup to the design and operating standards for such facilities.

Definitions

(a) When used in this Subpart, the following terms have the meanings given in the Act:

(1) "Administrator" - Sec. 1004(1)

(2) "disposal" - Sec. 1004(3)

(3) "Federal Agency" - Sec. 1004(4)

(4) "hazardous waste management" - Sec. 1004(7)

(5) "open dump" - Sec. 1004(14)

(6) "person" - Sec. 1004(15)

(7) "resource recovery" - Sec. 1004(22)

(8) "sanitary landfill" - Sec. 1004(26)

(9) "sludge" - Sec. 1004(26A)

(10) "solid waste" - Sec. 1004(27)

(11) "solid waste management" - Sec. 1004(28)

(12) "solid waste management facility" - Sec. 1004(29)

(13) "State" - Sec. 1004(31)

(14) "storage" - Sec. 1004(33)

(15) "treatment" - Sec. 1004(34)

(b) Other terms used in this Subpart have the following meanings:

(1) "Act" means the Resource Conservation and Recovery Act of 1976, Public Law 94-580.

(3) "Active Portion" means that portion of a facility where treatment, storage, or disposal operations are being conducted. It includes the treated area of a landfarm and the active face of a landfill, but does not include those portions of a facility which have been closed in accordance with the facility closure plan and all applicable closure standards.

(4) "Annular Space" means the space between the bore hole and the casing. A bore hole is the man-made hole in a geological formation for installation of a monitoring well.

(5) "Aquifer" means a geologic formation, group of formations, or part of a formation that is capable of yielding useable quantities of groundwater to wells or springs.

(6) "Attenuation" means any decrease in the maximum concentration or total quantity of an applied chemical or biological constituent in a fixed time or distance traveled resulting from a physical, chemical, and/or biological reaction or transformation occurring in the zone of aeration or zone of saturation.

(19) "Contamination" means the degradation of naturally occurring water, air, or soil quality either directly or indirectly as a result of man's activities.

(24) "Disposal Facility" means any facility which disposes of hazardous waste.

(25) "Endangerment" means the introduction of a substance into groundwater so as to:

(i) cause the maximum allowable contaminant levels established in the National Primary Drinking Water standards in effect as of the date of promulgation of this Subpart to be exceeded in the groundwater; or

(ii) require additional treatment of the groundwater in order not to exceed the maximum contaminant levels established in any promulgated National Primary Drinking Water regulations at the point such water is used for human consumption; or

(iii) Reserved (Note: Upon promulgation or revisions to the Primary Drinking Water Standards and National Secondary Drinking Water Standards under the Safe Drinking Water Act and/or standards for other specific pollutants as may be appropriate).

(26) "EPA" means the U.S. Environmental Protection Agency.

(27) "EPA Region" means the States and other jurisdictions in the ten EPA Regions as follows:

Region I - Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island.

Region II - New York, New Jersey, Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

Region III - Pennsylvania, Delaware, Maryland, West Virginia, Virginia, and the District of Columbia.

Region IV - Kentucky, Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, and Florida.

Region V - Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio.

Region VI - New Mexico, Oklahoma, Arkansas, Louisiana, and Texas.

Region VII - Nebraska, Kansas, Missouri, and Iowa.

Region VIII - Montana, Wyoming, North Dakota, South Dakota, Utah, and Colorado.

Region IX - California, Nevada, Arizona, Hawaii, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

Region X - Washington, Oregon, Idaho, and Alaska.

(28) "Facility" means any land and appurtenances, thereon and thereto, used for the treatment, storage, and/or disposal of hazardous waste.

(37) "Generator" means any person or Federal Agency whose act or process produces hazardous waste identified or listed under Subpart A; provided, however, that certain producers may or may not be generators depending on whether they meet the criteria specified in Section 250.29 of Subpart B.

(38) "Groundwater" means water in the saturated zone beneath the land surface.

(39) "Hazardous Waste" has the meaning given in Section 1004(5) of the Act as further defined and identified in Subpart A.

(41) "Hazardous Waste Landfill" means an area in which hazardous waste is disposed of in accordance with the requirements of Section 250.45-2.

(42) "Hydraulic Gradient" means the change in hydraulic pressure per unit of distance in a given direction.

(47) "Leachate" means the liquid that has percolated through or drained from hazardous waste or other man-emplaced materials and contains soluble, partially soluble, or miscible components removed from such waste.

(48) "Leachate Collection and Removal System" means a system capable of collecting leachate and/or liquids generated within a hazardous waste landfill, and removing the leachate and/or liquids from the landfill. The system is placed or constructed above the landfill liner system.

(49) "Leachate Detection System" means a gravity flow drainage system installed between the top and bottom liners of a surface impoundment capable of detecting any lechate that passes through the top liner.

(50) "Leachate Detection and Removal System" means a system capable of detecting the presence of leachate and/or liquids beneath the bottom liner system of a landfill, and is capable of periodically removing leachate and/or liquids if found or known to be present.

(51) "Leachate Monitoring System" means a system beneath a facility used to monitor water quality in the unsaturated zone (zone of aeration) as necessary to detect leaks from landfills and surface impoundments. (For example, a pressure-vacuum lysimeter may be used to monitor water quality in the zone of aeration.)

(52) "Liner" means a layer of emplaced materials beneath a surface impoundment or landfill which serves to restrict the escape of waste or its constituents from the impoundment or landfill.

(55) "Monitoring" means all procedures used to systematically inspect and collect data on operational parameters of the facility or on the quality of the air, groundwater, surface water, or soils.

(56) "Monitoring Well" means a well used to obtain water samples for water quality analysis or to measure groundwater levels.

(61) "Owner/Operator" means the person who owns the land on which a facility is located and/or the person who is responsible for the overall operation of the facility.

(63) "Permitted hazardous waste management facility (or permitted facility)" means a hazardous waste treatment, storage, or disposal facility that has received an EPA permit in accordance with the requirements of Subpart E or a permit from a State authorized in accordance with Subpart F.

(69) "Regional Administrator" means the Regional Administrator for the Environmental Protection Agency Region in which the facility concerned is located, or his designee.

(71) "Reporting Quarter" means the three (3) month time period covered by each quarterly report; the reporting quarters end on the last day of March, June, September, and December.

(73) "Representative Sample" means a sample having average characteristics of all groundwater in the aquifer beneath the facility.

(76) "Saturated Zone (Zone of Saturation)" means that part of the earth's crust in which all voids are filled with water.

(80) "Soil Barrier" means a layer of soil of a minimum of 1.5 meters (5 feet) in thickness with a permeability of 1×10^{-7} cm/sec or less which is used in construction of a landfill or a surface impoundment.

(82) "Sole Source Aquifers" means those aquifers designated pursuant to Section 1424(e) of the Safe Drinking Water Act of 1974 (P.L. 93523) which solely or principally supply drinking water to a large percentage of a populated area.

(83) "Storage Facility" means any facility which stores hazardous waste, except for generators who store their own waste on-site for less than 90 days for subsequent transport off-site, in accordance with regulations in Subpart B.

(85) "Surface Impoundment" means a natural topographic depression, artificial excavation, or dike arrangement with the following characteristics: (i) it is used primarily for holding, treatment, or disposal of waste; (ii) it may be constructed above, below, or partially in the ground or in navigable waters (e.g., wetlands); and (iii) it may or may not have a permeable bottom and/or sides. Examples include holding ponds and aeration ponds.

(89) "Treatment Facility" means any facility which treats hazardous waste.

(93) "Unsaturated Zone (Zone of Aeration)" means the zone between the land surface and the nearest saturated zone, in which the interstices are occupied partially by air.

(95) "Underground Drinking Water Source" (UDWS) means:

(i) an aquifer supplying drinking water for human consumption; or

(ii) an aquifer in which the groundwater contains less than 10,000 mg/l total dissolved solids; or

(iii) an aquifer designated as such by the Administrator or a State.

(96) "Underground Non-Drinking Water Source" means an underground aquifer which is not a UDWS.

(99) "Water Table" means the upper surface of the zone of saturation in groundwaters in which the hydrostatic pressure is equal to atmospheric pressure.

II. Rationale for Regulation

(A). Importance of the ground-water resource[1]

Almost one-half of the population (48%) of the United States depends upon ground water as a source of drinking water. (Figure 1). Of the total population, 29% use ground water delivered by community systems and another 19% have their own domestic wells. The rural population dependent upon ground water is much higher (94%) than the population served by public supplies (37%).

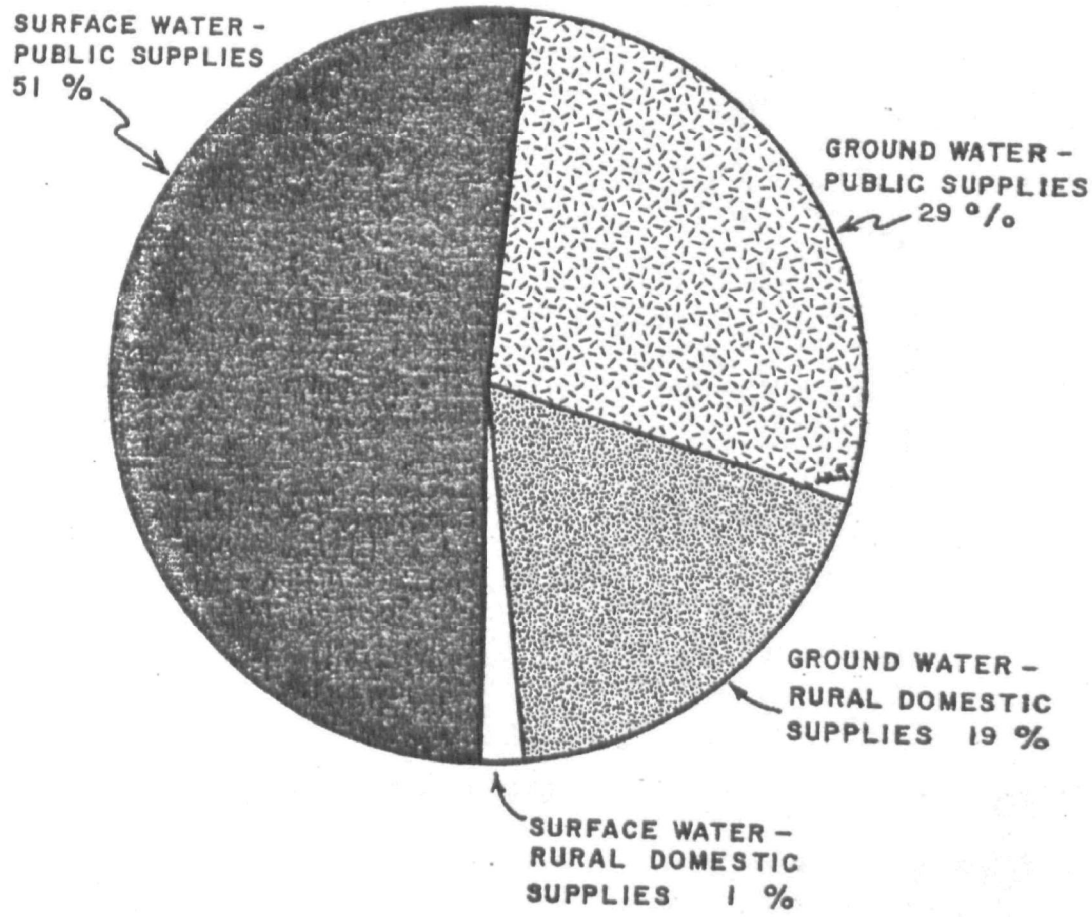

Figure 1. Population served by source and supply, 1970.

The other large users of ground water are public supplies and irrigation which rely on ground water to the extent of 34 and 36 percent, respectively. In terms of absolute quantity, irrigation accounts for 67 percent of total ground-water withdrawal. Public supplies are the second largest consumer of ground water. Figure 2 illustrates the break-down of ground water withdrawal by use.

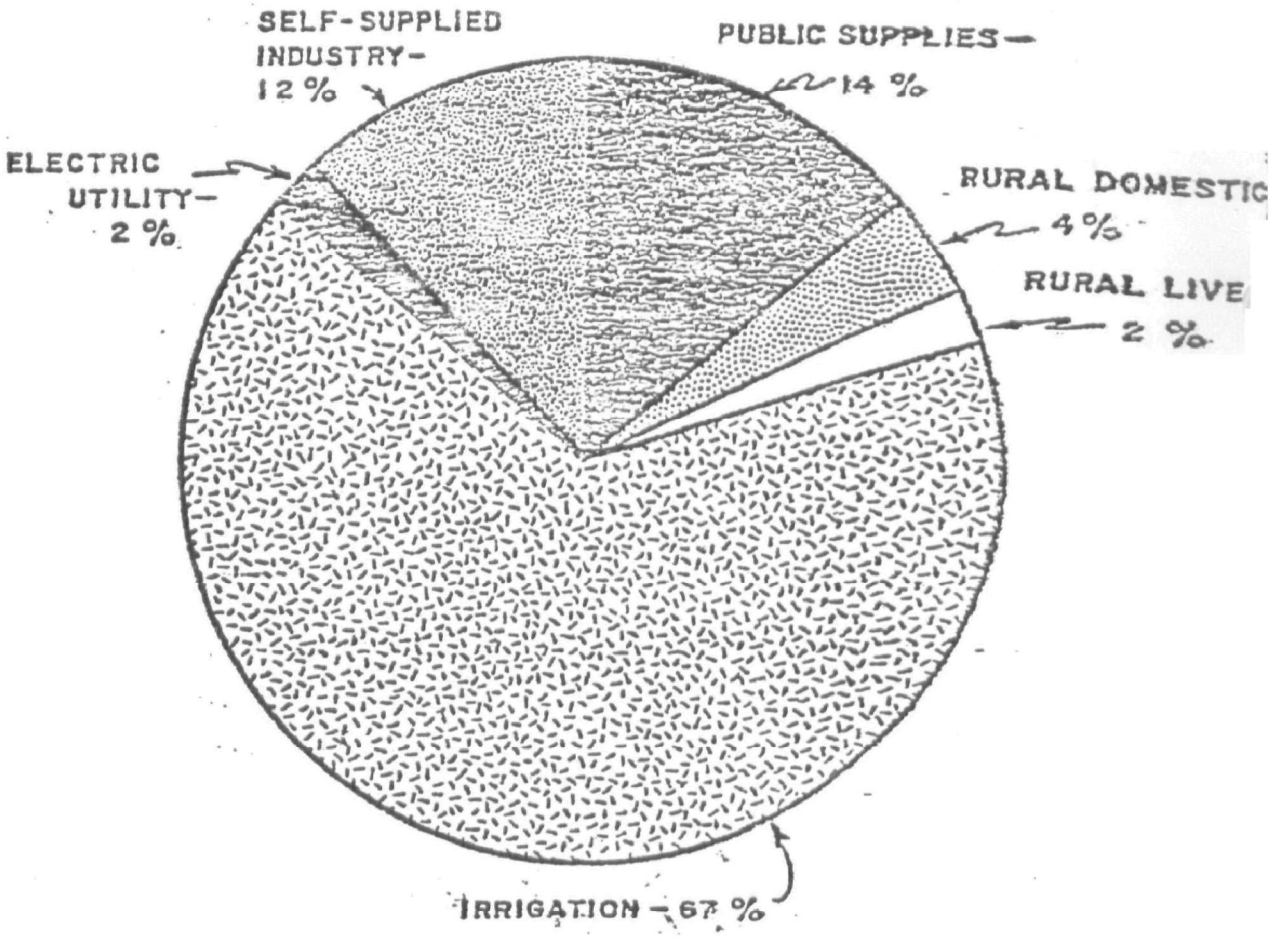

Figure 2. Total ground water withdrawal, by use, 1970.[1)]

(B) Damage Cases:

The following documented damage cases illustrate the potential for groundwater contamination from hazardous waste land disposal sites:

1. In Minneapolis-St. Paul area, the industrial solvent isopropyl ether disposed of in pits from mid 1950's to 1966 contaminated a private well near the disposal site in May 1966. Water from the well in the disposal area contained a maximum of 650 ppb isopropyl ether. After the disposal in pits discontinued, three wells installed for dewatering purposes have been pumped continuously since January 1968. Discharged water is piped 5.5 miles to Mississippi River outlet. Manufacturing company has reportedly spent over $400,000 to correct the situation.

2. Chromate plating wastes were discharged into an infiltration pit in Douglas, Michigan for about 3 years. The glacial-drift aquifer was contaminated for at least 1,000 feet in one direction from the pit and to a depth of at least 37 feet. All private wells in the village were condemned because there was no practical way to test the water quality in each one. Water from wells supplying the village had a chromate content of 0.8 mg/l in 1947.

3. The Ansul Company manufactures agricultural herbicides in Marinette, Wisconsin, which resulted in the production of salt wastes containing arsenic. The company had accumulated many tons of these salts at their plant location. Surveys by Ansul and the Wisconsin Department of Natural Resources (DNR) had indicated localized heavy groundwater contamination. Contamination of the Menominie River, adjacent to the plant, had occurred with maximum levels in the sediment found to be 35 ppm of arsenic (USPHS standard is 0.05 ppm).

4. The river contamination had been attributed to 7,500 tons of the salt wastes which has been stored on a loading dock within 10 feet of the river. A well at the dock had been found to yield water containing about 1.0 mg/l arsenic. The DNR had ordered the Ansul Company to construct new storage facilities for the salt wastes. Two new storage facilities were to be built, the first for the daily salt waste production and the second for the wastes currently stored on site.

5. An aluminum plant in Monroe County, Ohio had grossly contaminated the ground water under its site with flourides, high pH, and other trace chemicals. The water was also discolored. The source of

contamination was leachate from a used tailing pond and used potline piles. As a partial solution the firm was treating the pollution source with acid. They have also developed interceptor wells between their source of pollution and their main production well. The OEPA did recognize that these actions were beneficial in containing the pollution within the aquifer under the firms site. However, if the firm were to discontinue operations and thus discontinue the use of the main production well, the use of the inceptor well, and the use of acid treatment, the site would be a major source of pollution for many years after the plant closed.

9. A chemical plant in Hamilton County, Ohio which utilizes two infiltration lagoons for waste disposal had contaminated a very productive aquifer. This was discovered recently when a new well was developed on a nearby property. Follow up studies revealed that several other wells in the area were also contaminated. Abnormally high values of sodium, potassium, nitrogen, sulfates, phenols and high TOC values were found. A few of these constituents in several of the contaminated wells exceeded standards for drinking water.

6. An arsenic pesticide was used to control a grasshopper infestation near Perham, Minnesota in 1934. After the infestation was under control, the unused pesticide was buried in an unmarked shallow trench far from any urbanized areas. In 1972 a shallow well was installed near the pesticide disposal area to serve as a water supply for a local construction company. Soon after the well was placed in service, thirteen employees were stricken with what was later diagnosed to be arsenic poisoning. All of the thirteen employees required medical treatment and two had to be hospitalized. One employee was hospitalized for more than a month and still suffers from nerve damage.

7. Since August 1968, a commercial laboratory in Myerstown, Pennsylvania, has disposed of its arsenic waste by surface storage within the plant area (some of waste materials not known). This practice apparently has led to contamination of the ground and subsequent migrations into groundwaters through leaching, ionic migration actions, etc., abetted by the geologic and edaphic character of the plant site. In order to meet discharge requirements and/or eliminate the waste hazard,

the company has had to design and construct a system of recovery wells to collect the arsenic effluent from groundwaters in the area. Recovered arsenic and current arsenic waste (previously stored on the land) are now retained in storage lagoons. Presumably, the sludge from these lagoons was periodically reclaimed in some way. Lagoons of this type are generally not well attended and may result in environmental catastrophes.

9. A large landfill in southeastern Wisconsin was permitted to accept toxic and hazardous wastes. The site was underlain by 37 m (120 ft.) of glacial till on dolomite. Water-supply wells in the area are finished in the bedrock at a depth of 53 to 76 m (175 to 250 ft.). Monitoring wells completed to depth of 7.6 to 15 m (25 to 50 ft.) in the till showed some contamination. Most noteworthy was one well which shows traces of electronegative compounds, 4.9 mg/l of volatile organic compounds (heptane, octane, etc.), and 0.11 mg/l of high-boiling organic compounds (plasticizers, esters, napthalene, etc.). No information was available on the quality of water from wells completed in the bedrock.

10. In 1971, a major chemical company contracted with a trucker to haul approximately 6,000 drums of petrochemical wastes to a landfill for disposal. Instead, most of these wastes were transported to an abandoned chicken farm in New Jersey, where they were stockpiled and subsequently dumped. Within two years, a major aquifer had become contaminated with petrochemicals, resulting in the condemning of approximately 150 private wells. The cost of extending public water supply into the area was about $300,000. Moreover, this incident resulted in adverse impact on local building and development. The exact magnitude of the environmental and economic damage has not yet been delineated.

