



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF

5HR-11

0 6 MAY 1988

Mr. J.P. McBurney
Allied-Signal
P.O. Box 2332 R
Morristown, New Jersey 07960

Re: GDA FS ARARs and TBCs
Allied Chemical/Ironton Coke Superfund Site

Dear Mr. McBurney:

Please find enclosed the Federal and State applicable or relevant and appropriate requirements (ARARs) and other factors to be considered (TBCs) pertinent to the Goldcamp Disposal Area Feasibility Study (GDA FS). Please note that although we have tried to be as complete as possible, the Agencies may need to add to or subtract from this list of ARARs and TBCs. This is necessary because the alternatives and technologies are not yet fully developed. An example of this is ORC 3734.05(C)(6) (g). We may add this as an ARAR depending on the design and location of any proposed incinerator. Other measures, not determined to be ARARs, will be part of the overall site remedy if the Agencies determine that they are necessary to mitigate the public health and environmental problems posed by the site. In addition, the Agencies will include other types of requirements as part of the final cleanup program, such as monitoring, reporting, access, etc.

The ARAR portion of this document is somewhat repetitious because we tried to identify the complete list of ARARs for each alternative. Obviously, many of the alternatives have several ARARs in common. The document is organized by alternative, and each alternative is divided into Source, Receptor, and Migration components. The Federal ARARs are presented first under the headings of "Air," "RCRA," and "Water." The State ARARs are presented next for all media and statutes of concern under the heading of "State." We have not cited to Ohio's hazardous waste regulations because they are not generally more stringent than the federal hazardous waste regulations cited in the document. The Ohio hazardous waste rules equivalent to the federal rules cited in this document will be ARARs, in lieu of the federal rules, should Ohio receive hazardous waste program authorization prior to the ROD being signed. For your convenience, we have cited the pertinent statutes and regulations and included a short summary of the major provisions. The summaries, however, do not define the full scope of responsibilities, those must be obtained from the statutes

and regulations and the Agencies. Attached to this document you will find several tables and copies of statutes and regulations which support the ARARs. Throughout the ARAR discussion we have also noted where TBCs may apply. All TBCs are discussed in Attachment D.

Several outstanding issues remain which the Agencies and Allied must address:

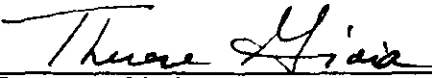
- 1) OAC 3734-1-05(B) may be an ARAR if the Ohio river water quality exceeds the existing ORSANCO criteria. Menzel Associates is already researching this issue through its work on the Endangerment Assessment. Please advise the Agencies of how recent ORSANCO sampling data for the Ohio river compares to the ORSANCO criteria.
- 2) State air regulations for sulfur dioxide (SO₂) may be ARARs for the incineration remedy. Allied must determine whether sulfur dioxide is expected to be a combustion product of the waste and, if so, estimate the quantity of SO₂ that will be emitted from the incinerator, sans air pollution controls.
- 3) The Agencies are still researching whether there are any Federal or State ARARs for the Naturally Occurring Radioactive Materials (NARMS) or accelerated produced radioactive materials that may build-up on the activated carbon. We expect to complete this research in the next couple of weeks and will inform you in writing of our determination.
- 4) Landfill gas control/monitoring will need to be included as part of any cap/slurry wall remedy. In addition, recently enacted Section 3734.041 to the ORC requires the Director of OEPA to promulgate regulations addressing controls of explosive gases from landfills. If these rules are promulgated and effective before the ROD is signed, these rules may be ARARs.

As you are aware, remedial actions conducted on-site do not require permits. However, the technical requirements (as opposed to the administrative requirements) of any applicable or relevant and appropriate permits must, at a minimum, be satisfied before the remedial action can be approved. Many of the ARARs identified have requirements for obtaining permits. Although the Agencies will not require Allied to obtain permits for on-site remedial actions, we will require Allied to meet the technical requirements of the permit. We may use the pertinent portions of the permit application as the vehicle for documenting that the technical requirements have been met.


We note that a great deal of technical design information for the alternatives and technologies remains to be developed. This information is necessary to identify all ARARs and TBCs, estimate the cost of the alternatives, develop performance standards which the alternatives must meet, and perform the detailed evaluation. We look forward to obtaining these design details during the meeting scheduled for May 18 and 19, 1988.