III. State Regulations

A survey of various state hazardous waste regulatory programs yielded the following information:

California[2]

The California State Water Resources Control Board is the agency regulating disposal sites and monitoring of hazardous wastes. Monitoring plans are developed case-by-case, based upon the detailed geologic and hydrologic requirements of the permit. The monitoring programs for hazardous waste disposal facilities may include any or all of the following components:

1. Monitoring of local ground and surface water from locations considered to be within the radius of influence of a disposal site; and from a background location. These data may be compared. The regulations observe that collection of baseline data is important because it may offer a basis to discount claims of degradation of water quality which may be filed later by other parties.
2. Periodic site inspection, sampling, and analysis of wastes performed by agency personnel. The operator is allowed to collect samples for replicate analysis.
3. Installation of piezometers or monitoring wells at critical locations.

4. Operation of continuous fluid level measuring instruments at seepage collection drains and dumps.

5. Monitoring wells, located on the basis of local ground and surface-water hydrology, from which the disposer may be required to collect samples.

The selection of constituents for analysis and evaluation is related to the type of waste being disposed. The basic program includes testing for pH, electrical conductivity or total dissolved solids, chloride, hardness, and total alkalinity. Specialized monitoring of hazardous waste disposal may require sample analyses for toxic materials, heavy metals, organics, color, BOD, tannins and lignins, with field tests for carbon dioxide. Gas probes for methane and carbon dioxide may also be required.

At sites receiving up to 200 tons of wastes daily, monitoring reports are generally required on a quarterly basis. Sites receiving more than 200 tons daily must submit monthly reports.

Illinois[3]

The Division of Land and Noise in the Illinois Environmental Protection Agency (IEPA) is responsible for the State's hazardous waste management program. The agency has developed a monitoring philosophy which begins with site selection standards designed to permit sites thought to be geologically capable of confining leachates without their

having any adverse effects on either surface or ground-water quality.

The state has a policy of nondegradation, but believes the philosophy of "zero discharge" to be geologically and/or economically impossible. Criteria developed for land disposal of hazardous wastes place considerable emphasis upon the origin and composition of the materials to be disposed of. The waste generator is required to list the standard industrial classification (S.I.C.) number for the industrial activity from which waste is derived. IEPA has assigned a number to each of the subgroups in the S.I.C. table. These numbers are used to determine the minimal scope of chemical analyses required with the permit application; this waste characterization provides a guide for future ground-water monitoring.

IEPA uses a landfill simulation leaching test to determine the environmental impact of the waste material.[4] This test is applied to hazardous wastes for which a disposal permit is required, according to the previously mentioned grouping of wastes by S.I.C. numbers. Theoretically, waste characterization should permit design of a waste-constituent-oriented monitoring program at each site.

The agency usually requires installation of at least one monitoring well hydraulically upgradient and one downgradient, placed as close as possible to the deposition area. The monitoring wells may penetrate shallow perched

water zones which are widespread in Illinois. If contamination is detected, IEPA interprets this as an "early warning signal" indicating possible later contamination of the underlying water-table aquifer.[5]

Maryland[6,7]

The program to monitor storage and disposal of hazardous wastes in Maryland is in the early stages of implementation, following the 1976 enactment of a law entitled Safe Disposal of Designated Hazardous Wastes, and promulgation of applicable regulations by the Maryland Department of Natural Resources (DNR). The law requires that the DNR establish procedures for monitoring of hazardous and industrial substances from the time of generation to the time of final disposal. It specifically directs the DNR to set minimum requirements for operation, maintenance, monitoring, reporting, and supervision of hazardous wastes at only especially permitted facilities.

Minnesota[8]

Hazardous waste management regulations are being promulgated by the Minnesota Pollution Control Agency's Hazardous Waste Management Section. These revise existing controls to permit monitoring of wastes from the point of generation to the disposal site, principally through surveillance measures designed to comply with RCRA's emphasis on manifest systems and site location controls. A noteworthy addition to the

regulations is designed to curb discharge of hazardous wastes to sewers after they have been diluted sufficiently to meet NPDES requirements.

Minnesota does not confine monitoring to wells, but has written regulations designed to provide sufficient predisposal information to tailor sampling programs for case-by-case evaluation. Minnesota has not written minimum monitoring requirements defining the number of wells, their construction, or other site-related directives. A hydrogeologic report on subsurface conditions must be provided for each type of hazardous waste disposal, storage and treatment facility. The disposer is required to submit a monitoring plan with provisions for soil borings and ground-water monitoring wells and piezometers, for sites designed for hazardous waste containerized storage, land treatment, and land disposal facilities.

The agency may require the applicant to assess the potential of the soil to attenuate the hazardous waste and any leachate through ion exchange, absorption, adsorption, precipitation, and other such mechanisms. At the same time, the permittee must submit a review of the anticipated products from such mechanisms including both final and intermediate biochemical metabolites and chemical degradation products. The regulations also outline requirements for final permit application. The applicant must submit a monitoring section that describes the procedures to be used and the parameters

to be analyzed by the permittee to: (a) inventory and identify incoming hazardous waste, (b) conduct air and ground-water monitoring programs, and (c) monitor the management of waste produced by the operation of the facility.[9]

New Jersey[10]

Regulations promulgated by the New Jersey Department of Environmental Protection (DEP) in 1975 prohibit opening of a new solid waste facility without prior installation of a ground-water monitoring system. Background water-quality data must also be obtained and recorded before any waste is deposited at the site. The DEP may also require installation of monitoring systems at sites in operation prior to September 1975. All monitoring system approvals are made on a case-by-case basis. Each disposal facility receiving hazardous wastes must have interception, collection, and treatment systems for any leachate generated at the site.

The submission of the required monitoring data must be made annually, at which time the registrant is required to provide a statement updating the information contained in the initial registration statement. The registrant must notify the DEP within 30 days of any change in status of the operation covered by the original statement. The regulations stipulate that the following be included in the annual analyses of samples collected as part of the monitoring program:

- presence of organisms of the Coliform Group
- turbidity
- color
- taste
-odor
- arsenic (As)
- barium (Ba)
- cadmium (cd)
- chromium (hexavalent Cr^{+6})
- cyanide (CN)
- fluoride (F)
- lead (Pb)
- selenium (Se)
- silver (Ag)
- A.B.S./L.A.S. (Alkyl-Benzene-Sulfonate and Linear-Alkyl Surfonate or similar methylene blue reactive substances contained in synthetic detergents)
- chloride (Cl)
- copper (Cu)
- hardness (as $CaCO_3$)
- iron (Fe)
- manganese (Mn)
- nitrate (NO_3)
- phenolic compounds (as phenol)
- sodium (Na)
- sulfate (SO_4)

- A.B.S./L.A.S. (Alkyl-Benzene-Sulfonate and Linear-Alkyl Surfonate or similar methylene blue reactive substances contained in synthetic detergents)
- chloride (Cl)
- copper (Cu)
- hardness (as $CaCO_3$)
- iron (Fe)
- manganese (Mn)
- nitrate (NO_3)
- phenolic compounds (as phenol)
- sodium (Na)
- sulfate (SO_4)
- total dissolved solids
- zinc (Zn)
- COD
- BOD

Each third month the analyses shall include the following:

- chloride (Cl)
- hardness (as $CaCO_3$)
- iron (Fe)
- phenolic compounds (as phenol)
- total dissolved solids
- COD
- BOD

New York[11,12] - At the present time, New York State is in the process of implementing a program designed to upgrade hazardous waste disposal and monitoring proctices. The program will be managed by the Hazardous Waste Bureau of the Department of Environmental Conservation (DEC).

Regulations classifying ground water and establishing water-quality effluent standards have been proposed by the DEC. The standards, if approved, will be applicable to industrial waste treatment, including hazardous waste management facilities designed both for treatment and storage. The regulations set specific requirements for groundwater protection and monitoring with special precautionary measures required at land burial facilities used for hazardous waste disposal. At these sites, monitoring programs will be established by the DEC on a case-by-case basis. A minimum of three monitoring wells, with two located hydraulically downgradient from the solid waste fill area, is required.

Ground-water sampling frequency is set as part of the operating permit. Baseline water quality must be established prior to use of the site. The regulations are applicable to both new and modified secure land burial facilities, which are defined as 'a disposal facility meeting the design and operation requirements (.....) for the proper disposal of hazardous wastes so that such wastes are immobilized or otherwise prevented from release to the environment or rendered harmless or decomposed into harmless materials within the facility.'

Implementation of the proposed standards. together with adherence to the regulations for solid waste management facilities which went into effect in August 1977, should provide for effective monitoring of any new hazardous waste facilities in the State.

13,14

Ohio - In 1976, the Ohio EPA promulgated new solid waste regulations which gave the Agency's Office of Land Pollution Control (OLPC). Division of Hazardous Wastes, more authority. These regulations influence future monitoring of hazardous waste storage and disposal facilities two ways. They provide a specific definition for ground-water pollution, and stipulate that sites must be located in geologic formations where permeability of the clay is such that the time required for the movement of leachate through the walls or bottom of the landfill to ground water or surface water must be 1,000 years under a 'hydraulic gradient of 1.2.' Pollution of ground water is defined as the 'entrance of any substance into such waters in such quantities as to prevent or materially interfere, either immediately or cumulatively, with any use of such waters otherwise possible, or in such quantities as would require such waters to be treated prior to use.' This policy of long-term protection of existing ground-water quality is further reinforced by the site data and monitoring requirement of the regulations.

The 1976 landfill regulations specify that 'very hazardous waste' must be containerized, while 'moderately hazardous waste' does not include enough hazardous material to require containerization prior to disposal.

The permitting procedure requires submission of a complete geologic and hydrologic report on existing conditions, including the 'ground-water development potential' of aquifer(s) beneath the disposal site. Chemical analyses of ground-water samples for 17 constituents must be submitted, with the agency entitled to request a sampling program involving 'analysis of such a number of samples from such a number of wells (as deemed necessary). The applicant must also provide data on the 'location, surface elevation, depths, construction details, materials penetrated, water levels, available reports on future plans for, chemical sampling, and other relevant characteristics of all monitor wells to be used for ground-water sampling, and detection of leachate production and migration.'

Provision is to be made for the collection, containment, treatment or disposal of leachate. The permittee is responsible for the maintenance of monitoring wells for sampling until three years after the landfill is completed.

15,16
Pennsylvania - The Division of Solid Waste Management in Pennsylvania's Department of Environmental Resources (DER) is responsible for the permitting and surveillance of monitoring programs associated with the disposal of hazardous waste throughout the State. At present, there are no facilities designed specifically for this purpose. However, since passage of RCRA, the Division has received inquiries from waste disposal firms interested in establishing facilities.

The Division's monitoring authority was strengthened considerably by a 1977 revision of State Solid Waste Management Rules and Regulations applicable to industrial waste disposal sites. The permitting procedures are designed to promote full disclosure of site and waste characteristics through two-phase permitting procedure. Data solicited from the applicant include complete coverage of pertinent geologic and ground-water condition. Phase I requires the applicant to describe monitoring proposed as part of the project, and to delineate specific monitoring points. However, the permit application advises that 'wells are not to be drilled until the Department approves the design, location, and specifications.'

The basic approach to monitoring hazardous waste management facilities in Pennsylvania begins with the assumption that all sites are ultimate disposal sites, with waste storage capabilities of the site dependent upon a wide range of environmental factors. For this reason, the regulations stipulate that 'monitoring points should not be located more than 500 feet from the permitted area, in order to obtain ground-water samples capable of being analyzed for contaminants as close as possible to the a actual place of deposition.'

One monitoring well must be installed hydraulically downgradient and one monitoring well upgradient from the deposition area. This is considered to be the minimum requirement for each project. However, DER approval of hazardous waste monitoring projects is to be on a case-by-case basis with provision for additional monitoring wells at the discretion of the agency. Design of the monitoring wells and sampling procedure are

dictated by the terms of the project permit.

The regulations stipulate that each monitoring well must be purged prior to obtaining water samples. Chemical analyses of water samples from the monitoring well and other hydrologic data must be submitted quarterly. Constituents included in the analyses are determined on a case-by-case basis, according to the chemical and physical properties and the volume of the materials disposed of.

Texas [17,18] - The Texas Water Quality Board is actively involved in a program to insure that monitoring requirements are satisfactory at both on-site and off-site hazardous waste storage and disposal facilities. Operators are required to comply with guidelines established in May 1976 for the implementation of approved monitoring-leachate collection systems. The agency reports that there are 'more than a dozen' sites in the state which do meet the requirements.

Although the board has established a zero discharge philosophy for hazardous wastes and landfills, it recognizes that all facilities eventually will discharge after closure of the operation, and therefore long-term post-operational surveillance is required in order to minimize possible damage to ground or surface water beyond the site.

The agency has established a three-phase monitoring program. Phase I involves sampling to establish background water quality at the site. Phase II mandates a periodic sampling program, the results of which must be reported to the agency monthly during the first year of site operation, and quarterly thereafter. Phase III of the monitoring program extends sampling and analysis of ground water and leachate for a number of years after the site is closed. The sampling frequency and time period of monitoring after closure is established by the agency at the time of permitting. Registration of hazardous waste disposal operations is on a case-by-case basis with the number of sampling points and/or monitoring wells set by the agency. The registration procedure was initiated as a means of obtaining information on existing waste disposal sites.

Sampling point distribution and monitoring procedures are dictated by hydrogeologic conditions and types of waste likely to be encountered. Guidelines developed by the TWQB call for three sampling points 'under ideal conditions,' that is, where the underlying earth meterials are fairly homogeneous, impermeable,and uniformly sloping in one direction. The monitoring wells should be equally spaced on a line through the center of the disposal area extending from the area of highest water-table elevation to the lowest water-table elevation on the property.

All monitoring wells must be cased , with the annular space between the zone of saturation and the surface completely backfilled or plugged with cement or packed with clay, to prevent percolation of surface water into the well bore. The well casing must be fitted with a removable cap to prevent entrance of runoff and rainfall.

Plans submitted for monitoring systems must address the procedure to be followed if sampling indicates leaching from the disposal site. The plans should include a description of steps to be followed to determine the cause of the problem and institute corrective measures.

Leachate collection systems should provide for monitoring and treatment of leachate. Treated leachate must either meet TWQB discharge standards, or be recycled to the facility producing the leachate. For sites accepting hazardous wastes,the agency recommends monitoring systems employing both wells and leachate collection systems in order to maximize the capability for early detection of pollutants leaking from the facility. Leachate monitoring systems are not accepted as a substitute for liners in situations where geologic or hydrologic conditions indicate the need for lining of the disposal site. Conversely, lining of these sites does not rule out the requirement for a monitoring system.

TWQB guidelines stipulate that in situations where more than one water-bearing stratum is present, each individual water-bearing unit should be monitored by properly spaced lines of three wells.

Wisconsin[19] - The Wisconsin Department of Natural Resources (DNR) views monitoring as one portion of the total hazardous waste management program, required principally as a surveillance tool with the data generated to be used in enforcement procedures. Facilities approved by DNR are not required to obtain any local permits or authorizations which may otherwise be necessary to operate the facility. Licensing involves three steps, with monitoring and closure plans to be submitted as part of the first step for the feasibility report. A waste classification plan incorporated in the law would assign all waste to classes, based upon the relative degree of hazard posed by the waste. The principal emphasis on monitoring devices is related to the long-term care provisions of the proposed law. In this respect, it should be noted that DNR views installation of monitoring devices and their operation as a final check of the operation of the facility, rather than as a substitute for hydrogeologically sound site criteria.

In the original plan of operation, the DNR can require up to 10 years of lone-term care, unless the licensee agrees to a longer period of time. After this time period expires, a decision on termination is to be made by the DNR.

IV. Regulatory Options

In absence of a ground-water monitoring system, any contamination taking place will not be detected until the contaminated ground water: (a) discharges at the ground surface, (b) enters surface water where it causes visible changes, or (c) intercepts a pumping well where a water quality change is noticed. Ground water is not observable nor is it generally a direct source of water for biota that might be deleteriously affected by a lowering of quality. Therefore, contamination may occur and continue unnoticed unless it produces visible changes at the land surfaces.

One purpose of ground-water monitoring is to verify the integrity of engineering and construction features designed to prevent leakage of liquid waste or leachate. Should the containment system fail, an effective monitoring system will detect contamination before the contaminants have spread beyond the property boundary or to supply wells. This early warning capability is desirable as steps to minimize contamination can be taken before a large volume of the aquifer has been affected. The very fundamental objective of monitoring is to serve as a check on potential leachate contamination. At existing site where ground water contaminaiton has begun, it is important to protect the users (Present and future) of the ground water. At new sites and at existing sites where contamination has not occurred, protection of the ground water resource ~~may~~ shall receive additional emphasis.

The Agency has considered two different ways to monitoring the hazardous waste treatment, storage and disposal facilities. One approach, it would require monitoring the ground water only. The disadvantage of this approach is once groundwater contamination has taken place, it is virtually impossible to remove it. Groundwater monitoring alone does not sufficiently protect the environment because the leak must move through and cause extensive contamination of the zone of aeration before it reaches and contaminates the groundwater. The other approach is considered to combine ground water monitoring of unsatruated zone which shall allow detection of leachate contamination at all stages. The Agency recognizes that the technology of leachate monitoring is still being refined, but the equipment for such monitoring is currently available. Although sampling the zone of aeration is difficult and some of the methods are expensive, EPA considers leachate monitoring extremely important because it can provide an early warning. Once groundwater contamination has occurred, it is extremely difficult or impossible to remedy, particulary where an aquifer is located far beneath a facility.

These proposed rules require groundwater and leachate monitoring at all landfills and surface impoundments. The groundwater monitoring requirements specify installation of a minimum of three monitoring wells hydraulically downgradient from the facility and one well upgradient from the facility. The leachate monitoring requirements specify the installation

of a Leachate Monitoring System under the primary liner or natural soil barrier of landfills and surface impoundments. Sampling and analysis is required at regular intervals to to determine changes in concentrations of chemical consituents in groundwater and leachate.

The Agency has established a three-phase monitoring program. Phase I. involves sampling to establish groundwater quality at the site. Phase II. manadates a periodic sampling program, the results of which must be reported to the Agency quarterly. Phase III. extends sampling and analysis of groundwater and leachate for a number of years after the site is closed.

A contract is granting to provide for publication of an "Air and Groundwater Monitoring Manual for Hazardous Waste Treatment, Storage, and Disposal Facities". The purpose of the manual is to provide specific guidelines to owners and operators of these facilities as to the requirements promulgated under the authority of Section 3004 of RCRA related to air and groundwater monitoring. Information to be included in this manual would allow owners and operators to determine the kind of monitoring network required, and the types of monitoring facilities or methods required. Additionally, the manual will be used by permit granting officials in determining the adequacy of monitoring plans and protocols used at facilities requesting permits (in accordance with Section 3005 regulations) to treat, store and dispose of hazardous waste.

V. Identification of and rationale for chosen regulation

250.43-8 Groundwater and Leachate Monitoring

An owner/operator of a landfill or surface impoundment facility shall install, maintain and operate a Ground-Water Monitoring System and a Leachate Monitoring System as specified in this Section and shall comply with the Sampling and Analyses and the Recordkeeping and Reporting Requirements of this Section.

All landfills and surface impoundments are potential threats to degrade gound water. Landfills are constructed by placing wastes in excavations and covering the material with a soil cover. Even though wastes in landfill are covered, leachate can be generated by the infiltration of precipitation and surface water runoff. Ponds and lagoons are commonly considered to be liquid-tight, but the potential for leakage of large quantities of fluids from these sites, can lead to pollute groundwater and surface water. A planned monitoring systems shall be established in such a manner to detect as early as possible the movement of contaminants from the facility into the groundwater. This will allow the determination of the potential for endangement of the groundwater and any impact on specified groundwater quality. Remedial measures can therefore be stated as early as possible to minimize or eliminate adverse environmental and health effects.

250.43-8 Groundwater and Leachate Monitoring

(a) Groundwater Monitoring System
A Groundwater Monitoring System shall consist of a minimum of four (4) monitoring wells meeting the following specifications:

(i) At least one well shall be located in an area hydraulically upgradient from the active portion of the facility so as to yield samples representative of the background quality of the groundwater which flows under the facility.

(ii) A minimum of three (3) monitoring wells shall be installed hydraulically downgradient of the active portion of the facility and shall be sunk to different depths in order to detect any leachate which has migrated into groundwater(s) underlying the facility property. Each well shall be constructed to draw samples from the depths where the faciltiy owner/operator can demonstrate that contamination is most likely to occur.

(iii) At least one of the three(3) wells specified in (ii) shall be located immediately adjacent to the active portion of the facility. The other wells shall be located within the property line of the facility to provide the greatest opportunity for interception of any leachate that migrates into groundwater(s) underlying the facility.

(2) All monitoring wells shall be cased, and the annular space shall be backfilled with an impermeable material in order to prevent surface water from entering the well bore and inter-aquifer water exchange.

Note: A Groundwater Monitoring System shall not to required or a lesser degree of groundwater monitoring may be utilized, if the owner/operator can demonstrate, at the time a permit is issued under Subpart E, that the geologic and

hydrologic conditions underlying the facility indicate no potential for discharge to groundwater.

Wells may be sunk to draw samples at a single depth if it can be demonstrated by the facility owner/operator that it is the depth where contamination is likely to occur.

The basic objectives of a monitoring program is to detect and evaluate potential or existing ground-water degration caused by leachate. In this approach, wells or other monitoring devices strategically located with reference to ground-water flow direction are sampled at regular intervals to determine changes in concentrations of chemical constituents in the ground water or the sample from other monitoring devices.

The number of monitoring wells required is site specific with either large sites or any site within a complex hydrogeologic setting requiring a greater number than small or hydrogeologically simple sites. If the geologic setting of the area of site is not complex, and the ground-water gradient has been accurately defined, a minimum of four monitoring wells is necessary. However, with complex geohydrologic conditions, a larger number of wells might be required for adequate monitoring.[20,23] On the other hand, installation of monitoring wells may not be necessary in locations where the depth of ground water below the land surface is sufficiently great and/or rainfall low enough so that solid waste leachate does not reach ground water.

The location of the background monitoring well in an area hydraulically upgradient is critical if there is a gound-water mound associated with the site. Thi s mound occurs because the recharge rate at that particular location is greater than in the surrounding area. The mounded ground water creates a gradient different from the natural gradient. For a limited distance, water will flow radially from the center of the mound. Because mounding of of ground water is possible, the background well should be placed outside of the range of influence on the natural upgradient side of the site. However, if the location of the background well is too far from the site, the water sample collected from the well might not be representative of the ground water which flows under the site and may be contaminated by other sources.

One of the downgradient wells should be immediately adjacent to the site in order to detect the leachate entering the ground water. The other downgradient wells should be in close proximity to the landfill in order to detect the leachate plume as soon as possible. Once leachate enters the ground water, it is diffiuclt to control; the sooner its presence is noted, the easier it will be to initiate remedial action.

Improperly constructed monitoring wells can pollute the ground water and/or induce inter-aquifer leakage which can cause movement of pollutants of from one aquifer to another. Therefore, finishing the well is an important step and should not be overlooked in monitor well construction. When the monitoring well is backfilled and sealed to the ground surface, the casing should be capped to prevent foreign material from entering the well. The cap for the well casing should be designed to provide easy access and protection against vandalism.

If the physical behavior of contaminant bodies is not ocmpletely known, there is almost no way of anticipating where the plume of contaminant will be within an aquifer. The monitori devices collecting water at multiple depths to screen the entire aquifer is recommended at this situation. A single well screening the entire aquifer is not appropriate because the type of construction could cause complications and it may contribut

To the vertical spread of contaminant by providing a conduit for ground-water movement. Knowledge of the characteristics and the types of waste materials at individual site is important design the well for allowing sampling of the ground-water in that portion of the saturated zone where water containing leachate is most likely to occur. Contaminants less dense than water may move along the top of the zone of saturation, whereas, contaminants more dense than water may move downward under the influence of gravity into the lower portion of the aquifer.

250.43-8 Groundwater and Leachate Monitoring

(b) Leachate Monitoring System

(1) A Leachate Monitoring System shall be installed within the zone of aeration underlying the facility without drilling through the bottom and side liners or soil barriers of the landfill or surface impoundment and shall be designed to collect samples in the zone of aeration between the bottom of the liner or soil barrier of the landfill or surface impoundment and the top of the water table.

Note: A Leachate Monitoring System shall not be required if the owner/operator can demonstrate that an alternative leachate monitoring tehcnique will detect leaks as effectively as the system presented in this paragraph.

A leachate detection/removal system installed below the lin liner or soil barrier of landfill pursuant to Section 250.4 -2(b)(12) and a leachate detection system installed below the liner or soil barrier of surface impoundments pursua to Section ~~250.45-3(c)(3)~~ shall be considered an acceptable substitute for a Leachate Monitoring System.

The zone of aeration, also called the unsaturated zone is part of the earth's crust where the voids are filled with air and (usually) where some water is held by molecular attraction. It is through this zone that percolating waters must pass to recharge or contaminate the groundwater. Within the zone of aeration, liquid movement is primarily vertical; only minimal horizontal movement is possible because of the controlling force of gravity. Since horizontal movement of fluids in the unsaturated zone is minimal, effective monitoring of contaminant migration from hazardous waste management facilities must of

necessity be performed directly beneath or adjacent to the area where the waste has been placed. The monitoring system installed by drilling through the bottom and side liners or soil barriers will cause disruption of the site integrity and produce pathways for liquid movement from the site thus creating more environmental risk.

This regualtion requires a Leachate Detection System installed between top and bottom liners of the surface impoundment and a Leachate Detection and Removal System installed below the liner or soil barrier of landfills. The purpose of these systems is to detect any failure of the top liner, a zone of aeration monitoring system is not required in this case.

Monitoring the zone of aeration in hydrogeologic environments were the water table is 1.5 to 3 meters (5-10 feet)[20] below the landfill is probably not necessary. Since monitoring in the zone of saturation will be effective in detecting a leak.

250.43-8 Groundwater and Leachate Monitoring

(c) Sampling and Analysis

(1) The background level of the quality of both the groundwater and the water in the zone of aeration underlying the facility shall be established by conducting the comprehensive analysis specified in paragraph(c)(6) on samples collected from the Groundwater Monitoring and Leachate Monitoring Systems on a monthly basis for at least one year.. For a new facility, comprehensive analysis of monthly sample shall begin at least three months prior to the treatment, storage or disposal of any hazardous waste at the facility.

Note: Samples withdrawn from a Leachate Monitoring System during the background monitoring schedule may be analyzed for representative characteristics of the comprehensive analysis if an adequate volume of sample cannot be collected to analyze for all of the characteristics specified in the comprehensive analysis.

All groundwater contains natural chemical constituents in solution. The kinds and amounts of constituents depend upon the geochemical environment, movement, and source of the groundwater. An accurate and complete record of existing ground water quality is necessary to determine background water quality in a monitoring program, The background quality for each monitoring well will serve as baseline to draw reliable conclusions for possible contamination in the future. Reliable data on background quality of ground water will also be of critical importance relative to regulatory and legal

considerations. Therefore, consideration must be given to both the ground-water quality which occurs naturally, as well as other possible sources of contamination which may affect the background quality.

Once a monitoring program has been in operation for an appreciable period of time, the data obtained form it can be used to provide specific analytical profiles and seasonal tre fluctuation for ground water and/or samples from the zone of aeration for a giving site. Statistical analyses of the profiles will provide such important statistical values as normal ranges, means, and standard deviations for each of the parameters.

Knowledge of the ground-water quality existing at the site prior to its activation for waste management is important because:

1) The water may contain naturally occurring elements that could be mistaken for contaminants.

2) The only accurate way to measure contamination resulting from waste management activities is to compare to conditions existing previously.

3) Man's activities on off-site locations may have produced contaminants that are moving beneath the new HWMF.

4) Knowledge of conditions existing prior to establishment of the waste facility protects the owner from complaints or law suits alleging that ground-water supplies have been damaged.

250.43-8 Groundwater and Leachate Monitoring

(c) Sampling and Analysis

(2) After the background level has been established pursuant to paragraph (c)(1), samples shall be taken from the Groundwater Monitoring System at least once a year and a analyzed pursuant to the requirements of paragraph (c)(6) and,in addition, samples shall be taken from the Groundwater Monitoring System on the following frequency and analyzed pursuant to the requirements of paragraph (c)(5):
(i) semi-annually, if the ground water flow rate ranges between 25 and 50 m/year (82 and 164 ft/year),or
(ii) quarterly, if the ground-water flow rate is greater than 50 m/year (164 ft/year).

(3) After the background level has been established pursuant to paragraph (c)(1), samples shall be taken from the Leachate Monitoring System at least once a year and analyzed in a accordance with the requirements of paragraph (c)(6) and, in addition, samples shall be taken from the Leachate Monitoring System at least once each quarter and analyzed in accordance with the requirements of paragraph (c)(5).

Note: This requirement is waived if the owner/operator can demonstrate that the quantity of any samples that can be obtained from the Leachate Monitoring System ~~is~~ are insufficient for conducting the required analyses.

The principal characteristic of concern in selecting a sampling frequency is the rate of ground-water flow at the site. The flow rate will be primarily dependent upon the aquifer porosity and permeability as well as the hydraulic gradient existing at the site, Ground-water flow rates ranging in orders of magnitude from a few meters per year in an impervious intergranular porosity aquifer to tens of meters per day in the more unpredictable fracture and solution

porosity aquifers. The higher the rate of ground-water flow, the greater the monitoring frequency needed.

The monitoring devices in the zone of aeration should be monitoring as intensively as those placed in the zone of saturati in the view of the difficulties which are most likely to be encountered in attempting to obtain a sufficient sample from the various devices which are located in the zone of aeration. This standard is accompanied by a note to deviate the requirement.

250.43-8 Groundwater and Leachate Monitoring

(c) Sampling and Analysis

(4) If after the background levels are established pursuant to paragraph (c)(1), the analyses of samples taken pursuant to paragraph (c)(2) 0r (c)(3) shows that the quality of the groundwater or the water in the zone of aeration significantly differs, as determined by the Student's t , single-tailed test at 95 percent confidence level, from the background quality of these waters, the owner/operator shall:

(i) notify the Regional Administrator within 7 days after such a finding;

(ii) determine, if possible, the cause of the difference in quality (e.g., the result of a spill, a design failure, and improper operating procedure) ; and

(iii) determine the extent of groundwater contamination or the potential for groundwater contamination and discontinue operation of the facility until the Regional Administrator determines what actions are to be taken.

Statistically analysis of monitoring data provides an objective way to compare and make decisions about a significant amount increment of a chemical species. In dealing with a small samples as well as large samples. Single-tailed student's t test (See Annexes) is an effective method to evaluate two different groups data to see if there is significant different or no essentially difference between each other. The 95 % confidence level of the single-tailed t test is considered to serve as an aid in the diagnosis of leachate contamination problem for regulatory

purpose. If a statistically significant increase in the concentration of a chemical species is detected, an investigation should be conducted immediately to minimize or eliminate adverse environemntal and health effects.

(c) Sampling and Analysis

(5) A minimum analysis shall quantify the following characteristics of the sample:
  (i) Speciifc conductivity, mho/cm at 25° C
  (ii) pH
  (iii) Concentrations of the chloride, mg/liter
  (iv) Concentrations of the total dissolved solids, mg/liter
  (v) Concentrations of dissolved organic carbon, mg/liter
  (vi) The concentrations of the principal hazardous constituents, or indicators thereof, found in the largest quantity in the hazardous waste disposed of in the facility, mg/liter.

(6) A comprehensive analysis shall quantify the following characteristics of the sample:
  (i) Those characteristics listed in paragraph (5)
  (ii) The concentrations of the contaminants and levels of the properties listed in Appendix II, except radioactivity levels if facility does not treat, store or dispose of waste containing radioactive substances.
  (iii) Concentration of beryllium, mg/liter
  (iv) Concentration of nickel, mg/liter
  (v) Concentration of cyanide, mg/liter
  (vi) Concentration of phenolic compounds (as phenol), mg/liter
  (vii) Presence of organic constituents as determined by a scanning by gas chromatography

Note: After the background level has been established, pursuant to paragraph (c)(1), the comprehensive analysis may be reduced to eliminate the analysis of characteristics that would not result from waste treated, stored or disposed of at the facility.

Specific conductivity, mho/cm at 25°C

The presence of charged ionic species in solution makes the solution conductive. As ion concentrations increase, conductance of the solution increases; therefore, the conductance measurement provides an indication of ion concentration. When monitoring ground water, specific conductance can be readily measured in the field and the result is a general indication of dissolved-solids concentration. Temperature is very important when performing conductivity measurements, because of the response of the conductance value to temperature change is somewhat different for different salts and different concentrations. It is necessary to record temperature with conductivity measurements, or to adjust the temperature with conductivity measurements, or to adjust the temperature of the samples prior to making conductivity measurement.

pH

The pH of water represents the interrelated result of a number of chemical equilibria.

Accurate measurement of pH in the field should be standard

practice for all ground-water samples, A pH measurement taken at the moment of sampling may represent the original equilibrium conditions in the aquifer satisfactorily, but the pH determined after a period of time from sampling may have no relation to the actual conditions due to the sample's gain or lose of carbon dioxide. Most ground water found in the Unites States has a pH value ranging from around 6.0 to 8.5. A departure from a normal pH could indicate the influx of acidic or alkaline industrial wastes. The pH of most ground waters are slightly basic because of the presence of carbonates and bicarbonates in the subsurface geology.

Concentrations of the chloride,mg/liter

The element chlorine is a member of the halogen group of the elements and the most important and most widely distributed of the halogens in natural water. Chloride is present in all natural waters, but mostly the concentrations are low. Exceptions occur where streams receive inflows of high-chloride industrial waste or are affected by oceanic tides.

It is known that chloride ions move with the water through most soils with less retardation and can be measured as an indicator of contamination. The chemical behavior of chloride in natural water is very tame and subdued compared to the other

major ions. Chloride ions do not significantly enter into oxidation or reduction reactions, form no important solute complexes with other ions, do not form salts of low solubility, are not significantly adsorbed on mineral surfaces.

Concentrations of the total dissolved solids, mg/liter

Because of the wide variety of inorganic and organic materials encountered in the analyses for solids,concentration of the total dissolved solids is used to evaluate of water quality as a indicator for monitoring purpose.

Concentrations of dissolved organic carbon, mg/liter

Organic contaminants may enter ground water by infiltration of precipitation from the hazardous waste site. As a result of accidental spills and leak , industrial organic waste may lead to groundwater contamination. Both natural and man-make contaminants can have undesirable effects on health. The dissolved organic carbon determination can indicate the organic contaminants and can be used as indicator for monitoring purpose,

The concentrations of principal hazardous constituents or indicators thereof, found in the largest quantity in the hazardous waste disposed of in the facility.

A large numbers of heavy metals and organic compounds in industrial waste are disposed on land or surface impoundment every year. The concentrations of specified componants can be very high at sites where the untreated industrial effluent is leaking from a surface impoundment and reaching the saturated zone almost unchanged in chemical composition. To analyze the principal hazardous constituents or indicators to gain the early warning for contamination of the groundwater is deemed important.

Comprehensive analysis

The purpose of monitoring is to detect discharges which may endanger groundwater.This analysis must include all substances covered by the Primary and Secondary Drinking Water Standard. Other hazardous material such as beryllium,nickel, cyanide and organic pollutants shall be analyzed for the purpose of monitoring . For a first step in the evaluation, identification of the organic compounds detected is not necessary. Only after establishing their presence is it necessary or desirable to

identify the organic species. The organic content in a water sample may be compared to the content in the samples from background quality of the well by means of comparing retention times of the peaks in the gas chromatogram. Peaks whose retention times are equal may be presumed to represent the same substance.

250.43-8 Groundwater and Leachate Monitoring

(d) Recordkeeping and Reporting

(1) An owner/operator of a facility shall forward to the Regional Administrator, at the end of each reporting quarter, two copies of the monitoring data developed pursuant to the requirement of paragraphs (c)(2) and (c)(3) during the reporting quarter.

(2) An owner/operator of a facility shall be required to retain for a minimum of 3 years, all records of monitoring and analytical activities and data, including all original strip chart recordings and instrumentation calibration and maintenance records.

Effective groundwater quality management requires that relevant infromation be available to the decision maker in a concise, comprehensive, timely, economical, and reliable manner. Relization of these goals can be accomplished with good recordkeeping and reporting requirement.

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Annex

The 'Small Sampling Theory", Student's Single-tailed t test, is to be used to determine the singnificant amount of increment of a chemical species by comparing the concentration with the baseline level.

Suppose two samples have sample number, means and standard deviations given by N_1, N_2, $\overline{X}_1$, $\overline{X}_2$, and s_1, s_2 respectively.

$$\overline{X} = \text{Mean} = \frac{\Sigma X}{N}$$

$$s = \text{Standard Deviation} = \sqrt{\frac{(X - \overline{X})^2}{N}}$$

$$s^2 = \text{Variance} = \frac{(X - \overline{X})^2}{N}$$

Then, there are two hypotheses:

$H_0 : \overline{X}_1 = \overline{X}_2$, and there is essentially no difference between the groups

$H_1 : \overline{X}_1 \neq \overline{X}_2$, and there is a significant difference between the groups

Under the hypotheses H_0,

$$t = \frac{\overline{X}_2 - \overline{X}_1}{\sigma\sqrt{1/N_1 + 1/N_2}} \qquad \text{where } \sigma = \sqrt{\frac{N_1 s_1^2 + N_2 s_2^2}{N_1 + N_2 - 2}}$$

The distribution with $\nu = N_1 + N_2 - 2$ degree of freedom.

On the basis of single-tailed t test at the 95% confidence level,

at $\nu = N_1 + N_2 - 2$ $\qquad t_{0.95} = p$

(The value from the table attached)

If $t<p$, we cannot reject H_0, and there is essentially no difference between the groups.

If $t>p$, we cannot reject H_1, and there is a significant difference between the group.

Sample calculation:

Reduce raw data : Specific conductivity (μmhos/cm)

	Background	Sample A	Sample B
	805	825	3400
	730	775	1800
	700	800	1560
	820	750	2100
	695	850	1480
Total	3750	4000	10340
Sample No. (N)	5	5	5
Mean ($\bar{X}$)	750	800	2068
Variance (s^2)	2770	1250	490176

(I) Calculate t for independent sample (Background vs Sample A)

$$= \sqrt{\frac{N_1 s_1^{\,2} + N_2 s_2^{\,2}}{N_1 + N_2 - 2}} = \sqrt{\frac{5 \times 2770 + 5 \times 1250}{5 + 5 - 2}} = 50$$

$$t = \frac{\bar{X}_2 - \bar{X}_1}{\sigma\sqrt{1/N_1 + 1/N_2}} = \frac{800 - 750}{50 \times \sqrt{1/5 + 1/5}} = 1.58$$

Degree of freedom $\nu = N_1 + N_2 - 2 = 5 + 5 - 2 = 8$

$t_{0.95} = 1.86$ (The value from the table)

Therefore, 1.58 < 1.86, there is essentially no difference between the sample.

(II) Calculate t for independent sample (background vs Sample B)

$$\sigma = \sqrt{\frac{N_1 s_1^2 + N_2 s_2^2}{N_1 + N_2 - 2}} = \sqrt{\frac{5 \times 2770 + 5 \times 490176}{5 + 5 - 2}}$$

$$= 555$$

$$t = \frac{\overline{X}_2 - \overline{X}_1}{\sigma\sqrt{1/N_1 + 1/N_2}} = \frac{2068 - 750}{555 \times \sqrt{1/5 + 1/5}} = 3.754$$

Therefore, 3.754 > 1.86, there is a significant difference between the sample.

Annex

Table : Percentile Values (t_p) for Student's t Distribution with ν Degrees of Freedom

ν	$t_{0.95}$
1	6.31
2	2.92
3	2.35
4	2.13
5	2.02
6	1.94
7	1.90
8	1.86
9	1.83
10	1.81
11	1.80
12	1.78
13	1.77
14	1.76
15	1.75
16	1.75
17	1.74
18	1.73
19	1.73
20	1.72
21	1.72
22	1.72
23	1.71
24	1.71
25	1.71
∞	1.645

Source: "Theory and Problems of Statistics" by Murray R. Spiegel (Schaum Publishing Co.) 1961

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BD-22

Resource Conservation and Recovery Act
Subtitle C - Hazardous Waste Management
Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

Draft

Background Document

Section 250.43-9 Financial Requirements

Date: December 15, 1978

U.S. Environmental Protection Agency

Office of Solid Waste

Preface

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulations. As new information is obtained, changes may be made in the regulations as well as in this background material.

Numerous revisions have been made in the proposed Section 3004 regulations since the background document was initially drafted. We have tried to revise the document to reflect the latest decisions made by the Agency. If there are inconsistencies between the proposed preamble and regulation and this background document, the proposed material takes precedence.