If you have any questions regarding these ARARs and TBCs, please don't hesitate to call us.

Sincerely,



Therese Gioia
U.S. Environmental Protection Agency
Remedial Project Manager



for Michael Moschell
Ohio Environmental Protection Agency
Project Coordinator

Enclosure

cc: Roger Hannahs, OEPA

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Therese Gioia
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Michael Moschell
Ohio Environmental Protection Agency
Project Coordinator

Enclosure

cc: Roger Hannahs, OEPA

TEH
5/6/88

DAB.
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ARAR AND TBC DOCUMENT

Goldcamp Disposal Area Feasibility Study
Allied Chemical/Ironton Coke Superfund Site

LIST OF ALTERNATIVES

- o Alternative 1 - No action
- o Alternative 2 - Cap/Surface Water Management/Use
Restrictions/Security
Measures/Municipal Water
Supply/Monitor
- o Alternative 3 - Slurry Wall/Cap/Inward Gradient/Use
Restrictions/Security
Measures/Municipal Water
Supply/Monitor
- o Alternative 10 - Cap/Surface Water Management/Use
Restrictions/Security
Measures/Collect/Carbon Adsorb/Ion
Exchange/Collect/Air Stripping/
Activated Carbon
- o Alternative 12 - Excavate/Incinerate On-
Site/Collect/Carbon Adsorb/Ion
Exchange/Collect/Air Stripping/
Activated Carbon
- o Alternative 14 - Slurry Wall/Cap/Inward
Gradient/Surface Water Management/Use
Restrictions/Security
Measures/Collect/Carbon Adsorb/Ion
Exchange/Collect/Air Stripping/
Activated Carbon
- o Alternative 16 - Excavate/Dispose of in On-site Landfill/
Collect Carbon Adsorb/Ion Exchange/Collect
Air Stripping/Activated Carbon
- o Alternative 17 - Excavate/Dispose of in Off-site Landfill/
Collect Carbon Adsorb/Ion Exchange/Collect
Air Stripping/Activated Carbon

GENERAL STATUTORY AUTHORITIES

Air

All of the remedial action alternatives which have been selected for detailed evaluation under Phase 2 of the project could result in the release of particulate matter, toxic, and/or radioactive gases via the air pathway if implemented. Air ARARs stem from the Clean Air Act, and include substances regulated through the federally approved State Implementation Plan (SIP) and substances regulated under the Federal NESHAPS program (Attachment A) and the New Source Performance Standards. The Air TBCs are discussed in Attachment D.

RCRA

The portions of the Resource Conservation and Recovery Act, as amended, which apply to this project are outlined in the alternative-specific portion of this document. In general the RCRA regulations found in 40 CFR 264 Subparts C, F, G, N, and O apply, as well as 40 CFR 270 (incineration) and to a lesser extent, 40 CFR 262 and 263. Please refer to Attachment B for copies of some of the pertinent regulations. For complete copies, you should refer to the applicable Code of Federal Regulations.

Water

The Clean Water Act and the Safe Drinking Water Act are the general federal statutes to refer to for federal water ARARs. MCLs, MCLGs, and AWQCs, may be ARARs under CERCLA. Please refer to the Attachment C for a list of compounds and their applicable standards. Water TBCs are discussed in Attachment D.

State

The generally pertinent State of Ohio statute is the Ohio Revised Code (ORC). ORC Chapter 3704 establishes Ohio EPA's authority to regulate and control air pollution within the State of Ohio. ORC Chapter 3734 provides statutory authority for the regulation of solid and hazardous waste activities in the State of Ohio. ORC Chapter 6109 establishes Ohio EPA's authority to regulate public water supplies. ORC Chapter 6111 establishes Ohio EPA's authority to set water quality standards and regulate water pollution sources. The pertinent State of Ohio regulations and rules developed on the basis of the ORC can be found in Chapter 3745 of the Ohio Administrative Code.