Comments in writing may be made to:

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INTRODUCTION

The Resource Conservation and Recovery Act of 1976 (RCRA) provides in Section 3004(6), that the EPA "shall promulgate regulations establishing such performance standards... as may be necessary to protect human health and the environment... qualifications as to ownership, continuity of operations and financial responsibility as may be necessary or desirable..."

The Financial Requirements regulations (250.43-9) in Subpart D sets forth these standards for owners and operators of hazardous waste treatment, storage and disposal facilities:

1) Continuity of operation regulations which include closure and post closure monitoring and maintenance, access and default,

2) Financial responsibility which consists of two areas: site life liability and post closure liability and remedial action, and

3) Transfer of ownership.

Continuity of Operation regulations insure that an owner or operator will establish the necessary financial resources to guarantee that the physical needs of a site, including closure and post closure monitoring and maintenance as required under section 250.43-7, will be accomplished.

The characteristics of an ideal solution to continuity of operation problems are oriented toward the institutional interests and capabilities of the hazardous waste management industry. The characteristics may be described as follows:

1) Strengthening the ability of hazardous waste management companies to meet financial responsibilities, including site closures, post-closure monitoring, and maintenance;

2) Providing compelling incentives to the companies to carry out these functions;

3) Creating an enduring back-up institution to step in if companies fail to carry out these functions. The back-up institution must have the capability to organize remedial efforts, legal capacity to do so, and the funds with which to pay for the efforts; and

4) Providing an orderly, safe return of closed site land to other uses.

Two principles should guide the continuity of operations structure. First, the funds required to carry out functions on sites that are abandoned or otherwise inadequately maintained must be assured before the abandonment happens and during the time the site is generating income, i.e. while it is still accepting wastes. Alternatively, funds could be gathered from existing site operators for ex post facto application to an abandoned site. Second, funds gathered in anticipation of a potential default by operators should be refunded to the operators who fulfill their obligations. If refund is not made, operators will lose incentive to discharge those obligations, and the institution designated to handle occasional and emergency site abandonments will instead find itself routinely handling an unnecessarily large number of site closure and post-closure operations.

With the exception of those things done to respond to the problem of the excessive longevity of hazard and responsibility, the intent of continuity of operation requirements is not to relieve hazardous waste management operators of their obligations, but to ensure operational needs in the event of their default.

Very little guidance as to the meaning of financial responsibility appeared in committee reports. However, the following text accompanied the Senate's version of the act, which was ultimately adopted.

> "One of the specific conditions... is the requirement that facilities providing treatment... meet minimum qualifications on ownership, financial responsibility, and continuity of operations. In a situation where the best accepted method of dealing with a hazardous waste may be long term stabilized storage, a permit must contain provisions to assure that the storage site will be maintained over that period. In addition, there must be adequate evidence of financial responsibility, not only for the operation of the site, but also to provide against any liability if the material escapes the storage."

Based on this guidance it appears that the term financial responsibility was intended to mean the ability to pay for injuries to others resulting from the escape of hazardous wastes into the environment.

Briefly, the provisions in the Financial Requirement regulation can be divided into six areas as follows:

1) Closure

Hazardous waste treatment, storage, and disposal site owners, are responsible for closing their sites in a manner consistent with regulations promulgated under Section 250.43-7. In order to ensure that adequate funds are available to meet closure responsibilities at the time they are needed, owners will be required under the Continuity of Operation regulations to establish individual trust funds at the time the permit is issued.

2) Post Closure Monitoring and Maintenance

Each disposal facility (e.g., landfill) owner will be required to maintain the site and monitor for possible leakage for 20 years following the site's closure. To insure that funds are available, the regulations will require the buildup of individual site trust funds over the operating life of the facility.

3) Access and Default

The Regional Administrator, employees and agents of the EPA, shall have the right to enter a facility to carry out the closure and/or post closure monitoring and maintenance in the event these requirements are not being met. The Regional Administrator also has the right to use all or part of the funds in the closure/ post closure trust funds to carry out these activities.

4) Site Life Liability

Each hazardous waste management facility is liable for damages to health and the environment attributable to the facility. To insure that such liability is covered to a responsible extent, financial responsibility regulations will require each site owner to maintain a specified level of liability for claims against damages to persons or their property.

5) Post Closure Liability and Remedial Action

Financial Responsibility must also be maintained after a disposal site ceases operation, because the potential for damage still exists. In the current draft of the regulation, requirements for post closure financial responsibility are being reserved. Due to the uncertainties associated with long term disposal of hazardous wastes and the unavailability of non-sudden liability coverage from the private sector, the EPA has considered seeking additional legislative authority to create a federally administered fund.

6) Transfer of Ownership

The Transfer of Ownership standard has been included in the proposed regulation in order to guarantee that the money in the post closure monitoring and maintenance trust fund will remain secure in the event ownership of a disposal facility changes.

In the remaining sections of this background document the regulations and regulatory alternatives will be discussed. The discussion will be organized into two chapters: Rationale and Description and Analysis.

In the Rationale chapter, the need for promulgating the financial requirement regulation is examined. Several damage cases are presented to illustrate the necessity for assurance of facility closure, post-closure monitoring and maintenance, and financial responsibility for damages to persons and property.

The next chapter of the paper, Description and Analysis, will present an analysis of the proposed regulation and the alternatives that were considered by the EPA. The first four topics deal with the Continuity of Operation regulation. They include Facility Closure, Post Closure Monitoring and Maintenance, Access and Default and Alternatives for Meeting Continuity of Operation Objectives. The first three of these sections examine regulatory alternatives, (e.g., time periods for developing the closure trust fund, number of years post closure monitoring and maintenance must be accomplished). The fourth section deals with

alternatives to the site specific trust fund required by the regulation for closure and post closure monitoring and maintenance. The EPA considered minimum owner assets, bond requirements and industry mutual assessment requirements as alternatives to the trust fund requirement.

The next two topics in this chapter describe the Financial Responsibility Requirement and the regulatory alternatives considered by the EPA.

The final section, Transfer of Ownership discusses the reasoning and alternatives for this portion of the regulation.

RATIONALE

The Financial Requirement regulation (250.43-9) is divided into three sections: Continuity of Operation, Financial Responsibility and Transfer of Ownership.

The Continuity of Operation regulation will set up a reserve of funds to assure that closure and post-closure responsibilities as required under Section 250.43-7 of RCRA can be met.

The primary objective of the Financial Responsibility regulation is to ensure a source of funds accessible to the legal process, that would be sufficient to meet legitimate claims for damages resulting from the escape of hazardous wastes into the environment.

The Transfer of Ownership standard has been included in the proposed regulation in order to guarantee that the money in the post closure monitoring and maintenance trust fund will remain secure in the event ownership of a disposal facility changes.

EPA damage files show that in many cases damaged parties had no recourse for claims because the facility owner or operator made little or no provisions to establish financial responsibility. Also, in many instances when facilities were ordered closed or declared bankruptcy there were insufficient funds to clean-up, close, and maintain the site properly.

The following incidents from the EPA files illustrates the magnitude of the problem.

Love Canal, N.Y.

In 1836, a U.S. Government engineer surveyed the Niagara County area, looking for a possible site for a ship canal to connect Lake Erie and Lake Ontario. He reported that Lewiston, New York, by virtue of its location on the Niagara River at the base of a 300-foot escarpment, not only was an excellent place for a ship canal, it also had excellent potential as a source of cheap water power.

Unfortunately, the Canal was never completed. In the 1920's the excavation became a chemical and municipal disposal site for several chemical companies and the City of Niagara Falls. Chemicals of unknown kind and quantity were buried at the site for a 25-30 year period, up until 1953. After 1953, the site was covered with earth, by the Hooker Chemical Co. The land was sold to the Board of Education which in turn, sold it to a private developer.

In the late 1950's homebuilding began directly adjacent to the Love Canal landfill. Over a period of time about 100 homes were built and an elementary school was opened.

Love Canal has numerous chemicals which have been buried within its boundaries for more than 25 years - toxic ingredients which are infiltrating scores of nearby homes, posing a serious threat to human health and upsetting the domestic tranquility of hundreds of families living in this middle class community.

The Love Canal problem began to surface in recent years as chemical odors in the basements of the homes bordering the site became more noticeable. This followed prolonged heavy rains and one of the worst blizzards ever to hit this section of the country.

To date, more than 80 chemical compounds have been identifed in the landfill by the Health Department's Division of Laboratories and Research and the U.S. Environmental Protection Agency (EPA). Eleven of these are known or suspected of causing cancerous growth in laboratory animals, and one - benzene - is a well-established human carcinogen.

It was found that a higher incidence of birth defects, and miscarriages among other health effects, existed among the residents at Love Canal, which prompted the city to declare a medical emergency in August 1978.

Priority was given to securing temporary housing for families with children under two years of age and pregnant women. Some 41 top priority families were identified in the first two "rings" of homes - the 235 properties nearest the former canal bed.

Following issuance of Health Commissioner Whalen's August 2 order, the Department of Environmental Conservation (DEC) assumed overall responsibility for reviewing remedial engineering plans at the Love Canal.

Specifically, DEC would:

o Provide onsite supervision of construction activity at the Love Canal site;

o Assist the Niagara County Board of Health in its mandate to abate the public health nuisance at the site;

o Consult with the Niagara County Health Department, the State Department of Health and the U.S. Environmental Protection Agency (EPA) to develop a long-range engineering solution;

o Review the cleanup actions proposed by the county in the consultant report by Conestoga-Rovers and Associates, which proposed the construction of a tile drainage system in the southern section of the Love Canal site; DEC also must give final approval to the detailed design and engineering plans;

o Review and approve plans to minimize hazardous exposure during construction;

o Conduct additional studies, in cooperation with the State and County Health Departments and the City of Niagara Falls, to define the boundaries of the Love Canal landfill; to measure through continued air, water, and soil sampling, the extent to which contaminated waters have moved away from the site; to determine the extent of groundwater aquifer contamination; and to determine the effectiveness of the proposed drainage system

to contain and remove the contaminated groundwater from the site.

The Niagara County Board of Health and the Niagara County Health Commissioner were ordered to,

(a) Take adequate and appropriate measures to cause the removal from the Love Canal Chemical Waste Landfill site of all chemicals, pesticides and other toxic material which lie exposed or visible on the surface of the site.

(b) Take appropriate and adequate measures to limit accessibility to the site by the installation of suitable fencing or other effective means, together with periodic surveillance and monitoring.

(c) Take all other appropriate and necessary corrective action to abate the public health nuisance now existing at the Love Canal Chemical Waste Landfill site, including immediate steps to determine the feasibility of lowering the elevated levels of organic contamination in the air of basements by the moisture-proofing and venting of such basements in cooperation with the New York State Departments of Health and Environmental Conservation.

(d) Take all appropriate and necessary steps to undertake necessary engineering studies seeking a long-range solution to decontamination of the site. In connection therewith, that consultation and cooperation of the United States Environmental Protection Agency, the New York State Department of Environmental Conservation and the New York State Department of Health be sought, and approval of the New York State Department of Environmental Conservation be obtained.

The State recommended that approximately 280 families leave their nearby homes because of the hazard posed by the chemicals. The State promised to buy their homes at fair market values. Most residents took the State up on their offer to relocate. The cost of the operation was an estimated $11 million. Remedial work, expected to cost another $10 million, was started to drain off the buried chemicals.

Love Canal illustrates the ignorance, lack of vision, and inadequacy of laws which allow the indiscriminate disposal of such toxic materials.

St. Louis Park, Minnesota

Between 1917 and 1972, Reilly Tar and Chemical Company and Republic Creosoting Company operated on an 80 acre site in St. Louis Park (population 50,000), a western suburb of Minneapolis. Reilly Tar and Chemical refined coal tars to produce creosote, which was then used by Republic Creosote to treat ties and timbers. The creosote waste (e.g., creosote oil, coke) was discharged into a ponding area in the southern part of the property.

The creosoting operation has long been a suspected source of groundwater contamination. In the early 1930's a tar-like taste was detected in municipal and private shallow wells. However, no action was taken against the companies at the time since deeper groundwater resources were readily available.

Routine investigation by the St. Louis Park Municipal Water Supply in 1973 detected low levels of phenolic compounds, possible carcinogens which are breakdown products of creosote oils, in raw water from deep municipal wells. The recent discovery spurred an intensive investigation to uncover the extent and degree of groundwater contamination.

Tests for soil and water contamination were conducted by the Metropolitan District Office, Minnesota Department of Health, and the St. Louis Park Water Department. The surface soil of much of the 80 acre site was found to be saturated with coal tar waste. The contaminants appeared to move downward and southward readily with the groundwater.

Although the ultimate effect of contaminants migrating in groundwater is unpredictable, there is a serious concern for protecting potential and presently used deeper supplies. Unfortunately, industrial wells that are somewhat confined in the area were recently abandoned and migration of contaminants away from the site began to accelerate. Slight contamination already detected in deep aquifers at the site was attributed to recharge through uncased wells. As remedial action, the city closed three wells in the area of the disposal site. These wells were believed to be conduits for surface contamination of deeper aquifers. Another well will be closed in the near future.

According to the Minnesota Pollution Control Agency (MPCA), the Reilly Tar and Chemical Company and the Republic Creosote Company have contributed nothing to the cleanup of the site. The City and State have spent in excess of $500,000 for ground-water monitoring and pollution studies. In addition, the city incurred the following costs:

$20,000 - three wells capped, cleaned and filled with sand

$750,000 - lining of storm sewer ponds, and pipes in vicinity of the site to prevent creosote contamination

$2-3000 - special treatment of water main near the site

$50-60,000 - excavation of two to three acres of contaminated material in part of property redeveloped by the city

$10,000 - soil borings

Estimates of cleanup vary from $20 to $200 million, depending upon the method used. A $500,000 study (one-half federal; one-half state funded) to be conducted by the U.S.G.S. over the next two years will determine the feasibility of using a system of barrier wells for containment of the pollutants. The gradient control system would capture coal tar derivatives and dispose of them in septic sewers or in a waste water treatment facility, depending upon degree of contamination. Total cost of implementing this technique is as

yet unknown. The barrier system will probably be coupled with excavation and removal of an undetermined volume of contaminated soil. This would cost upwards of $20 million depending upon amount of material, transport, and method of disposal. The city of St. Louis Park anticipates spending an additional $10,000 to $20,000 to build new wells and $50,000 for closing a fourth. Cost of possible carbon filtration of municipal water, future water monitoring expenses, and professional time has not been accounted for in these figures.

In the early 1970's complaints were filed against the companies by the Minnesota Pollution Control Agency (MPCA) and the plant was closed down in 1972. At the same time, part of the companies property was being considered for redevelopment by the city. The companies went out of business and sold the property to the city of St. Louis Park. The city, unaware of the seriousness of contamination, signed a "harmless" agreement freeing the companies of responsibility for cleanup of the site. Tests have since shown widespread contamination of soil and groundwater, which necessitates expensive cleanup of the site. A court hearing initiated by the State to amend a complaint against the Reilly Tar and Chemical Company was necessary to determine upon whom the burden of cleanup should fall. The companies involved are reportedly operating in Indianapolis, Indiana.

The two case summaries above illustrate the magnitude of the problems encountered where there are no sufficient funds set-aside for the closure, and post closure maintenance and monitoring of a hazardous waste management facility, or to ensure financial responsibility on the owners part.

The Love Canal and St. Louis Park episodes emphasize the fact that in many cases, damaged parties have no recourse for claims because the facility owner or operator made no provisions to establish financial responsibility. Funds to conduct routine maintenance and monitoring of groundwater, which might have prevented contamination were never established. Thus, it was not until evidence of damage appeared that responsibility was assigned. There is no guarantee that the responsibility party will have available the necessary funds to make all claims good, and to restore the site to a level where it no longer poses a threat to human health and the environment.

DESCRIPTION AND ANALYSIS OF THE PROPOSED REGULATION AND THE REGULATORY ALTERNATIVES

The EPA has proposed regulations in six separate areas to ensure that adequate resources will be available for Continuity of Operation and Financial Responsibility. The six areas are (1) facility closure, (2) post closure monitoring and maintenance, (3) access and default, (4) site-life liability, (5) post closure, financial responsibility for hazardous waste disposal facilities and (6) transfer of ownership.

Facility Closure

The Facility Closure regulation will assure a source of funds to close a permitted facility after operations have ceased. The regulation will require each owner or operator of a hazardous waste treatment, storage or disposal facility to estimate the cost of final closure in accordance with the technical closure requirements contained in Section 250.43-7. This estimate will then be evaluated by the Regional Administrator. Upon approval of the estimate, the owner or operator will be required to establish a secured trust fund for the closure of his or her facility. The trust shall be deposited with and maintained by a bank or other approved fiduciary.

The size of the trust will be computed by determining the site life of a facility, in years, and multiplying the closure cost estimate by the corresponding Present Value Factor given

in the regulation. Since the closure trust fund will be established at the beginning of operations but not needed until closure, the EPA has taken into account the interest that will accrue from the fund in determining the fund size. (See Table 1).

The EPA has used a real interest rate of 2% to determine the present value factor. The real interest rate is the net interest gained from investment minus inflation. As closure and post closure funds are likely to be invested in interest bearing securities of the U.S. (or possibly some other secure investment), the real interest rate is likely to be relatively low (i.e., 1.0% to 2.0%).

When an owner or operator has ceased operations at a hazardous waste management facility and has completed closure of the site, as prescribed in Section 250.43-7, he or she may apply to the Regional Administrator for return of the funds in the trust.

In previous drafts of the Continuity of Operation regulation, the owner or operator was required to develop a site specific trust fund for closure but was allowed to deposit annual cash payments over a portion of the operating life of the site. For example, in the first draft of the regulation, the owner or operator was required to deposit equal cash payments for the first five years of operation to be equivalent to the closure cost estimate. To ensure that the necessary funds would

Table 1

Real Interest Rate on Ten Year
U.S. Government Securities

Year of Issue	Real Interest Rate*
1943	-2.89
1944	-2.45
1945	-2.34
1946	-2.79
1947	-1.74
1948	- .16
1949	- .04
1950	- .76
1951	- .59
1952	.28
1953	.68
1954	.41
1955	.62
1956	.77
1957	1.32
1958	1.01
1959	1.99
1960	2.36
1961	1.11
1962	1.10
1963	.55
1964	.43
1965	- .38
1966	- .77
1967	-1.14

*Both real and nominal interest rates on U.S. government securities have varied enormously historically. Table 1 shows the post-war real rates of return for U.S. government 10-year securities (both shorter and longer terms securities tended to have slightly lower real rates of return during this period). During the post war period, real rates of return on 10-year government bonds have varied from -2.89 percent to a high of 2.36 percent. The arithmetic mean for the period examined is approximately zero. The table shows only real interest rates through 1967 because after this date the bond would not yet have matured.

Derivation: real interest rate equals nominal interest rate minus the inflation rate divided by 1 plus the inflation rate. This formula is an approximate which somewhat underestimates the real interest rate when the bulk of the inflation occurs in the final years and overestimates when the inflation occurs early in the life of the bond.

Nominal Interest Rates from *Moody's Investor Services*, Inflation Rates from Economic Report of the President (1977), derivation of real interest rates by EPA.

always be available in the event a facility closed in the first five years before the entire amount for closure was deposited, the permit holder was also required to obtain a surety bond equal to the undeposited amount.

Surety bonds are used to guarantee the performance of an obligor over a specified period of time. Performance is defined very specifically. The bond issuer, such as a surety broker, "stands in place of the principle" and pays the amount to the agency in whose name the bond was issued, if the obligor fails to meet the performance requirements. The surety company then looks to the obligor for indeminification. Unlike insurance, a surety bond does not relieve the obligor of its obligations. Surety bonds do not cover risk sharing. Surety companies do not ever expect to lose financially on any bond they issue.

In the second draft of the regulation, the five year time period for building up the cash was lengthened to one half of the estimated site life. Again, the remaining, unpaid portion of the closure estimate would be supplemented with a surety bond. The EPA decided on this alternative because it was felt that requiring an owner or operator of a hazardous waste management facility to establish this fund in the first five years might result in a negative cash flow. Clearly, this would pose a severe financial burden on the facility.

In the proposed draft, however, the length of time to develop the closure trust fund was shortened, so that an owner or operator must post the entire amount at the time the permit is granted. It would seem that this policy is a total departure from the logic in the second draft to increase the pay-in period. However, in the proposed draft of the regulation, the surety bond has been omitted. Research done by the Office of Solid Waste indicated that most firms would not be able to attract a surety bond. Commonly, a surety company will issue a bond only when it is satisfied that the obligor has adequate assets to reimburse the surety company for the amount of the bond if it is forfeited. Without a surety bond there is no guarantee that funds will be available if a facility closes prematurely. Since the closure costs represent a minor portion of the funds required under this regulation and since the availability of funds for closure are considered extremely important to assure the protection of public health and the environment, the EPA feels that it is reasonable to require the total amount for closure be established as a condition of receiving a permit.

Although the closure requirements have been made more stringent in the proposed regulation, as compared to previous drafts, it is important to note that requirements under the post Closure Monitoring and Maintenance section have been made less burdensome.

Post Closure Monitoring and Maintenance

Every permitted hazardous waste disposal owner/operator will be required to maintain the site and to monitor the site for possible leakage for twenty years following site closure, as required under Section 250.43-7. By definition hazardous waste treatment and storage facilities will not be required to comply with the post closure monitoring and maintenance requirements, since all wastes will be removed from the facility at the time of closure.

To ensure the availability of funds for this activity, the EPA will require each disposal facility to establish individual trust funds.

Each owner or operator of a hazardous waste disposal facility should file with the Regional Administrator, as part of his or her application for a permit, an estimate of the annual cost for post closure monitoring and routine maintenance in accordance with the technical closure requlation in Section 250.43-7. This estimate will be submitted to the Regional Administrator for approval.

This trust shall be similar in structure to the one developed for facility closure. However, instead of posting the entire amount as a condition of receiving a permit, the trust for post closure monitoring and maintenance will be built up over the life of the site, or twenty years whichever is shorter.

One year after closure, in compliance with 250.43-7, and every year thereafter for a period of twenty years, an owner or operator who has carried out all necessary post closure monitoring and maintenance may apply to the Regional Administrator for reimbursement in an amount equal to the yearly monitoring and maintenance costs.

In previous drafts of the regulation the permit applicant was required to establish the entire trust fund for post closure monitoring and maintenance within the first five years of operation. Due to the severe economic impacts resulting from this requirement, the EPA decided to lengthen the pay in period to one half the expected site life. Payment stretched out over a longer period of time, will require a higher total deposit, but will lower the annual costs. This arrangement was similar to the trust developed for facility closure. The facility owner or operator would deposit a cash deposit every year for the first half of the site life. Initially, the regulation required that the portion of the post closure monitoring and maintenance cost estimate that was not deposited would be supplemented with a surety bond. As was the case with the closure regulation, very few facilities have sufficient net liquid assets to obtain a surety bond for this amount.

Therefore, the EPA omitted the surety bond requirement from the proposed regulation. Of course, this alternative increases the risk that funds may not be available to monitor and perform routine maintenance if a site closes before the entire amount is deposited.

The EPA feels that having total funds available upon receipt of a permit to assure proper closure of a site is relatively more important than requiring total funds for post closure monitoring and maintenance in order to safeguard public health and the environment. Since the surety bond requirement was omitted from the regulation, there is no way to guarantee funds would always be available in the event a facility was ordered closed or went bankrupt. Therefore, EPA now requires the entire amount for closure be deposited at the time a permit is granted. The EPA realizes that this requirement poses a larger financial burden on the facility owner/operator as compared to developing the trust over a specified number of years. Therefore, to lessen the overall financial impact by lowering annual costs, the pay in period for the post closure monitoring and maintenance trust fund has been increased to the life of the site, or twenty years whichever is shorter.

The amount of the annual cash payment for post closure monitoring and maintenance shall be calculated by multiplying the annual post closure operating costs determined under Section 250.43-9(a)(2)(i) by 16.35 and dividing that product

by the appropriate Sum of Annuity Factor from the table in the regulation. The period of payment is equal to the site life of the facility unless the life exceeds twenty years. In this event the appropriate Sum of Annuity Factor will be 24.297.

The EPA has assumed that the trust will be an interest bearing fund. A real interest rate of 2% was used to determine the size of the fund. A real interest rate implies that nominal interest will exceed inflation by 2%. With a real rate of return of 2%, a facility owner or operator will need an amount 16.35 times larger than the estimate made under Section 250.49-9(a)(2)(i) at the time of closure. This fund will be large enough to monitor and maintain a facility for twenty-years. The sum of annuity factor compensates for the amount of interest a fund earns while it is being developed, (i.e., during the operation of the site).

In earlier drafts of Section 3004 an owner or operator of a disposal facility was required to maintain and monitor for leaks after closure, until the site no longer poses a hazard. Therefore the Financial Requirement for post closure monitoring and maintenance required the owner operator to establish a perpetual care fund. This regulation was changed from perpetuity to twenty-years because the EPA determined a perpetual care requirement was burdensome both technically and economically. Furthermore, many of the comments received

from outside reviewers cautioned the EPA that this requirement may seriously discourage any new entry into the hazardous waste management industry.

Access and Default

The Access and Default regulation, Section 250.43-9 (a)(3) was added to the Continuity of Operation section in the proposed draft to provide for rapid or emergency access to a site, and allow the EPA to carry out closure and post closure monitoring and maintenance.

Both Section 3008 and 7003 of RCRA provides for access to a site, however neither gives the EPA the right to enter a facility immediately.

Section 3008 of RCRA provides for federal enforcement of the RCRA Hazardous Waste Management requirements. The enforcement procedure provides 1) that a violator be notified of his failure; 2) if the violation extends 30 days beyond notification the Administrator may either issue an order requiring compliance within a specified time, or initiate a civil action for relief; 3) if the violation occurs in a state which maintains its own authorized hazardous waste program, the state shall be given 30 days notice prior to initiating civil action or issuing an order to the violator. 4) If the violator fails to respond to the order, he may be subject to a civil penalty of $25,000 for each day of continued non-compliance, and the violator's license may be suspended or revoked.

Section 7003 of RCRA provides for response to an imminent hazard. It provides that if a hazardous waste operation

presents "an imminent and substantial endangerment to health or the environment, the Administrator may bring suit... to immediately restrain any person for contributing to the illegal disposal... or to take such other action as may be necessary". The Administrator is required to notify the affected State of any such suit.

Clearly, neither of these actions provide for the type of access needed to protect human health or the environment from the potential release of hazardous materials from a site that is being improperly operated, or one that has been abandoned.

Alternatives for Meeting Continuity of Operation Objectives

Both the closure and post closure regulations require the owner or operator to establish individual trust funds to assure continuity of operation.

The trust fund concept is the only method that requires the establishment of an independent entity charged with assuring continuity of performance. The fund would be administered by a trustee, who is legally responsible for the appropriate use of the fund. The fund would be used only for closure and post closure maintenance.

Trust funds present a general advantage over other possible methods of meeting continuity of operation objectives. Funds are built up during the time a facility's income is greatest, and then secured for use when an operator's immediate interest in a site is at its lowest; when it has ceased producting revenue but still requires maintenance expenditures.

The two different types of trust funds, industry-wide and site-specific, have different advantages and disadvantages. An industry-wide fund would be used only in an emergency where an operator has defaulted on the closure or post closure requirements. This would require a smaller capital investment than would be required for the site-specific fund. Unfortunately, if the industry-wide fund were to be adopted in the regulation,

additional legislation would be required.

The major advantage of the site-specific trust fund approach is that each owner or operator would be reimbursed after the closure and post closure obligations were met. Naturally, the site-specific trust fund provides a strong incentive to meet continuity of operation requirements.

The EPA has also considered several alternative methods, in addition to the trust fund, that will guarantee closure and post closure responsibilities will be met. The alternatives that were considered are:

1) Minimum Owner Asset Requirements
2) Bond Requirements
3) Industry Mutual Assessment Requirements

Minimum Owner Assets

Net assets or liquid net assets would serve as an indication of the stability and reliability of a hazardous waste management facility. Presumably, a firm with high assets would be unlikely to abandon a site without fulfilling the closure and post-closure requirements. This is especially true if the owner or operator operates other permitted facilities.

The advantages of this option are that a facility that qualifies would not have to tie up large sums of capital.

However, the disadvantages against adopting this alternative are also compelling. Only the largest firms would be able to use this method, while smaller to medium sized firms would have to commit funds during operation. This would put the smaller firms at a definite competitive disadvantage.

Furthermore, there is no guarantee that a company with a high level of assets will remain solvent. If the presumption that reliability is directly related to assets is incorrect and a company becomes insolvent, the regulatory agency, and society generally, are left with no recourse, and no assets to apply to the needs of the site.

Bond Requirements

Bonds are usually used to guarantee performance of a specified activity.

Bonds are not designed to cover risk, nor provide any mechanism for risk sharing. Unlike insurance, a bond does not relieve the obligor of obligations. Several types of bonds are available to a facility owner or operator. Usually, a surety company will issue a bond only when it is satisfied that the obligor has adequate resources to reimburse the surety company for only funds disbursed under the bond. If the surety company is not totally confident that it can recover, the bond applicant may be required to post collateral. The collateral may reach 100% of the cash required. This is essentially a cash bond. Surety companies never expect to lose

financially when they issue a bond.

Bonding is a commonly used device to assure performance. The advantages of bonding are significant. Bonds will provide assurance that a permit holder will perform closure and post closure functions as required by law. From a regulatory standpoint, bonding is a simple requirement to administer. For those owners or operators that can demonstrate sufficient assets, bonds are a relatively inexpensive requirement. Unfortunately, for those companies judged unbondable by surety firms, a cash collateral will be required. This may prove a serious obstacle to the financially weaker firms, even though they are fully reliable and stable. Probably the biggest disadvantage with bonding is that they usually guarantee performance over short periods of time. Bonds are usually renewed every one or two years and can be cancelled, usually after a thirty day notice. Thus, a hazardous waste management firm facing financial difficulties that jeopardize its future ability to fulfill its performance obligations, may decide to discontinue its bond or more conceivably, discover that a surety company will not renew the bond, precisely at the time when financial assurance is most needed.

Industry Mutual Assessments Requirements

A final approach for meeting continuity of operation objectives is an industry-wide mutual assessment organization. This type of organization would assess industry members to cover closure and post closure costs of abandoned member sites. The costs would be divided between each member of the mutual assessment association on a predetermined basis. Each member is liable for its share of the costs.

An industry wide mutual assessment association has a number of advantages: 1) the initiative for self administration comes from the industry; 2) the industry will have a collective interest in the content, implementation and enforcement of the regulations; and 3) the funds required to implement the assessment system will not be much larger, generally, than the costs of providing for those facilities that are abandoned. Therefore, if no sites were abandoned, no assessments would be required.

The disadvantages, however, may eliminate this alternative from further consideration. Similar to an industry-wide trust fund, the EPA can not require a mutual assessment association, without additional legislation. The mutual assessment association is totally dependent on the voluntary cooperation of the hazardous waste management industry. If site abandonment problems occur frequently and assessments are high, low risk members would probably leave the association in favor of other methods

of meeting continuity of operation objectives.

Another diadvantage of the mutual assessment organization is that it does not offer strong incentives to industry to meet continuity of operation requirements.

Site Life Liability

Each hazardous waste treatment, storage, or disposal facility is liable for damages to health and the environment. To ensure that sites can cover such liability to a responsible extent, the regulations will require a treatment, storage, or disposal facility to show evidence of a minimum of $5 million of financial responsibility during the life of the site. Financial responsibility can be established by liability insurance, self-insurance, a combination of the two or some other method of financial responsibility acceptable to the Regional Administrator.

In the first draft of the Financial Responsibility regulation, the EPA required all permitted facilities to purchase insurance coverage from a pool of insurance companies willing to participate in meeting claims against hazardous waste management facilities. Such pools exist for liabilities associated with nuclear hazards, marine oil spills, aviation accidents, and similar high risk activities.

The EPA could probably require all permit applicants to purchase coverage from the pool as a condition of receiving a permit. However, the EPA could not compel the insurance industry to form the pool.

EPA received comment on the first draft of the regulation regarding the point that the pool concept may be in violation of the antitrust laws. Since all permitted facilities were required to purchase coverage from the pool, this would essentially exclude any insurance companies that wished to offer the coverage outside the pool. For these reasons the pool requirement was dropped from the next draft.

In later drafts of the regulation, the EPA allowed a facility to establish financial responsibility by either obtaining liability insurance, self insuring or by demonstrating some other means of financial responsibility acceptable to the Regional Administrator. However, if self insurance is used, a firm can not self insure for more than 10% of its equity. Ten percent is considered to be extremely conservative by industry. However, equity is not a stable indicator of a firm's ability to self insure. Self insurance is totally dependent upon a firm's economic viability. For example, the EPA does not want a facility with liquid assets of $5 million self insuring for the total amount required under the regulation.

The main reason for allowing self insurance is to allow firms to take a deductible on their coverage. For example, if a firm has a $50,000 deductible (i.e., the firm pays the first $50,000 of any settlements), the remaining coverage would be considerably cheaper. This is similar to the deductible for automobile insurance. Clearly a $100 deductible policy is cheaper than a policy containing no deductible. This is because the probability for an occurrence with claims in the deductible range is much greater than one in the catastrophic range.

In the proposed draft of the regulation, the minimum level of financial responsibility will remain at $5 million. However, very little acturial data to support this figure exists. Examination of EPA data on recent damage incidents indicates that there is no reliable classification process by which the relative hazards from differing wastes and differing treatment, storage and disposal processes can be established. The dollar values of damages in EPA files range from $100,000 to $40 million. However, it is not unrealistic to imagine claims considerably greater than $40 million. Clearly, the EPA can not require every firm to maintain financial responsibility sufficient to cover the largest foreseeable claim. For this reason, the EPA has attempted to establish (with very little actuarial data and minimal experience with a regulated hazardous waste industry) a degree of coverage that provides some protection and is not prohibitive in terms of cost.

The EPA has considered several options to the proposed regulation. In the first draft of the regulation, a permitted facility was required to maintain financial responsibility for $10 million during the life of the site and in perpetuity after a disposal site closed. The ability of disposal facilities to provide $10 million of financial responsibility would be assured by developing a perpetual care account. The fund would be large enough so that the interest would pay the premiums.

One of the big drawbacks with this regulation was that it tied up vast amount of capital, both while a facility was operating and after closure. However, the major problem with this draft was that coverage in perpetuity for sudden and non-sudden events wasn't available. No insurance firm was willing to commit itself to insure against the risks associated with long term disposal of hazardous waste. Even if the coverage was provided by the insurance industry, it could easily be cancelled by the insurance company since the policy would be up for renewal every year.

Since the earlier drafts of the regulation, the EPA has met with representatives from insurance companies, the hazardous waste management industry and environmental groups. As a result of these meetings the EPA has decided to propose additional legislation to establish a national hazardous waste disposal liability fund for post-closure liability. This fund would be

funded by a surcharge levied on the amount of waste disposed. Clearly, the national fund will eliminate a great deal of the uncertainty associated with long term disposal of hazardous waste.

Since the national fund concept has been considered, the EPA has met again with members of the insurance industry in order to assess the probability for offering non-sudden/non-accidental coverage during the operating life of a site. The EPA is very optimistic that non-sudden/non-accidental coverage will be available from the private sector in the amount required.

Post Closure Liability and Remedial Action

In the previous drafts of the regulation the method that initially received the greatest emphasis for meeting the post closure financial responsibility objectives was liability coverage. Unfortunately most liability policies in effect only offer protection against sudden occurences such as explosions, pipline ruptures or abrupt failure of containment vessels. In general, hazardous waste management facilities in the United States have insurance protection against this type of occurence. However, the critical insurance protection for liability from hazardous waste disposal is non-sudden/non-accidental coverage.

A national liability fund to provide this coverage for hazardous waste disposal facilities is currently being studied by the EPA. This fund would provide the necessary resources for third party claims and remedial action in the event a damage incident occurs at a hazardous waste disposal facility after closure.

Normally, this area of coverage could be provided by the private insurance industry in the form of a Comprehensive General Liability policy. However, due to the uncertainties and long term ("long tail") risks associated with land disposal (i.e., landfilling) of hazardous wastes, most insurance companies are unwilling, or at best extremely reluctant, to underwrite

this activity. The few firms that do offer this coverage charge such prohibitively high rates that most companies currently in the hazardous waste disposal business could not afford the premiums.

For this reason, the EPA intends to reserve proposal of this section of the Financial Requirement Regulation and propose a Federally administered, privately financed central fund. The fund would be developed by a surcharge levied on each ton of hazardous waste. As currently envisioned, the fund would be administered by a federal agency, perhaps the Treasury Department, EPA, or a Congressionally mandated administering agency. The EPA administered RCRA permitting system would be used to enforce payments to the fund. If a facility failed to pay its assessed fees the permit authorizing operation of the facility could be revoked. The charge could be levied either on each ton of waste disposed or on each ton generated with a rebate for wastes which are detoxified or recycled. In the former case, treaters and storers would not be taxed since their operations create no post closure hazards.

Due to a lack of experience with a regulated hazardous waste industry, there is no actuarial data which can be used to predict the necessary size of the fund or the charge per ton. Flexibility will therefore be required to change the disposal tax as experience dictates.

The fund would indemnify permitted facilities for third party damage suits and for remedial (cleanup) activities from unexpected accidental discharges after a facility has been closed properly in accordance with RCRA regulations. In this regard the implementing regulations for the fund would not attempt to modify the legal liability process; thus payment would not be made until after the appropriate court action had been completed. Facilities would not be eligible for indemnification by the fund unless closure and post closure responsibilities had been carried out in accordance with RCRA regulations.

There are two problems associated with such a fund:

(1) Since RCRA does not provide authority to mandate such a fund, Congressional action is needed. The Agency is currently preparing a legislative initiative.

(2) This fund could not practically or equitably provide needed resources for suits or cleanup activities associated with facilities closed prior to the RCRA permitting process. Abandoned sites, such as Love Canal in Niagara Falls, are currently creating serious health problems some of which may cost $50 million to cleanup.

Transfer of Ownership

Section 3004(6) of the Resource Conservation and Recovery Act calls for the issuance of ownership requirements as may be necessary and desirable.

In the proposed version of the regulation the EPA has included requirements covering the transfer of ownership. This regulation will ensure that the closure and post closure trust funds will remain with the land in the event the property is sold. Briefly, the regulation states that if the owner or operator of a facility transfers the ownership or operation of the facility during the twenty year post closure care period the funds shall remain in the trust fund until all post closure requirements are satisfied.

In the first draft of the Financial Requirement regulation the permit holder had to own the site in fee simple. There are several reasons why the EPA would be interested in promulgating regulations that would specify ownership requirements.

In many cases, individuals or organizations, exposed to high risks of potential liability, will attempt to shield part or all of their assets from potential claimants. For example, a hazardous waste disposer may organize the firm so that it is divided into individual subsidiaries. One subsidiary may own and operate

the transport business, while another, with no significant assets of its own, would perform the actual disposal operation. It is important to realize that there is no implication of intenfial misconduct with this type of arrangement. The organization is attempting to partition its assets in such a way to provide protection to the parent corporation in the event of a catastropic loss.

A second problem associated with ownership is the possibility that a waste disposer might rent the site over which he would have no authority after-termination of his lease. This arrangement could essentially release the operator from any liability for closure, routine monitoring and maintenance or damage.

The clearest solution to these problems would be for the EPA to require that organization applying for the permit be required to own in Fee Simple the land, as well as the assets in cash, buildings, vehicle and facilities used in the operation for which the permit is issued. Those who commented on this regulation felt this requirement was extremely burdensome and probably illegal.

In the later drafts of the regulation, all ownership requirements were omitted. It was felt that the closure and post closure trust funds would guarantee the availability of resources to maintain the site no matter who owned the land. Also, since the

EPA is considering the creation of a National liability fund to assume the responsibility for damages at properly closed sites there would be no need to require strict fee simple ownership.

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BACKGROUND DOCUMENT

RESOURCE CONSERVATION AND RECOVERY ACT
SUBTITLE C - HAZARDOUS WASTE MANAGEMENT

SECTION 3004 - STANDARDS APPLICABLE TO OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

SECTION 250.44 STANDARDS FOR STORAGE
SECTION 250.44-1 STANDARDS FOR STORAGE TANKS
SECTION 250.44-2 STANDARDS FOR CONTAINERS

December 15, 1978

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE

I. Introduction

A. RCRA Mandate for the Regulation:

The Congress of the United States, via Section 3004 of Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 (P.L. 94-580), mandated that the Administrator of the Environmental Protection Agency promulgate regulations establishing performance standards applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities as may be necessary to protect human health and the environment. These standards are to include, but not be limited to, requirements respecting (1) location, design, and contruction, and (2) operating methods, techniques and practices of these facilities.

Compliance with this mandate, therefore, necessitates the establishment of regulations that would protect human health and the environment from the adverse effects of air and water pollutants from hazardous waste storage.

In addition to the general storage standards, storage tank and storage container standards are also being promulgated under Section 3004. The Act does not specifically require that such standards be written, but it is believed that improper tank/container use, handling and/or disposal can pose a threat to human health and the environment, and thus storage tanks and containers should be regulated.