ALTERNATIVES

ARARs

Alternative 2-Source

Air

◦ Cap

- 1) Fugitive dust control from grading-to State Rule 3745-17-08 for requirements

RCRA

- 1) Landfill closure requirements (40 CFR §264.310)
 - minimize migration of liquid into landfill
 - design for minimum maintenance
 - promote drainage-diversion or collection/treatment
 - minimize erosion
 - accommodate settling
 - cover permeability must be designed to be less than or equal to permeability of natural subsoils
- 2) Post-closure care (40 CFR §264.310(b))
 - maintain integrity and effectiveness of cap-repair effects of subsidence, settling, erosion, etc.
 - Use restrictions to protect human health or environment
 - ground water monitoring system in compliance with 40 CFR 264 Subpart F
 - prevent run-on/run-off
 - protect locational benchmarks
- 3) Use Restrictions (40 CFR §264.116 and 264.117 (c))
 - submit survey plat indicating location and dimensions of disposal area and contents of cell.
 - plat must contain owners obligation to restrict disturbance of unit
 - plat prepared by a professional land surveyor and filed with local zoning authority
 - record use of property in facility

ALTERNATIVES

ARARs

Alternative 2-Source

RCRA cont.

° Cap cont.

- ° deed to the property
 - ° limits on post closure use of property
- 4) Monitor - Ground Water - Substantive requirements of CFR §264.92 - 264.99
- ° background well(s) at appropriate location/depths
 - ° downgradient wells at point of compliance (boundary of waste unit)
 - ° establish ground water protection standard for constituents of concern; limits are MCL's or health based numbers established by EA.

Water

Not Applicable to Source Control-Cap except for surface water management-See State ARARs

State

1) Water Pollution Control as it applies to Surface Water Management of Run-on/Run-off-Ohio Administrative Code

- 3745-1-05(A) Antidegradation policy. Existing instream water uses shall be maintained and protected. No degradation of the present water quality designation is allowable.
- 3745-1-05(B) Antidegradation policy. The most stringent statutory and regulatory controls for waste treatment will be required for all new and existing point sources.
- 3745-1-32 Ohio River criteria.

ALTERNATIVES

ARARs

Alternative 2-Source

State cont.

° Cap cont.

Permits to Install

3745-31-05(A)(3) Any installation of a new source of pollution must meet Best Available Technology requirements.

NPDES Permits

3745-33-04 Criteria for issuing NPDES Permits.

3745-33-05(A) General Permit conditions. (6), (8), and (9)

2) Air Pollution-Ohio Administrative Code

3745-15-07 Air pollution nuisance prohibition. Prohibits the release in to the open air from any source of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors or any other substances in such a manner or amount as to endanger the health, safety, or welfare of the public or cause unreasonable injury or damage to property.

3745-17-08 Restriction of emission of fugitive dust.

Alternative 2-Receptor

Water

° Municipal Water

See State ARARs below.

State

Public Water Supply

OAC 3745-81 through 3745-99 are ARARs, in particular 3745-91.

ALTERNATIVES

ARARs

Alternative 2-Receptor

State cont.

° Municipal Water

Any changes to public drinking water systems (line extensions, new wells, changes in treatment) must be approved by Ohio EPA prior to construction. A backflow prevention device must be placed on the municipal service line, in compliance with Ohio Administrative Code 3745-95. Public water systems must also comply with OAC 3734-7 regarding operator certification.

Alternative 2-Migration

This technology does not meet State or Federal ARARs-See other Migration Alternatives for a list of ARARs.

° Monitor

Alternative 3-Source
Receptor
Migration

See Alternative 2 for all Alternative 3 ARARs

- ° Cap/Slurrywall
 - ° Municipal Water
 - ° Monitor
-

Alternative 10-Source
Receptor

See Alternative 2 for all Source and Receptor ARARs

- ° Cap
 - ° Municipal Water
-

Alternative 10-Migration

Air

° Collection/treatment

- Air Stripping 1)
- Activated Carbon

Air stripper emissions may not exceed emission standards for this source established in the approved State SIP and any applicable New

ALTERNATIVES

ARARs

Alternative 10-Migration

Air cont.

o Collection/treatment

- Air Stripping
- Activated Carbon

Source Performance Standards (NSPS) or NESHAPs. In addition, volatile organic compounds which may be emitted should be evaluated in the risk assessment (see Air TBCs).

- 2) Special handling of spent activated carbon is required if radon products which may be present in the water lead to a concentration in the carbon that meets "radioactive" definition of DOT. Breakthrough or release of radon gas shall not create an occupational or public health threat and shall not exceed State radioactive emission standards. Radiation monitoring may be required in the design (and possibly throughout implementation) phase of the remedy.