This document will, therefore, be concerned with the standards for storage (Section 250.44), storage tanks (Section 250.441), and containers (Section 250.442).

B. Key Definitions:

Definitions given in Subtitle A, Section 1004 of RCRA pertinent to the establishment of storage tank performance standards under 3004 are as follows:

> "The term 'storage', when used in connection with hazardous waste, means the containment of hazardous waste, either on a temporary basis or for a period of years in such a manner as not to constitute disposal of such hazardous waste."

> "The term 'disposal', means the discharge, deposit, injection, dumping, spilling, leaking or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters."

Additionally, the following terms are pertinent to this area of regulation amd are defined as follows:

Container means any portable enclosure in which a material can be stored, handled, treated or disposed. Typical examples are 55 gallon drums, bottles, bags, and canisters.

Incompatible Waste means a waste unsuitable for commingling with another waste or material, because the commingling might result in:

(1) Generation of extreme heat or pressure,

(2) Fire,

(3) Explosion or violent reaction,

(4) Formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential of reacting violently,

(5) Formation of toxic (as defined in Subpart A) dusts, mists, fumes, gases, or other chemicals,

(6) Volatilization of ignitable or toxic chemicals due to heat generation, in such a manner that the likelihood of contamination of groundwater, or escape of the substances into the environment, is increased, or

(7) Any other reactions which might result in not meeting the Air Human Health and Environmental Standard.

Secondary Container means a storage device into which a container can be placed for the purpose of containing any leakage of hazardous waste from such emplaced container.

Storage Tank means any manufactured nonportable covered device used for containing pumpable hazardous waste.

Triple Rinsing means the cleaning of containers three times, each time using a volume of appropriate solvent equal to approximately ten percent of the container's capacity.

True Vapor Pressure means the pressure exerted when a solid and/or /iquid is in equilibrium with its own vapor. The vapor pressure is a function of the substance and of temperature.

Vapor Recovery System means a vapor gathering system capable of collecting vapors and discharged gases and a vapor processing ~~disposal~~ system capable of processing such vapors and gases so as to prevent emission of contaminants to the atmosphere.

Venting Device means equipment used to equalize pressure in a storage tank under conditions which cause pressure or vacuum beyond the tank design limits.

With regard to the term 'storage', the Act does not specify when storage begins. This lack of specificity causes a problem because it makes it difficult to determine when the storage regulations should apply to generators. That is, because it is practically impossible to remove a waste from its generating source the instant that the waste is created, all generators must store a waste for some temporary period before treating, disposing or shipping offsite.

The Agency feels that it would be inappropriate to require generators to comply with 3004 storage regulations the instant a waste is generated. This position is based on the following three premises:

1. The probability that hazardous waste will damage and subsequently leak from a storage device into which it has recently been placed is low.

2. The application of 3004 storage regulations to all generators does not meet Congressional intent to regulate them separately. That is, Subtitle C of RCRA mandates that a separate set of regulations be promulgated for generators of hazardous waste (Section 3002) and operators and owners of hazardous waste treatment, storage and disposal facilities (Section 3004). Since the regulations applying to generators are clearly distinguished from those applying to storage facilities, the Agency has concluded that the intent of Congress was to regulate generators differently than from those that store hazardous waste.

3. Generators frequently stockpile hazardous waste until an amount is collected which is economically feasible to transport. The additional cost of smaller and more numerous trips of hazardous waste from the facility as soon as the waste is generated (which would be necessary in order for generators to avoid having to comply with 3004 storage regulations) would be unreasonable.

However, the Agency also recognizes the tendency for generators to accumulate considerable quantities of hazardous waste over extended periods of time. For such prolonged storage, the generator should have to comply with 3004 regulations.

Therefore, the Agency has decided that a reasonable temporary period should be stipulated which allows a generator to accumulate hazardous waste onsite with the intent to ship offsite, without being considered to be a storage facility operator. 90 days was selected as this interim period. This approach eliminates the overlap between generators and those that store waste, meets the Congressional intent, and provides public health and environmental protection.

Accordingly, a storage facility has been defined as being any facility which stores waste, except for generators who store their own waste for less than 90 days for subsequent transport offsite, in accordance with regulations in Subpart B.

II. Rationale for the Regulation

A recent inventory of the types of environmental damage which have occurred in 421 land disposal systems studied by the Agency shows that 15 cases were related to the storage of wastes. Ten cases resulted in discharges to groundwater and five cases resulted in direct contact poisoning of personnel.

TANKS:

Inventories such as the one cited above indicate that improperly managed tanks which store hazardous waste pose a significant threat to human health and the environment and thus should be regulated.

Tanks or vessels which store hazardous wastes are vented to allow the escape of gases and vapors, thereby preventing internal rupture or other damage to the tanks from expansion of the volatile constituents. However, periods of higher ambient temperatures when volatiles escape often correspond to the worst days meteorologically for volatile materials to contribute to atmospheric pollution.

Depending upon the chemical and physical properties of the waste stored, volatile hazardous wastes can pose a threat to both the community and environment. Volatile organics vented to the atmosphere can react with nitrogen oxides in the presence of sunlight in a complex reaction to form ozone. Because such materials were recognized as ozone percursors, a National Primary and Secondary Ambient Air Quality Standard was promulgated for total hydrocarbons (160 Mg/m^3 measured as a three hour average between 6 a.m. and 9 a.m.).

Two cases of air pollution associated with storage tanks have been identified by EPA. One case involved a storage tank which was left unattended for several years in a small business facility. After the facility changed hands, the new owner in cleanup operations loosened a screw on the storage tank which had apparently slowly built up pressure

and the pressurized stream of liquid which was released caused eye injury and property damage. Subsequent analysis revealed that the tank contained a waste pesticide solution. An undetermined amount of vapor was emitted to the atmosphere.

The second case involved organic lead fumes escaping from solvent recovery, storage, and transporting operations. The problem began with initial storage where there were problems with escaping fumes. Subsequently, various recovery techniques were tried but discontinued because of escaping vapors. The wastes are currently stored awaiting the development of disposal/reuse methods.

CONTAINERS:

Improperly managed containers which store hazardous waste also pose a significant threat to human health and the environment, as evidenced by the following discussion of numerous incidents of damage which have resulted from the haphazard storage and disposal of containers contaminated with hazardous wastes.

Surface Water Contamination via Run-off

1. From 1969 to 1972, an estimated 15,000 drums of industrial wastes containing cyanides, arsenic, cadmium, chromium, petroleum products, acids, and miscellaneous other toxic and corrosive materials were dumped on farm land in Illinois. The problem first received attention in May

1974, when three dead cattle were discovered in the area. Pathological examination revealed that the cattle had died of cyanide poisoning. Chemical analysis of nearby surface water run-off indicated a maximum cyanide concentration of 365 ppm. (The U.S. Public Health Service drinking water standard for cyanide is 0.2 ppm). After the dumping had ceased but before the damages were evident, a portion of the affected farm land was purchased by a company which was subsequently faced with the clean-up problems. A consulting firm, hired by the new owners, has prepared a comprehensive study of this incident, which documents the substantial damage to local wildlife, vegetation, and groundwaters.

2. In Riverside County, California, several drums of phosphorus osychloride, phosphorus thiochloride and thionyl chloride were improperly dropped off at a dump. Later, during a flood, the drums were unearthed, ruptured, and washed downstream. The released hydrogen chloride gas and contaminated the water.

3. In June, 1973, a major chemical company in Virginia contracted with a processing firm in Alabama to pick up, haul and dispose of approximately 10,000 durms of aramid waste, containing 30 to 80 percent sulfuric acid. Most

of the wastes were shipped in 208 liter (55-gal.) steel drums and 190 liter (50-gal.) fiber drums. The wastes brought to Alabama were never processed and remained in two open storage areas and in one enclosed warehouse. Due to weathering, physical stress, and the corrosive and harsh nature of the wastes, many of the drums stored in the two open areas disintegrated and their contents spread over the adjacent ground. In addition to contamination of local waters (chemical analysis of samples of drainage water from the storage site indicated a very high acidity and high concentrations of heavy metals), the storage of waste at the three locations presented a great fire hazard. On March 9 -10, 1976, a fire broke out at the site, and two fire fighters became ill, presumably due to inhalation of toxic fumes.

Groundwater Contamination

4. In 1971, a major chemical company contracted with a trucker to haul approximately 6,000 drums of petrochemical wastes to a landfill for disposal. Instead, most of these wastes were transported to an abandoned chicken farm in New Jersey, where they were stockpiled and subsequently dumped. Within two years, a major aquifer had become contaminated with petrochemicals, resulting in the condemning of approximately 150 private wells. The cost

of extending public water supply into the area was about $300,000. Moreover, this incident resulted in adverse impact on local building and development. The exact magnitude of the environmental and economic damage has not yet been delineated.

5. Several sheep and cattle and a foxhound died, and many cattle became seriously affected, on two farms close to a factory producing rodenticides and pesticides in Great Britain. (This case illustrates the similarity of problems that exist in highly industrialized nations.) The drainage from the factory lead into a succession of ponds to which the animals had unrestricted access and from which they are therefore likely to have drunk. Investigations showed that a field on the site was a dumping ground for large metal drums and canisters, many of which had rusted away, and their contents were seeping into the ground. Residues from the manufacture of fluoroacetamide were dumped on the site and percolated into the drainage ditches leading to the farm ponds. Veterinary evidence indicated that the assimilation of fluoroacetamide was possible if the animals had drunk contaminated water. Ditches and ponds were dredged and the sludge deposited on a site behind the factory. All sludges and contaminated soil were subsequently excavated, mixed with cement, put into steel drums

capped with bitumen, and dumped at sea. The presence of fluoroacetamide in the soil and associated water samples persisted at very low but significant levels and thus delayed the resumption of normal farming for nearly 2 years.

Dispersal of toxic dusts from leaky containers

6. At a dump in Contra Costa County, California, a large number of drums containing solvents were deposited in a landfill. In the immediate area were leaky containers of concentrated mineral acids and several bags containing beryllium wastes in dust form. The operators failed to cover the waste at the end of the day. The acids reacted with the solvents during the night, ignited them and started a large chemical fire. There was possible dispersion of beryllium dust into the environment. Inhalation, ingestion or contact with dust by personnel could have led to serious health consequences.

7. In May 1969, in Jerome, Idaho, Di-Syston was incorporated into the soil in a potato field. The "empty" paper bags from the pesticide were left in the field, and the wind blew them into the adjacent pasture. Fourteen head of cattle died, some with convulsions, after licking the bags. Blood samples showed 0.0246 part per million Di-Syston.

Incompatible Wastes

8. At an engineering works, hot chromic acid waste was inadvertently added to a drum containing methylene chloride waste from degreasing operations. There was a violent eruption

resulting in chemicals being sprayed locally in the workshop, but no one was harmed.

9. An employee transferred two five-gallon cans of waste vinyl cyanide and water from a still to a supposedly empty waste drum. As the employee rolled the drum to a storage area across the road, it exploded. Waste material sprayed out on the employee. He believed that he saw a flash at the time of the explosion. The drum was thrown approximately forty-eight feet, wrapping around a steel guard post. The employee received thermal and possible chemical burns to both feet.

The waste drums contained still bottoms from the stripping of a vinylation mixture. The exothermic reaction, causing the drum to rupture, was probably a combination of cyanoethylation and polymerization.

Volatilization of Toxic Chemicals Due to Compaction of Containers

10. A load of empty pesticide containers was delivered to a disposal site in Fresno County, California. Unknown to the site operator, several full drums of an acetone-methanol mixture were included in the load. When the load was compacted by a bulldozer, the barreled waste ignited, engulfing the bulldozer in flames. The operator escaped unharmed, but the machine was seriously damaged.

The ensuing fire, which also involved dispersion of pesticide wastes, was extinguished by firemen. The firemen were examined to ensure no exposure to pesticide dusts.

11. In October 1974, a bulldozer operator was killed in an explosion at an industrial landfill in New Jersey, as he was burying and compacting several 55-gal. drums of unidentified chemical wastes. The victim died as a result of burns which covered about 85% of his body.

Emanation of Poisonous Gases Due to Improper Storage and Disposal of Containers

12. At a drum reclaiming plant in northern California, 15 men were poisoned by gases given off from drums. It is presumed that this incident occurred because of inadequate storage procedures by the company involved.

13. At least eighteen persons were hospitalized and two firemen suffered permanently disabling lung damage in California in 1973 after inhaling a nematocide emanating from an undepleted 300-lb pressyrized canister that had been improperly disposed of by the manufacturer. A businessman had obtained the canister in order to "make a nice stand-up fireplace."

Damage to Vegetation and Domestic Livestock

14. A firm engaged in the disposal of spent chemicals generated in the Beaumont-Houston area ran into considerable opposition in Texas and subsequently transferred its

disposal operations to Louisiana. In October 1972, this firm was storing and disposing of toxic chemicals at two Louisiana locations: De Ridder and DeQuincy. At the DeRidder site, several thousand drums of waste (both metal and cardboard type, some with lids and some without) were piled up at the end of a airport runway apron within a pine tree seed orchard. Many of the drums were popping their lids and leaking, and visible vapors were emanating from the area. The pine trees beside the storage area had died. At the same time, the firm was preparing to bury hundreds of drums of hazardous waste at the DeQuincy location, which is considered by EPA to be hydrogeologically unsuitable for such land disposal. Finally, court action enjoined this firm from using the DeRidder and DeQunicy sites; however, the company has just moved its disposal operations near Villa Platte in Evangeline Parish, where the same problems exist.

15. On July 9, 1969, in Patterson, Louisiana, the owner of a farm noticed several pigs running out of a cane field; some of the animals appeared to be undergoing convulsions. It appears that aldrin-treated seed and containers had been dumped on the land in a field and that the pigs, running loose, had encountered this material. Eleven of the pigs died. Analysis of rumen contents showed 230.70 parts per million aldrin and 1.13 parts per million dieldrin.

These are but a few of the damage reports in the EPA files attributed to the careless handling, storage and/or disposal of hazardous waste-contaminated containers and storage tanks. The types of incidents considered heretofore do not fall under the category of accident, but rather as occurrences which could have been avoided by prudent and responsible hazardous waste management;* therefore it stands to reason that regulations for the handling, storage and disposal of waste-contaminated containers and storage tanks should be written.

III. Identification of Regulatory Options

A. Standards mandated by RCRA:

These requirements have been deemed by the Agency as the basis for developing standards for storage tanks and containers. Sections 3004(3) and (4) state that the standards to be promulgated by the EPA shall include requirements respecting:

> "(3) treatment, storage, or disposal of all such waste (hazardous) received by the facility pursuant to such operating methods, techniques, and practices as may be satisfactory to the Administrator;"
> "(4) the location, design, and construction of such hazardous waste treatment, disposal, or storage facilities;"

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* Lazar, Emery C. "Damage Incidents from Improper Land Disposal." Journal of Hazardous Materials, 1 (1975/76), p. 163

B. Existing Federal and State Regulations:

1. Federal Regulations

(a) Tank Regulations

"Standards of Performance for Storage Vessels for Petroleum Liquids" was promulgated on March 8, 1974 by the EPA. Applicable storage tanks are those with more than 40,000 gallons capacity and are designed to withstand pressures up to but not in excess of 15 psig without venting.

The standards for hydrocarbons as stated in this regulation are as follows:

(1) If the true vapor pressure of the petroleum liquid, as stored, is equal to or greater than 78 mm Hg (1.5 psia), but not greater than 570 mm Hg (11.1 psia), the storage vessel shall be equipped with a floating roof, a vapor recovery system, or their equivalent.

(2) If the true vapor pressure of the petroleum liquid as stored is greater than 570 mm Hg (11.1 psia), the storage vessel shall be equipped with a vapor recovery system or its equivalent. ~~(see Figure 1).~~

Additionally, the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has promulgated regulations applying to storage tanks ~~and~~ which are intended to protect workers from fires and explosions. Normal venting and relief venting for fire

exposure for above ground tanks are required by OSHA for the storage of petroleum liquids (for Reference see 29 CFR Part 1910, Subpart H, Section 1910.106.

Although it would seem that the regulations promulgated by EPA and OSHA are inconsistent, they in fact apply to the same facilities consistently since venting required by OSHA need not be uncontrolled (i.e., without a vapor recovery system). Likewise, a requirement for vapor recovery systems by EPA need not preclude the design and construction of an emergency vent to the atmosphere.

(b) Container Regulations

In the past four years the EPA has proposed or promulgated guidelines and regulations for the storage and disposal of specific types of containers. These guidelines and/or regulations could be modified or expanded to encompass all types of hazardous waste containers.

I. Federal Register, Volume 39, No. 85 - "Pesticide and Pesticide Containers". In order to promulgate recommendations for the disposal of pesticide containers, containers were divided into 3 groups:

a. Group I Containers. Combustible containers which formerly contained organic or metallo-organic organic mercury, lead, cadmium, or arsenic compounds, pesticides, except should be disposed of in a pesticide incinerator, or buried in a specially designated landfill.

b. Group II Containers. Non-combustible containers which formerly contained organic or metallo-organic pesticides, except organic mercury, lead, cadmium, or arsenic compunds, should first be triple-rinsed. Containers in good condition may then be returned to the pesticide manufacturer or formulator or drum reconditioner for reuse with the same chemical class of pesticide previously contained, providing such reuse is legal under currently applicable U.S. Department of Transportation regulations, including those set forth in 49 CFR 173.28. Other rinsed metal containers should be punctured to facilitate drainage prior to transport to a facility for recycle as scrap metal or for disposal. All rinsed containers may be crushed and disposed of by burial in a sanitary landfill, in conformance with State and local standards or buried in the field by the user of the pesticide. Unrinsed containers should be disposed of in a specially designated landfill, or subjected to incineration in a pesticide incinerator.

c. Group III Containers. Containers (both combustible and noncombustible) which formerly contained organic mercury, lead, cadmium, or arsenic or inorganic pesticides and which have been triple rinsed and

punctured to facilitate drainage, may be disposed of in a sanitary landfill. Such containers which are not rinsed should be encapsulated and buried in a specially designated landfill.

Regarding the storage of pesticide containers, in this same ruling the EPA made the following recommendations:

a. Storage sites. Storage sites should be selected with due regard to the amount, toxicity, and environmental hazard of pesticides, and the number and sizes of containers to be handled. When practicable, sites should be located where flooding is unlikely and where soil texture/structure and geologic/hydrologic characteristics will prevent the contamination of any water system by runoff or percolation. Where warranted, drainage from the site should be contained (by natural or artificial barriers or dikes).

b. Operational Procedures. Pesticide containers should be stored with the label plainly visible. If containers are not in good condition when received, the contents should be placed in a suitable container and properly relabeled. If dry excess pesticides are received in paper bags that are damaged, the bag and the contents should be placed in a sound container that can be sealed. Metal or rigid plastic containers should be checked carefully to insure that the lids and bungs are tight. Where relevant and practicable, the following provisions should be considered:

1) Classification and separation. (i) Each pesticide formulation should be segregated and stored under a sign containing the name of the formulation. Rigid containers should be stored in an upright position and all containers should be stored off the ground, in an orderly way, so as to permit ready access and inspection. They should be accumulated in rows or units so that all labels are visible, and with lanes to provide effective access. A complete inventory should be maintained indicating the number and identity of containers in each storage unit. (ii) Excess pesticides and containers should be further segregated according to the method of disposal to ensure that entire shipments of the same class of pesticides are disposed of properly, and that accidental mixing of containers of different categories does not occur during the removal operation.

2) Container inspection and maintenance. Containers should be checked regularly for corrosion and leaks.

II Federal Register, Volume 41, No. 112 - "Vinyl Chloride; Recommended Procedures for Disposal of Aerosol Cans":

Final disposal of VCM-containing aerosol cans should be undertaken using methods listed in order of preferred priority:

1. High temperature incineration (except for products containing heavy metals);
2. Burial in a State-approved chemical (or hazardous) waste landfill;
3. Burial in a separate area of a State-approved sanitary landfill.

III Federal Register, Vol. 42, No. 100 - "Polychlorinated Biphenyls (PCBs)":

a. Disposal requirements for PCB containers - unless decontaminated, a PCB container shall be disposed of:
   1. in an incinerator, or
   2. in a chemical waste landfill, provided that the PCB container shall first be drained, and flushed internally if necessary, so that remaining PCB chemical substances and PCB mixtures constitute no more than 0.5 percent of the total volume of the container.

b. Storage requirements for PCB containers

The facilities at which the containers are to be stored must meet the following specifications:

i. An adequate roof to prevent rainwater from reaching the stored PCBs.

ii. An adequate floor which has continuous curbing with a minimum six inch high curb. Such floor and curbing must provide a containment volume equal to at least

two times the internal volume of the largest PCB equipment or PCB container stored therein or twenty-five percent of the total internal volume of all PCB equipment or containers stored therein, whichever is greater.

iii. No drain valves, floor drains, sewer lines, or other openings that would permit liquids to flow from the curbed area.

iv. Continuous, smooth, and impervious construction for floors and curbing such as Portland cement concrete.

v. All PCB containers shall be checked for leaks at least once every 30 days. All leaking containers and their contents shall be transferred immediately to properly marked nonleaking containers.

vi. Any PCB container used for the storage of liquid PCB chemical substances or liquid PCB mixtures shall comply with the specifications of the Department of Transportation Materials Transportation Bureau Hazardous Materials Regulations, 49 CFR 173.346 (41 PR 42544, September 27, 1976). Any PCB containers used for the storage of nonliquid PCB mixtures, PCB articles, or PCB equipment may vary from 49 CFR 173.346 by meeting DOT Spec. 5, Spec. 5B or Spec. 17C with removable heads.

c. Decontamination of PCB containers - Essentially, what the EPA has required for the decontamination of the containers is a standard, triple-rinse procedure:

> Any PCB container to be decontaminated shall be decontaminated by flushing of the internal surfaces of the container three times with a solvent containing less than 0.05 percent PCB chemical substance in which the solubility of PCBs is five percent or more by weight. Each rinse shall use a volume of the normal diluent equal to approximately ten percent of the PCB container's capacity. The solvent may be reused for decontamination until it contains 0.5 percent PCB chemical substance. The solvent shall then be disposed of as a PCB mixture.

2. State Regulations

In most states, regulations governing the storage of hazardous wastes are part of general hazardous waste regulations. The guidelines which are applied to hazardous waste disposal are also applied to waste storage facilities. In many states, waste storage is not specifically mentioned in regulations; however, waste tank or container storage and handling are described at the time engineering plans for a waste disposal facility are submitted for state review and approval.

The following are excerpts from regulations and/or guidelines in those states with programs deemed most progressive. Minnesota: (proposed regulations HW-4)

As applicable, containers and portable tanks used to store hazardous waste shall meet the following minimum requirements:

1. Containers and tanks shall be of sturdy, leak-proof construction. Containers shall be of adequate wall thickness, of weld hinge and seam strength, and of sufficient material strength to withstand side and bottom shock while filled without impairment of the ability of the container or tank to fully contain the waste.
2. Except during filling or emptying, a container or tank shall be securely closed so that there is no escape of waste or its vapors. This provision shall not apply when in conflict with other applicable state or federal laws.
3. Lids, caps, hinges, or other closure devices shall be of sufficient strength and construction so that when closed they will withstand dropping, overturning or other shock without impairment of the container's or tank's ability to fully contain the waste. Gasketed closures shall be fitted with gaskets of efficient material which will not be deteriorated by the contents.

4. Containers, tanks and their closures shall be constructed of materials which will not undergo chemical reaction with the contained waste or with other substances that the container may contact if such a reaction may impair the container's or tank's ability to fully contain the waste. Containers and tanks constructed of material that may undergo such reaction shall be protected with a non-reactive liner.

5. Nails, staples, and other metallic devices shall not protrude into the interior of the outer packaging in such a manner as to be likely to cause failures.

6. Corroded or damaged containers or tanks shall not be used to contain hazardous wastes. Such containers, before being reused to store hazardous wastes, shall be repaired or reconditioned in compliance with 49 CFR 173.28.

7. Until a drained or emptied container or portable tank has been thoroughly cleaned and sufficiently rinsed to remove all significant residual hazardous waste, the container shall be considered to contain hazardous waste and shall be stored, handled, transported, and disposed of as required by these regulations. Cleaning solutions and rinsates shall be disposed of in accordance with applicable laws and regulations.

Minnesota also proposes to require that Hazardous Waste Storage Areas meet the following minimum design and construction requirements:

1. Storage of hazardous waste is prohibited in buildings, completely enclosed vehicle trailers or other enclosed areas in any area where a spillage or leakage of hazardous waste or a solution thereof may potentially enter waters of the state or may potentially cause violation of state air quality regulations through drains, sewer inlets, sanitary sewers, doorways, vents, tunnels, pipes, windows, permeable earth or soil floors or other routes. Safeguards shall be constructed and maintained that are adequate to prohibit escape of spilled or leaked hazardous waste from a building or an enclosed storage area. Incompatible wastes shall be stored within separate safeguards.
2. Storage of hazardous waste is prohibited at any outdoor storage location, except as provided for in HW-4 D-4, without safeguards adequate to prevent the escape or movement of the hazardous waste or a solution from the site in the event of the failure of a container, tank or piping. Incompatible wastes shall be stored within separate safeguards.

3. For storage of containers, storage tanks or portable tanks at any outdoor location, or in any structure, vehicle trailer, or other unit or area which is not completely enclosed, an impervious continuous dike or wall shall entirely surround the storage area and enclose an emergency storage volume. The volume shall be equal to the larger of the capacity of the largest enclosed storage tank or portable tank plus one foot of freeboard or the total capacity of all containers plus one foot of freeboard. The dike or wall shall be sturdily constructed to securely hold such a volume of hazardous waste.

4. An impervious liner with a permeability of less than 500 gallons per acre per day under the entire storage area and enclosure of such construction or composition either natural or artificial as to prevent (in case of any failure of the storage tank or container), the seepage, percolation or other movement of hazardous waste or solution into the underlying ground shall be constructed. The permeability of this basin seal should be as low as possible. The impreviou liner shall extend to include areas beneath containers, tanks, and the surrounding berms or dikes.

5. Loading and unloading locks, vehicle-loading racks and fill pipe areas shall be constructed to contain spillages and

leakages of hazardous wastes that could occur as a consequence of hazardous waste transfer activities or storage at these areas. The containment area shall be constructed to prevent escape of spilled hazardous waste or a solution thereof to outside the containment area, whether by overflow, drains, sewers, seepage into the ground, or any other route. The containment area shall be completely on top of an impervious liner 500 to prevent percolation or other movement of spilled hazardous waste into the ground.

6. If diking is impractical due to space limitations, vehicle access, or other causes, alternative methods of safeguards may be allowed in lieu of the above requirements. Alternative safeguards shall include an emergency storage volume equal to the above requirements and shall be over an impervious liner that extends sufficiently to contain the waste in the event of spillage."

Regarding operation criteria for Hazardous Waste Storage Areas, Minnesota proposes to require that:

"Containers of hazardous waste which are corroded or otherwise damaged shall be replaced as soon as possible and all leakages be properly recontainerized."

Washington: (from draft No. 2 - "Hazardous Waste Regulation", 3-20-77).

1. Empth non-combustible containers (which previously contained extremely hazardous waste) that are decontaminated and drained by processes equivalent to triple rinsing shall not be considered extremely hazardous waste.
2. Containers holding extremely hazardous waste shall not be opened, or handled and stored in a manner which may rupture the containers, or cause them to leak, unless
   a. severe container damage requires transfer to another container, or
   b. detoxification is planned, or
   c. waste sampling becomes necessary."

Texas: (From Technical Guideline #9: "Non-Compatible Wastes", of the Texas Water Quality Board's Industrial Solid Waste Management Regulation, issued 5-3-76).

In its discussion of the handling and disposal of non-compatible wastes, the Texas guidelines include the following suggestions concerning containers:

1. Non-compatible wastes should not be mixed in the same transportation or storage container.
2. A waste should not be added to an unwashed transportation or storage container that previously contained a non-compatible waste.

3. Non-compatible waste should not be combined in the same pond, landfill, soil mixing area, well, or burial container. An exception is the controlled neutralization of acids and alkalies in disposal areas. Containers which hold non-compatible wastes should be well separated by soil or refuse when they are buried. Ideally, separate disposal areas should be maintained for noncompatible wastes.

4. Non-compatible wastes should not be incinerated together."

California: California also addresses the issue of containerized non-compatible wastes in its draft regulations, dated 4-1-77.

1. Storage and transportation containers holding wastes which might be incompatible shall be separated from each other or protected from each other in order to prevent the wastes from mixing should the containers break or leak.

2. A waste shall not be added to an unwashed container that previously held an incompatible material."

In addition, California has proposed the following other requirements for the storage and disposal of hazardous waste containers.

1. The operator (of a hazardous waste facility) shall provide or otherwise arrange for special equipment such as lifts, ramps and lines to remove containerized hazardous waste from vehicles and containers if necessary to prevent hazards to public health, personal safety, wildlife or domestic livestock.

2. Containers may be opened, emptied or buried within a hazardous waste area only if the nature of the waste and the precautions taken preclude fires, contamination of persons with hazardous waste, discharge of a hazardous waste outside the hazardous waste area and movement of hazardous waste to an area outside the hazardous waste area. Otherwise, containers holding hazardous wastes shall not be opened, handled or disposed of in a manner which may rupture the containers or cause them to leak, before they are buried.

3. Empty containers contaminated with hazardous materials shall be stored, handled, processed and disposed of as hazardous wastes.

4. Nonstationary containers used for storing hazardous waste shall be such that the containers can be safely transported, handled, or moved."

The State of California also issued information and guidelines that were to be utilized in the "Used Pesticide Container Cleanup Project", held during the period of March 1 thru 12, 1971. Although the guidelines were drawn up specifically for pesticide containers, they could possibly be broadened to encompass other types of hazardous waste containers. The following are selected passages from these guidelines:

1. The pesticide containers to be revieved at the approved disposal sites must be rinsed.
2. At the end of each day's disposal operation the containers should be completely covered with soil.
3. The desired equipment for compaction and burial of containers is a crawler-type tractor equipped with a bulldozer blade.
4. The container unloading area should be in or adjacent to the burial area; containers should not be dumped down a long slope or on open dump face. If the area is sloped, it may be advantageous to construct a low control berm (1 foot high) since containers may roll and be scattered prior to actual compaction.
5. Upon arrival (at the waste facility) the containers should be crushed and compacted into the landfill immediately, unless they are taken to a segregated, enclosed storage

area. If the containers are stored, they should be rendered unusable prior to storage, and crushing and compaction should start immediately upon removal from storage when the appropriate equipment is available.

6. Always keep lids and bungs tightened on metal, glass, and plastic containers. Used bags and sacks should be stored in closed secondary containers.
7. Check stored used pesticide containers routinely for corrosion, leaks, breaks, etc., to assure that a hazardous condition does not develop in the storage area.
8. After metal containers have been decontaminated they may be stored as any other scrap metal."

South Carolina: Similar to California's regulations, the regulations cited from South Carolina pertain to the storage and disposal of pesticide containers:

1. Metal and Glass Containers:
   a. Pesticide containers less than 20 gallons shall be hauled to a special designated area for disposal.
   b. Used metal or glass pesticide containers which hold less than 20 gallons of liquid pesticide shall be rinsed and drained three (3) times with water or other spray carrier immediately and the rinse solution drained from the container into the tank mixt

c. Pesticide containers equal to or more than 20 gallons shall be salvaged, if possible. These containers shall be rinsed by the same procedure as the smaller containers named in (b) above. The containers shall then be stored using minimal precautions until they can be sold to a drum reconditioner.

2. Fibrous, Paper, and Plastic Containers: Pesticide containers made of fibrous materials, paper, or plastic shall be disposed of in a special designated area in the same manner as the metal containers with the exception of being rinsed. Fibrous, paper, and plastic containers shall be covered immediately after being brought to the landfill or stored in metal containers with a cover on each container until such time as the desired amount is received for proper covering without wasting time and effort of the operator.

3. No open burning of pesticide containers shall be permitted.

Oregon: Again, these proposed rules pertain only to pesticides, but have the potential to suffice for other types of containers as well.

"Noncombustible containers, including but not limited to cans, pails or drums constructed of steel, plastic or glass, shall be decontaminated by triple rinsing or jet

rinsing or jet rinsing of containers for liquid or solid pesticides or by other methods approved by the Department. Noncombustible fumigant pesticide containers shall be decontaminated by standing open to the atmosphere with closure removed in an upside down position for a period of five (5) or more days. Decontamination shall be performed immediately but not to exceed two (2) days after emptying of containers.

Combustible containers, including paper bags and drums, but not including plastic containers, shall be disposed by:

(a) burning of combustible containers in an incinerator or solid fuel fired furnace which has been certified by the Department to comply with applicable air emission limits or;

(b) open burning of not more than 50 pounds in any day, except those used for organic forms of beryllium, selenium, mercury, lead, cadmium or aresenic. Open burning shall be conducted in compliance with open burning rules, OAR Chapter 340, Division 2, Subdivision 3, according to requirements of local fire departments and districts and in such a manner as to protect public health, susceptible crops, animals, surface water supplies and waters of the State

EPA's review of State's waste storage regulations or guidelines indicates that:

-- Most states do not regulate hazardous waste storage specifically.

-- Many permit applications for waste disposal also include storage facilities. The procedures for waste storage are reviewed (along with the remainder of the application) by the state personnel who determine approval or rejection on a case-by case basis.

-- Hazardous waste regulations in some states are very weak; these are the states that do not mention waste storage in their regulations.

-- Most state hazardous waste storage restrictions have been formed with emphasis on protection of water resources.

-- Hazardous waste storage regulations generaly involve design and operating standards.

3. Others: EPA also reviewed standards that have been used and may be applied to the design and construction of hazardous waste storage tanks from the following sources:

(1) American Petroleum Institute Standard No. 620. Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks, Third Edition, 1966.

(2) American Petroleum Institute Standards No. 12A, Specification for Oil Storage Tanks with Riveted Shells, Seventh Edition, September 1951, or No. 650, Welded Steel Tanks for Oil Storage, Third Edition, 1966.

(3) American Petroleum Institute Standards No. 12B, Specification for Bolted Production Tanks, Eleventh Edition, May 1958, and Supplement 1, March 1962; No. 12D, Specification for Large Welded Production Tanks, Seventh Edition, August 1957; or No. 12F, Specification for Small Welded Production Tanks, Fifth Edition, March 1961. Tanks built in accordance with these standards shall be used only as production tanks for storage of crude petroleum in oil-producing areas.

(4) Underwriters' Laboratories, Inc., Subjects No. 142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, 1968; No. 58, Standard for Steel Underground Tanks for Flammable and Combustible Liquids, Fifth Edition, December 1961; or No. 80, Standard for Steel Inside Tanks for Oil-Burner Fuel, September 1963.

IV. Analysis of Regulatory Options

Option 1 General regulatory language. For example, "all storage facilities shall be located, designed, constructed, and operated in such a manner as to assure no adverse effect on human health and the environment." Advantages:

- Non-specific regulatory language allows more latitude and flexibility in enforcement. Enforcement authorities would be able to decide on a case-by-case basis whether a particular storage facility was located, designed, constructed, and operated in such a manner as to prevent the release of hazardous substances to the environment. Such an evaluation could take into consideration ~~such~~ such factors as the type of waste stored, local climate, the type of storage device used by the facility, the amount of time that the waste is stored before disposal, etcetera.

Disadvantages:

- Difficulty in compliance because of non-specificity of language (e.g. type of storage device to be used, specific diking requirements)
- May result in non-uniform implementation.
- In the absence of specific national standards, there will be no means by which to assist or compare the equivalency of state hazardous waste programs to the federal program.

- States may find it difficult to develop adequate hazardous waste programs without the existence of federal standards as guidance.

Option 2 General regulatory language coupled with specific recommendations. For example, "all storage facilities shall be located, designed, constructed, and operated in such a manner as to assure no adverse effect on human health and the environment. Listed below are a number of recommendations that should be given consideration by storage facility owners/operators in order to ensure that the storage facility will pose the least amount of threat to human health and the environment..." (See excerpts from Texas guidelines on page 31 for an example of a list of recommendations to be considered).

Advantages:

- Clearly defines factors for owners/operators to be concerned with in locating, designing, constructing, and operating an environmentally sound storage facility.
- Provides flexibility in enforcement.
- Recommendations, although bearing no legal weight, aid in enforcement because of the "as to assure no adverse effect on human health and the environment" criteria in the general statement.
- Aids enforcing officials in judging the adequacy of the design and operation plans of the storage facility.

- Provides a basis for assessing the equivalency of state programs.

Disadvantages:

- Possible loophole in enforcement because suggestions are not legally enforceable.

Option 3 Specific regulatory language. For example, "storage tanks which contain volatile waste shall not be vented directly to the atmosphere if they have a storage capacity in excess of 19,000 liters (5000 gallons)".

Advantages:

- Specific and clearly defined duties which are not subject to broad interpratation, either in imposing liability or escaping liability.
- ~~There~~ More easily enforceable, less discretionary.
- Provides a basis for assessing the equivalency of state programs.

Disadvantages:

- ~~There~~ More difficult to formulate regulations in that specific requirements for storage areas, tanks, and containers would have to be pinpointed.
- Varied nature of the waste stored at facilities may make certain aspects of these regulations inappropriate.
- Inflexibility of specific standards discourages industry from developing new and innovative technologies to store hazardous waste.

Option 4 Specific regulatory language coupled with notes which provide a basis for deviation from the standard. For example, "storage tanks which contain volatile waste shall not be vented directly to the atmosphere if they have a storage capacity in excess of 19,000 liters (5000 gallons). Note: Facility owners/operators may vent their storage tanks with a capacity in excess of 19,000 liters (5000 gallons) directly to the atmosphere if it can be demonstrated that such direct venting would not cause the Air Human Health and Environmental Standard (Section 250.42 - 3) to be exceeded."

Advantages:

- This approach has all the advantages of option 3, plus it affords a degree of flexibility which option 3 lacks. That is, the mechanism of the note provides a basis for deviation from the standard if the facility owner/operator can demonstrate to the EPA Regional Administrator, prior to receiving a permit, that the proposed alternative method meets the objective of the standard.

Option 5 Promulgate no regulations pertaining to the storage of hazardous waste.

Advantages:

- Saves time and personnel in enacting and implementing a regulation.
- Storage of hazardous waste would be adequate in some states which already provide for specific storage requirements in their hazardous waste regulations.

Disadvantages:

- Storage of hazardous waste may be inadequate in states not providing for specific storage requirements.
- Requirement is mandated by the Act ("Such standards shall include... requirements respecting... storage... of all such waste (hazardous) received by the facility... and the location, design and construction of such hazardous waste... storage facilities").

V Identification and Rationale for Chosen Regulatory Option:

The purpose of the storage standards (Sections 250.44, 250.44-1, and 250.44-2) is to prevent the release of hazardous substances from the storage facility to the environment.

Option III, the regulatory option which we have chosen to implement in the regulation, is one which we feel best protects human health and the environment by specifically delineating what is required of owners and operators of storage facilities.

The storage standards are unusual when compared to most of the other sections of the 3004 regulations in that none of the storage standards are accompanied by notes (the option 4 regulatory format). The reason why the Option 4 format was not selected for any of the storage standards is because the Agency believes that it is not possible for the facility owner/operator to deviate from these particular standards and still meet the objective of the standard.

STET ~~A. General Storage Standards (Section 250.44)~~

Standard

250.44 (a) An owner/operator of a storage facility, as defined in Section 250.41, shall store the hazardous waste in either a storage tank or storage container and shall comply with the requirements of this Section.

Standard

250.44 (b) Storage of hazardous waste shall be conducted in such a manner that no discharge of hazardous waste occurs.

Rationale for Standards (a) and (b)

The Resource Conservation and Recovery Act of 1976 (RCRA) defines "storage" when used in connection with hazardous waste, to mean the "...containment of hazardous waste, either on a temporary basis or for a period of years, in such a manner as not to constitute disposal of such hazardous waste. A key word in the above definition is disposal, which is defined in RCRA as follows:

"disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any contituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters."

Taken together, the above definitions in RCRA have been judged as requiring that "storage" be performed in a zero-discharge manner if it is to be in accordance with the intent of RCRA. Standard 250.44 (b), therefore, was written in order to clarify the no-discharge aspect of the definition of storage. The Agency believes that storage, as defined in RCRA, cannot be achieved unless the waste is enclosed in a storage container or storage tank, hence the reason why standard 250.44 (a) was proposed.

Standard

250.44 (c) An owner/operator of a storage facility shall visually inspect the facility daily in accordance with the requirements of Section 250.43-6 for the purpose of detecting any potential discharge of hazardous waste.

Rationale

Visual inspections of storage facilities are required in order that leakage of hazardous waste from storage devices (e.g. tanks and containers) can be detected, and remedial measures can be taken to minimize or prevent the movement of hazardous waste

outside the storage area. Inspection of the storage facility serves as an early warning device which allows time for correction before fires or explosions occur, or ground and surface water is contaminated, thereby reducing the risk to human health and the environment.