RCRA

- 1) Ground water concentrations at the end of cleanup program must be less than or equal to SDWA or RCRA MCL's at the point-of-compliance (waste unit boundary). Alternate Concentration Limits may only be used under the limited conditions outlined in CERCLA Section 121(d)(2)(B)(ii). Ambient Water Quality Criteria may also be ARARs under certain circumstances. A standard for drinking water more stringent than MCL's may be needed in special circumstances. In such cases the Agency will consider the MCLG and other pertinent guidelines. TBCs include Health Advisories and the 10^{-6} risk based levels established by the Endangerment Assessment for compounds without MCLs (see Attachment D).
- 2) If collection/treatment activities require storage or treatment in tanks, or containers or miscellaneous RCRA units as defined in

ALTERNATIVES

ARARs

Alternative 10-Migration

RCRA cont.

° Collection/treatment

- Air Stripping
- Activated Carbon

260.10, then the Facility must comply with the substantive elements of 40 CFR 264. Also, if wastes (i.e. spent carbon) are transported off-site, the facility must comply with the generator substantive criteria of 40 CFR 262 and with the disposal requirements of CERCLA Section 121(d)(3), and ensure transporter meets substantive requirements of 40 CFR 263.

- 3) Disposal of any hazardous residuals must also take into consideration the CERCLA Off-site Policy (see Attachment D).

Water

- 1) Discharge water from treatment unit must meet or exceed Clean Water Act NPDES permit discharge limits established for the particular discharge, depending on how and where discharge occurs. See State ARARs. TBCs include 10^{-6} risk levels established by EA for compounds without MCLs (see Attachment D).
- 2) If existing water quality in the Ohio River does not meet ORSANCO standards for the chemicals of concern, no additional discharge of those chemicals to the Ohio River shall be allowed. See State antidegradation standards.
- 3) Standards, including the State's use designations and chemical limits, for prevention of chronically toxic conditions must be met at the point ground water infiltrates into surface water.
- 4) MCL's and AWQC, under the Safe Drinking Water Act and Clean Water Act, must be met for groundwater at the completion of cleanup. A standard for drinking water more stringent

ALTERNATIVES

ARARs

Alternative 10-Migration

Water cont.

° Collection/treatment

than MCL's may be needed in special circumstances. In such cases, the Agency will consider the MCLG and other pertinent guidelines.

State

1) Hazardous Waste-Transport OAC 3745-53-11
PUCO Registration

2) Water Pollution Control-OAC

3745-1-05(A) Antidegradation policy. Existing instream water uses shall be maintained and protected. No degradation of the present water quality designation is allowable.

3745-1-05(B) Antidegradation policy. The most stringent statutory and regulatory controls for waste treatment will be required for all new and existing point sources.

3745-1-32 Ohio River criteria.

Permits to Install

3745-31-05 Any installation of a new (A)(3) source of pollution must meet Best Available Technology requirements.

NPDES Permits

3745-33-04 Criterial for issuing NPDES Permits.

3745-33-05 General Permit conditions.
(A)(6), (8),
and (9)

ALTERNATIVES

ARARs

Alternative 10-Migration

State cont.

° Collection/Treatment

3) Air Pollution-OAC

- 3745-15-07 Air pollution nuisance prohibition. Prohibits the release in to the open air from any source of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors or any other substances in such a manner or amount as to endanger the health, safety, or welfare of the public or cause unreasonable injury or damage to property.
- 3745-21-05 Non-degradation policy - ambient air quality standards.
- 3745-21-07 Control of emissions of organic materials from stationary sources.
- 3745-21-07(B) All new stationary sources of emissions of photochemically reactive materials shall minimize such emissions by use of the latest available control techniques and operating practices in accordance with best current technology.
- 3745-21-07(C) Alternate means of abatement of emissions can be used if approved by the Director.

Permits to Install

- 3745-31-05 Any installation of a new source of pollution must meet Best Available Technology requirements.

ALTERNATIVES

ARARs

Alternative 12-Source

Air

- Incineration
 - 1) Fugitive dust control
 - 2) State Implementation Plan requirements and applicable NSPS and NESHAPs limitations.
 - 3) TBCs include modeling to determine risk/limits of any emissions, volatiles, dioxins, etc.; particulates control - National Ambient Air Quality Standard for particles <10 micrometers (PM₁₀)-24-hr PM₁₀ standard is 150 micrograms/cubic meter of air with no more than one exceedance/year, annual PM₁₀ standard is 50 ug/m³ based on annual arithmetic mean; and temperature in secondary chamber maintained at minimum 1800°F/minimum residence time of 1 second.

RCRA

- 1) Performance standards, including requirements for waste analysis, monitoring, inspections, and closure. See 40 CFR §264.340-264.351.
- 2) Achieve destruction and removal efficiency (DRE) of 99.99% for each principal organic hazardous constituent (POHC).
- 3) Trial burn and trial burn plan per 40 CFR Sections 270.62 and 270.19
- 4) If incineration activities require storage or treatment in tanks, or containers or miscellaneous RCRA units as defined in 260.10, then the facility must comply with the substantive elements of 40 CFR 264. Also, if hazardous wastes (i.e. ash) are transported off-site, the facility must comply with the generator substantive criteria of 40 CFR 262 and with the disposal requirements of CERCLA Section 121(d)(3), and ensure transporter meets substantive requirements of CFR 263.
- 5) Off-site disposal of any hazardous residuals must also take into consideration the CERCLA Off-site Policy (see Attachment D).

ALTERNATIVES

ARARs

Alternative 12-Source

° Incineration

Water

- 1) Any liquid hazardous waste streams resulting from incinerator will have to be dealt with in accordance with Federal and State Water ARARs outlined in other Alternatives.

State

- 1) Hazardous Waste-Transport
OAC 3745-53-11 PUCO Registration

- 2) Air Pollution-OAC

- | | |
|------------|--|
| 3745-15-07 | Air pollution nuisance prohibition. Prohibits the release in to the open air from any source of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors or any other substances in such a manner or amount as to endanger the health, safety, or welfare of the public or cause unreasonable injury or damage to property. |
| 3745-17-05 | Non-degradation policy - particulate matter standards. |
| 3745-17-07 | Control of visible particulate emissions from stationary sources. |
| 3745-17-08 | Restriction of emission of fugitive dust. |
| 3745-17-09 | Restrictions on particulate emissions and odors from incinerators. |
| 3745-21-05 | Non-degradation policy - ambient air quality standards. |

<u>ALTERNATIVES</u>	<u>ARARs</u>
Alternative 12-Source	<u>State cont.</u>
° Incineration	3745-21-07 Control of emissions of organic materials from stationary sources.
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	<u>Permits to Install</u>
	3745-31-05 (A)(3) Any installation of a new source of pollution must meet Best Available Technology requirements.
Alternative 12-Receptor Migration	See Alternative 2 for all Receptor ARARS and Alternative 10 for all Source ARARS
° Municipal Water Collection/Treatment	
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Alternative 14-Source	See Alternative 2 for all Alternative 14-Source ARARS
° Cap/Slurrywall	
Alternative 14-Receptor	See Alternative 2 for all Alternative 14-Receptor ARARS
° Municipal Water	
Alternative 14-Migration	See Alternative 10 for all Alternative 14-Migration ARARS
° Collection/Treatment	
<hr/>	
Alternative 16-Source	<u>Air</u>
° On-site Landfill	1) Fugitive Dust Control

ALTERNATIVES

ARARs

Alternative 16-Source

RCRA

- On-site Landfill
- 1) On-site landfill must meet requirements of 40 CFR 264 Subpart N, especially Section 264.301 which addresses design and operation standards, including liner/leak detection and leachate collection requirements.
 - 2) Use Restrictions (40 CFR §264.116)
 - submit survey plat indicating location and dimensions of disposal area and contents of cell.
 - plat must contain owners obligation to restrict disturbance of unit
 - plat prepared by a professional land survey or and filed with local zoning authority
 - record use of property in facility deed to the property
 - 3) If activities require storage or treatment in tanks, or containers or miscellaneous RCRA units as defined in 260.10, then the facility must comply with the substantive elements of 40 CFR 264. Also, if wastes are transported off-site, the facility must comply with the generator substantive criteria of 40 CFR 262 and with the disposal requirements of CERCLA Section 121(d)(3), and ensure transporter meets substantive requirements of 40 CFR 263.
 - 4) Off-site disposal of any hazardous wastes must also take into consideration the CERCLA Off-site Policy (see Attachment D).