Standard

250.44 (d) An owner/operator of a facility may be required by the Regional Administrator to comply with all or part of the groundwater and leachate monitoring requirements of Section 250.43-8, if the Regional Administrator determines that there is a potential for discharge of the hazardous material.

Rationale

Monitoring of storage facilities is required in order that leakage of hazardous waste from storage devices (e.g. tanks and containers) can be detected, and remedial measures can be taken to minimize or prevent the movement of hazardous waste outside the storage area. Monitoring of the storage facility ser as an early warning device which allows time for correction befor groundwater sources are contaminated, thereby reducing the risk to human health and the environment.

Standard

250.44 (e) Each storage area shall have a continuous base which is impervious to the material being stored, and shall be designed and constructed so that any surface water runoff or spill can be contained until the wast can be removed.

Rationale

The purpose of this requirement is to reduce or eliminate the possibility that a hazardous waste emanating from a storage device will contaminate the groundwater. To preclude such an occurrence, it is necessary that the base of the storage area be correlated to the type of waste being stored in terms of base permeability and integrity.

Standard

250.44 (f) Hazardous waste which the Regional Administrator determines would cause the Air Human Health and Environmental Standard (Section 250.42-3) to be exceeded if it were held opened to the environment, particularly with regard to volatility and toxicity, shall be stored in a storage tank(s) or a storage container(s) until the hazardous waste is disposed of, treated or incinerated in accordance with the requirements of this subpart.

Rationale

This regulation specifies which hazardous wastes require storage in tanks. Rather than basing this determination on a single factor (i.e., true vapor pressure), the overall characteristics of the waste are used. For example, if the waste has a high degree of toxicity or volatility and would cause the Air Human Health and Environmental Standard to be exceeded when stored in an open manner, such as a settling pond or lagoon, this regulation requires that the waste be stored in a storage tank or a storage container.

Standard

250.44 (g) Storage tanks and containers shall be of sturdy and leakproof construction in accordance with the Occupational Safety and Health Administration's regulations for storage of flammable and combustible liquids (29 CFR Part 1910, Subpart H, Section 1910.106).

Rationale

Because storage of hazardous waste must be accomplished in a "zero discharge" manner, by definition this requirement necessitates that storage be "leakproof," so as to prevent the release of hazardous waste to the environment.

OSHA's responsibility is to ensure worker safety, and for this reason, OSHA has written explicit design specifications for the storage of flammable and combustible liquids. These design specifications are deemed to be adequate to ensure that tanks and containers are sturdy and leakproof, and therefore the EPA has decided to adopt OSHA's storage regulations.

Standard

250.44 (h) Storage tanks and containers shall be constructed of materials which are compatible with the hazardous waste to be contained or shall be protected by a liner compatible with the hazardous waste to be contained so that the ability of the storage tank or container to contain the waste is not impaired.

250.44(i) A hazardous waste shall not be contained in an unwashed storage tank or container that previously held an incompatible material (See Appendix I).

Rationale for (h) and (i)

Both standards, (h) and (i), are concerned with the contact of incompatible materials. Reaction between incompatible substances may produce potentially hazardous situations, such as heat generation, fires, explosions, or release of toxic substances. Such situations have potential for severe adverse public health and environmental effects.

These regulations are designed to prevent contact of a hazardous waste with the wall of a container or tank with which it is incompatible or with a waste with which it is incompatible, thereby reducing a potential source of the aforementioned hazards.

250.44 (j) The identity and location of all stored waste shall be known (e.g. via labelling and recordkeeping) throughout the entire storage period.

Rationale

Many accidents involving hazardous waste are attributed to persons not knowing what the material is that they are handling. Presuming the substance to be non-hazardous, the person may not handle the material with the degree of caution that one would normally exercise if the material was known to be hazardous. To preclude this type of situation, it is required that the identity of the waste be known throughout the storage period.

Additionally, in the event of an emergency, it is necessary to know the location of all stored waste in order that those wastes which are vulnerable to the emergency (e.g. explosive waste during a fire) can be quickly removed, or otherwise isolated.

STET ~~B. Storage Tanks (Section 250.44-1)~~

The strategy employed in developing storage tank regulations was first to determine which wastes require storage in tanks, and secondly to determine how storage areas are to be constructed to prevent the escape or leakage of hazardous waste from the tanks to the environemnt.

Standard

250.44-1 (a) Storage tanks which contain volatile waste shall not be vented directly to the atmosphere if they have a storage capacity in excess of 19,000 liters (5000 gallons).

Rationale

This regulation was developed to prevent dangerous expansion or harmful evaporation resulting from the storage of a large amount (Volume 19,000 liters) of volatile waste.

The selection of 5000 gallons as the threshold above which indirect venting is required is based on the fact that the typical carrying capacity of transport vehicles for hazardous wastes is 5000 gallons. To require these transport vehicles to be equipped with indirect venting devices would impose an unduly harsh financial burden on the owners of these vehicles.

In addition it is felt that the amount of volatiles which emanate from a storage tank containing less than 5000 gallons will be relatively small, such that human health and the environment will not be inordinately impaired if direct venting of these vehicles is allowed.

The agency recognizes, however, that there are instances when it would be best to not take advantage of the flexibility afforded by this standard, e.g., for those hazardous wastes which are extremely volatile and/or toxic. Under such circumstances, the indirect venting of storage tanks would be necessary.

Standard

250.44-1 (b) All storage tanks above ground shall have a spill confinement structure(s) (e.g., dike or trench), with a capacity equal to the entire contents of the largest storage tank, plus sufficient freeboard to allow for the containment of precipitation resulting from a 24-hour, 25-year storm.

Rationale

The degree of protection for tank storage areas was chosen to be equal to the capacity of the largest storage tank because:

1) There is a precedent for this mandatory standard. It is adopted from EPA's Oil Pollution Prevention regulations, CFR 40, Part 112.7(e) (2) (ii);
2) In storage areas which house more than one tank, the probability that more than one tank will simultaneously leak or rupture is very low;
3) The majority of tank spills and ruptures occur at a slow, rather than at an instantaneous and complete rate of release;
4) Those tank ruptures which do occur instantaneously are associated with violent explosions. In such a situation, a protection device would be relatively ineffective in containing the spill anyway.

The capacity of protective devices used to enclose tanks must allow for accumulation of water due to precipitation when stored outside. Because of the regional differences in precipitation within the U.S., the allowances for precipitation was selected to be based on the amount of precipitation that can be expected from a 24-hour, 25-year storm.

Standard

250.44-1 (c) Diking requirements and operating procedures for storage tanks shall be in accordance with EPA's oil or hazardous

pollution prevention regulations (40 CFR Part 112, Subchapter D) issued pursuant to Section 311 of the Clean Water Act.

Rationale

Section 1006 of RCRA mandates that all provisions of RCRA shall be integrated with the appropriate previsions of the Clean Water Act. To this end, this regulation has been written to comply with Section 1006's mandate to integrate with other acts.

C. Storage Containers (Section 250.44-2)

The intention of the storage container regulations is to prevent the release of hazardous substances from waste - contaminated containers into the environment. These regulations will apply to both full containers and those which have been emptied and have residues. Since in both cases the containers have been contaminated with hazardous waste, the term "contaminated container" is used in these regulations to denote both "full" and "empty" containers.

Standard

250.44-2 (a) If a container is not in good condition or if the contents of a storage container begin to leak, the hazardous waste in the container shall be recontainerized in a storage container(s) in good condition.

250.44-2 (b) A storage container holding hazardous waste shall not be opened, handled or stored in a manner which may rupture the containter or cause it to leak.

Rationale for (a) and (b)

Both standards, (a) and (b), are concerned with leakage of hazardous waste from containers. Because storage of hazardous waste for any period of time must provide for "zero discharge" by definition then, this requirement necessitates that storage also be done in a leakproof manner. In order to ensure compliance with this definition, standard (a) requires that all containers be examined for defects (e.g. faulty seams, excessive corrosion, other damage, etc.) in order to determine if the containers are suitable for storage of hazardous waste.

Storage or disposal of hazardous waste in containers without first examining the containers for defects has resulted in serious consequence to public health, the environment, and property. For example, concentrated mineral acid in Case History no. 6 (cited earlier in this document) trickled out of its container in such a way that the acid contacted organic solvents. This encounter started a large chemical fire and dispersed beryllium dust which was disposed of nearby. Contact with beryllium dust by personnel could have led to serious health problems.

The purpose of standard (b) is to limit handling of containerized waste by personnel to the bare minimum. It is felt that the less often a waste is handled, the less opportunity there will be for container damage and subsequent leakage of the hazardous waste from the container.

Standard

250.44-2 (c) A storage facility which stores hazardous waste in storage containers shall have a spill confinement structure(s) (e.g., dike or trench) with a capacity equal to 10 percent of the containerized waste, plus sufficient freeboard to allow for containment of precipitation resulting from a 24-hour, 25-year storm.

Rationale

The degree of protection for container storage areas was chosen to be equal to 10 percent of the containerized waste (and not the capacity of the largest container, as is true with the storage tank regulations) because it is likely that more than one container will be leaking simultaneously and therefore, the degree of protection for containerized hazardous waste storage areas should be greater than the capacity of the largest enclosed container. On the other hand, the likelihood that all of the enclosed containers will be leaking simultaneously is quite small, and to require a protection device capable of containing the total volume of waste stored would be overly stringent. Therefore, the interim value of 10 percent of the stored waste was selected as a reasonable degree of protection against the anticipated amount of hazardous waste emanating from stored containers.

The capacity of protective devices used to enclose containers must allow for accumulation of water due to precipitation when stored outside. Because of the regional differences in precipitation within the U.S., the allowances for precipitation ~~was~~ were

selected to be based on the amount of precipitation that can be expected from a 24-hour, 25-year storm.

Standard

250.44-2 (d) Storage containers holding hazardous waste which are incompatible (see appendix I) shall be separated from each other or protected from each other in order to prevent the wastes from mixing, should the containers break or leak.

Rationale

This regulation is concerned with the mixing of incompatible hazardous wastes in storage containers.

When potentially incompatible wastes come in contact with one another, reactions between the incompatible chemical constituents in the wastes may create hazardous situations such as heat and pressure generation, explosions, fires or release of toxic substances. These hazards have potential for adverse effects on public health, property and equipment, and the environment.

Case History No. 9 (cited earlier in this document) demonstrates the importance of inspection and cleaning of used containers before reuse for hazardous waste storage. Vinyl cyanide waste was transferred into an "empty" waste drum. The drum in fact had a residual mixture of a vinylation process. The resultant polymerization reaction produced sufficient heat and pressure to rupture the drum. Fortunately, the workers involved sustained only minor injuries, although fatalities

could have occurred. The intent of this standard is to minimize this type of potentially dangerous situation.

Standard

250.44-2 (e) Empty combustible storage containers (e.g., fibrous and paper containers), which previously contained hazardous waste, shall be:

(1) incinerated in a facility which complies with the requirements of Section 250.45-1, or

(2) disposed in a landfill which complies with the requirements of Section 250.45-2.

Rationale

The burning of empty combustible containers is allowed because incineration provides for safe disposal of these containers while, at the same time, does not take up space in the limited number of hazardous waste landfills. However, where incineration of these containers is impracticable, this regulation allows for the disposal of these containers in landfills which comply with the requirements of Section 250.45-2.

Standard

250.44-2 (f) Empty non-combustible storage containers (e.g., metal and glass containers) which previously contained hazardous waste, shall be:

(1) Cleaned by removing hazardous waste residuals at a permitted facility and

(i) transported to a drum reconditioner; or

(ii) transported to a metal or glass recovery facility as scrap for resource recovery; or

(2) Transported to a permitted drum reconditioner, with the appropriate manifest; or

(3) Reused with the same type of waste previously contained, or with another compatible waste provided such reuse is lawful under currently applicable U.S. DOT regulations, including those set forth in 49 CFR 173.28.

Rationale

The emphasis of this regulation is on resource recovery. The advantage of such an approach is two-fold:

(1) the amount of hazardous waste that must be disposed of is reduced

(2) a hazardous pollutant (the contaminated container) is transformed into an economic asset.

A recent EPA publication furnished the following data regarding the recycling of containers:

It is shown that single use drums require twice as much energy per fill as heavier drums which can be reconditioned. This is because the greatest energy requirements in the steel drum system are for the manufacture of steel. It takes approximately 10 times as much energy to manufacture a drum as it does to recondition a drum. A change from the existing mix of reusable and single use drums to an all 18 gage drum system with an average of eight reconditionings per drum (nine fills), would create energy savings of 17,043 billion BTU per year. This is 23 percent of the total energy requirements for the existing system and enough energy to provide electric power for one month to a city the size of San Francisco. It is envisioned that further energy savings could be realized if the number of reconditionings of reusable drums could be increased.[2]

2 Prussing, L.L., and J.E. Prussing. The Energy Requirements of Steel Drum Manufacturing and Reconditioning. In Corson, A.S., P.A. Savage, and C.A. Baggatts, eds. Proceedings: the 1975 Public Meeting on Hazardous Waste Management, Newark, NJ, Rosemont, IL, Houston, TX, and San Francisco, CA, Dec. 1975, V.I. Office of Solid Waste Management Programs Publication SW - 9p. Washington, D.C. U.S. Environmental Protection Agency, 1976

Standard

250.44-2 (g) Paper bags contaiminated with hazardous waste shall be stored in closed secondary containers.

Rationale

The concern of this regulation is with leakage of hazardous waste from paper bags to the environment. It is thought that the requirement to place paper bags in secondary containers will prevent this type of leakage from occurring.

Standard

250.44-2 (h) All containers received at hazardous waste facilities shall be in compliance with Section 250.25 (containers) of Subpart B.

Rationale

The purpose of this standard is to alert owners and operators of hazardous waste treatment, storage and disposal facilities that a separate set of container regulations exist which apply to generators of hazardous waste. Familiarization with the generator standards will enable the owner/operator to protect himself against accepting containers which do not meet 3002 requirements, and which could be an indication of faulty container construction.

BD-24

Resource Conservation and Recovery Act
Subtitle C - Hazardous Waste Management
Section 3004 - Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

FINAL

BACKGROUND DOCUMENT

Section 250.45 Standards for Treatment/Disposal

U.S. Environmental Protection Agency
Office of Solid Waste
December 15, 1978

This document provides background information and support for regulations which are designed to protect the air, surface water, and groundwater from potentially harmful discharges and emmissions from hazardous waste treatment, storage, and disposal facilities pursuant to Section 3004 of the Resource Conservation and Recovery Act of 1976. It is being issued as a draft to support the proposed regulations. As new information is obtained, changes may be made in the regulations as well as in this background material.

This document was first drafted many months ago and has been revised to reflect information received and Agency decisions made since then. EPA made changes in the proposed Section 3004 regulations shortly before their publication in the Federal Register. We have tried to ensure that all of those decisions are reflected in this document. If there are any inconsistencies between the proposal (the preamble and the regulation) and this background document, however, the proposal is controlling.

Comments in writing may be made to:

Timothy Fields, Jr.
U.S. Environmental Protection Agency
Office of Solid Waste
Hazardous Waste Management Division (WH-565)
401 M St., S.W.
Washington, D.C. 20460

Legislative Authority

Subtitle C of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (Public Law 94-580, hereinafter called the Act), creates a framework to control hazardous waste. Congress has found that such waste presents "special dangers to health and requires a greater degree of regulation than does nonhazardous solid waste" (Section 1002 (b) (5)). Because of the seriousness of this waste problem, Congress intended that the States develop programs to control it. In the event that States do not choose to operate this program, the U.S. Environmental Protection Agency (EPA) is mandated to do so.

According to the legislative history, House Rep. 94-1491 at 2 (1976), "An increase in reclamation and reuse practices is a major objective of the Resource Conservation and Recovery Act." This theme is emphasized in the two major objectives of the Act stated in Section 1003: protection of public health and the environment and conservation of valuable material and energy resources. Resource recovery is desirable for several reasons: it reduces the need for raw materials, while virgin materials are becoming scarce; it can save energy; and it reduces the volume of waste that must be disposed.

Treatment vs. Disposal

While safe techniques for land disposal (e.g., landfilling) can protect public health and the environment, land disposal waste management options generally do not provide opportunities for resource conservation or recovery. Furthermore, land disposal of hazardous waste entails substantial long term monitoring and security efforts, with associated costs, because the waste is contained but not destroyed.

In contract, waste treatment options, such as incineration and chemical/physical/biological treatment, can destroy hazardous waste (or render it non-hazardous) once and for all, while providing the potential for energy and/or material recovery at the same time. Treatment, therefore, responds to both objectives established by Congress. In many cases, treatment may be less costly than land disposal in the long run when credits for energy and material recovered, and long term monitoring and security costs associated with land disposal are taken into account. Also, the public is more likely to accept a treatment/recovery facility than a land disposal facility.

For these reasons, the Agency perfers treatment as a hazardous waste management option over land disposal. The Agency recognizes, however, that some hazardous waste is not amenable to treatment, and that land disposal is the only feasible option for such waste. Thus, both options are necessary. Further, the Agency does not presume to know in advance what the economic, health and environmental trade offs will be for a given hazardous waste in a given waste management situation. Consequently, in most cases, the Agency has not specified that only one management option is permitted.

Rather, in Section 250.45 (a), the Agency states its preferance for treatment options vs. land disposal options, where practical.

Radioactive Waste

Some owners/operators of hazardous waste management facilities may not be familiar with U.S. Nuclear Regulatory Commission rules regarding disposal of discrete radioactive waste, such as radioisotapes used in hospitals and laboratories. Consequently, Section 250.45 (b) mostly restates the requirements that facilities at which discrete radioactive waste is disposed need a license issued by the U.S. Nuclear Regulatory Commission or an Agreement State, in addition to a RCRA permit.

Ignitable, Reactive, Incompatible, and Volatile Waste.

An exception to the general Agency policy, mentioned above, against specifying waste management options is found in Section 250.45 (c) which prohibits treatment or disposal of ignitable, reactive, incompatible, and volatile waste in landfills, surface impoundments, basins, or landfarms. The Agency has taken this position because damage cases show that fires, explosions, and other releases of hazardous contaminations to the air are likely to occur when such waste is treated or disposed of in facilities where waste is not segregated by type, and where controls of air emissions are not generally used.

Ignitable and reactive wastes are defined in Subpart A, and more details can be found in background documents under that Subpart. Incompatible Waste is defined in Appendix I of these proposed Subpart D regulations by various groupings of waste which have potential to cause various types of reactions. This definition is taken from the California State Department of Health regulations. For a detailed discussion on volatile waste, see the Background Document entitled "Regulations to Control Air Emissions" under Subpart D.

A note associated with Section 250.45 (c) allows a deviation from the general prohibition on treatment and disposal of ignitable, reactive, incompatible, and volatile waste in landfills, surface impoundments, basins, or landfarms provided the facility owner/ operator can show during the permit issuance process that such treatment or disposal will not release air contaminants above the surface of such facilities at concentrations such that any one contaminant will exceed permissible contaminant levels established by the U.S. Occupational Safety and Health Administration (see 29 CFR 1910.1000) for various substances, nor that the sum of the air contaminants in a mixture, expressed as ratios of contaminant concentrations to permissible contaminant levels for each contaminant, will not exceed unity above the surface of such facilities. This possible deviation was provided because there may be some waste management situations (e.g., where only one type of waste is handled) which can achieve control of air emissions sufficient to protect human health and the environment. In addition, the owner/ operator must demonstrate that such wastes will not damage the structural integrity of the landfill, surface impoundment, or basin, or affect the attenuation capacity of a landfarm, through heat generation, fires or explosive reactions. It has been documented in EPA's damage files that such management in the past could have prevented many accidents resulting in environmental and human health harm.

For a detailed discussion of why OSHA permissible air contamina levels were used in this case, see the Background Document entitled "Regulations to Control Air Emmissions."

Air Monitoring: Owners and operators of hazardous waste incinerators are required to continuously monitor and record temperature in the combustion zone or after burner, and carbon monoxide concentrations in the emissions. Other facility point sources, particularly new types of resource recovery technologies, must be better understood before emission requirements and air monitoring requirements are prescribed.

Air sampling at non-point sources (e.g., surface impoundments, landfills) is not required in these regulations. Sampling at a non-point source may be a permit condition, if the owner/ operator wishes to deviate from a standard that is accompanied by a note prescribing the terms of such a deviation. If the note allows a demonstration of compliance with the air standard, air sampling may be used as part of this demonstration.

Air sampling procedures for non-point sources are under development. A manual will be provided by EPA following promulgation of these rules to describe the procedures by which air sampling at non-point sources could be accomplished.