Water

Surface water (including collection, treatment, and discharge) ARARs are covered under Alternative 2-Source ARARs for State and Federal.

State

- 1) Siting criteria per ORC 3734.05(C)(6)(g):

ALTERNATIVES

ARARs

Alternative 16-Source

State cont.

° On-site Landfill

- (f) That the active areas within a new hazardous waste facility where acute hazardous waste as listed in 40 CFR 261.33(e), as amended, or organic waste that is toxic and is listed under 40 CFR 261, as amended, is being stored, treated, or disposed of and where the aggregate of the storage design capacity and the disposal design capacity of all hazardous waste in those areas is greater than two hundred and fifty thousand gallons, are not located or operated within:
 - (i) Two thousand feet of any residence, school, hospital, jail, or prison;
 - (ii) Any naturally occurring wetland; or
 - (iii) Any flood hazard area if the applicant cannot show that the facility will be designed, constructed, operated, and maintained to prevent washout by a one hundred-year flood or that procedures will be in effect to remove the waste before flood waters can reach it.

2) Hazardous Waste-Transport
OAC 3745-53-11 PUCO Registration

3) Solid Waste

Solid waste regulations require plan approval for "...any person proposing to establish a new solid waste disposal facility, or proposing to substantially modify an existing solid waste disposal facility". (OAC 3745-27-06) An important part of the review process concerns siting of solid waste facilities. OAC Section 3745-27-06(I) states:

ALTERNATIVES

ARARs

Alternative 16-Source

State cont.

° On-site Landfill

(I) Except by means of a waiver granted under 3745-27-11, the Director shall not approve plans for a sanitary landfill under any of the following conditions:

- (1) The sanitary landfill will be located in a regulatory floodplain outside of a floodway; or
- (2) The sanitary landfill will be located in a sand or gravel pit; or
- (3) The sanitary landfill will be located in a limestone quarry or a sandstone quarry; or
- (4) Those portions of the sanitary landfill where waste materials are to be deposited will be located within 1000' of a water well in existence on the date the plans were received by Ohio EPA; or
- (5) Those portions of the sanitary landfill where waste materials are to be deposited will be located within 200' of a stream or lake; or
- (6) The seasonal high ground water table and lowest level of waste materials in the sanitary landfill will be separated by less than 5 feet of soil of low permeability; or
- (7) The seasonal high ground water table will be less than 5 feet below the existing surface of the site.

4) Permits to Install

3745-31-05
(A)(3)

Any installation of a new source of pollution must meet Best Available Technology requirements.

ALTERNATIVES

ARARs

Alternative 16-Source

State cont.

° On-site Landfill

5) Air Pollution-OAC

3745-15-07 Air pollution nuisance prohibition. Prohibits the release in to the open air from any source of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors or any other substances in such a manner or amount as to endanger the health, safety, or welfare of the public or cause unreasonable injury or damage to property.

3745-17-08 Restriction of emission of fugitive dust.

3745-21-05 Non-degradation policy - ambient air quality standards.

Alternative 16-Receptor

See Alternative 2 for all Alternative 16-Receptor ARARs.

° Municipal Water

Alternative 16-Migration

See Alternative 10 for all Alternative 16-Migration ARARs.

° Collection/Treatment

Alternative 17-Source

Air

° Off-site Landfill 1) Fugitive Dust Control

RCRA

1) Generation in compliance with 40 CFR Parts 262.

ALTERNATIVES

ARARs

Alternative 17-Source

RCRA cont.

- Off-site Landfill
- 2) Decontamination of equipment in accordance with 40 CFR 264.114.
 - 3) If activities require storage or treatment in tanks, or contains or miscellaneous RCRA units as defined in 260.10, then the facility may have to comply with the substantive elements of 40 CFR 264. Also, for wastes transported off-site, the facility must comply with the generator substantive criteria of 40 CFR 262 and with the disposal requirements of CERCLA Section 121(d) (3), and ensure transporter meets substantive criteria of 40 CFR 263.
 - 4) Disposal of any hazardous wastes must also take into consideration the CERCLA Off-site Policy (see Attachment D).

Water

Any decontamination liquids or other liquid wastes produced from the excavation of wastes for Off-site disposal activities must comply with State ARARs outlined in Alternative 2-Source and as applicable, Alternative 10-Migration, depending on how these liquids are handled and disposed.

State

- 1) Hazardous Waste-Transport
OAC 3745-53-11 PUCO Registration
- 2) Air Pollution-OAC
3745-15-07 Air pollution nuisance prohibition. Prohibits the release in to the open air from any source of smoke, ashes,

ALTERNATIVES

ARARs

Alternative 17-Source

State cont.

- ° Off-site Landfill

dust, dirt, grime, acids, fumes, gases, vapors, odors or any other substances in such a manner or amount as to endanger the health, safety, or welfare of the public or cause unreasonable injury or damage to property.

3745-17-08

Fugitive Dust

Alternative 17-Receptor

See Alternative 2 for all Alternative 17-Receptor ARARs

- ° Municipal Water

Alternative 17-Migration

See Alternative 10 for all Alternative 17-Migration ARARs

- ° Collection/Treatment

ATTACHMENT A

Promulgated NESHAPS

Radon
Beryllium
Mercury
Vinyl Chloride
Radionuclides
Benzene

ATTACHMENT B

(1) The parameters for which each hazardous waste will be analyzed and the rationale for the selection of these parameters (i.e., how analysis for these parameters will provide sufficient information on the waste's properties to comply with paragraph (a) of this section);

(2) The test methods which will be used to test for these parameters;

(3) The sampling method which will be used to obtain a representative sample of the waste to be analyzed. A representative sample may be obtained using either:

(i) One of the sampling methods described in Appendix I of Part 261 of this chapter; or

(ii) An equivalent sampling method.

[Comment: See § 260.21 of this chapter for related discussion.]

(4) The frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up to date; and

(5) For off-site facilities, the waste analyses that hazardous waste generators have agreed to supply.

(6) Where applicable, the methods which will be used to meet the additional waste analysis requirements for specific waste management methods as specified in §§ 264.17, 264.314, and 264.341.

(c) For off-site facilities, the waste analysis plan required in paragraph (b) of this section must also specify the procedures which will be used to inspect and, if necessary, analyze each movement of hazardous waste received at the facility to ensure that it matches the identity of the waste designated on the accompanying manifest or shipping paper. At a minimum, the plan must describe:

(1) The procedures which will be used to determine the identity of each movement of waste managed at the facility; and

(2) The sampling method which will be used to obtain a representative sample of the waste to be identified, if the identification method includes sampling.

[Comment: Part 270 of this chapter requires that the waste analysis plan be submitted with Part B of the permit application.]

(Approved by the Office of Management and Budget under control number 2050-0012)

[45 FR 33221, May 19, 1980, as amended at 46 FR 2848, Jan. 12, 1981; 46 FR 14294, Apr. 1, 1983; 50 FR 4514, Jan. 31, 1985; 50 FR 18374, Apr. 30, 1985]

§ 264.14 Security.

(a) The owner or operator must prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons or livestock onto the active portion of his facility, unless he can demonstrate to the Regional Administrator that:

(1) Physical contact with the waste, structures, or equipment within the active portion of the facility will not injure unknowing or unauthorized persons or livestock which may enter the active portion of a facility; and

(2) Disturbance of the waste or equipment, by the unknowing or unauthorized entry of persons or livestock onto the active portion of a facility, will not cause a violation of the requirements of this part.

[Comment: Part 270 of this chapter requires that an owner or operator who wishes to make the demonstration referred to above must do so with Part B of the permit application.]

(b) Unless the owner or operator has made a successful demonstration under paragraphs (a)(1) and (2) of this section, a facility must have:

(1) A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the active portion of the facility; or

(2)(i) An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff), which completely surrounds the active portion of the facility; and

(ii) A means to control entry, at all times, through the gates or other entrances to the active portion of the facility (e.g., an attendant, television monitors, locked entrance, or controlled roadway access to the facility).

[Comment: The requirements of paragraph (b) of this section are satisfied if the facility or plant within which the active portion is located itself has a surveillance system, or a

barrier and a means to control entry, which complies with the requirements of paragraph (b)(1) or (2) of this section.)

(c) Unless the owner or operator has made a successful demonstration under paragraphs (a)(1) and (2) of this section, a sign with the legend, "Danger—Unauthorized Personnel Keep Out", must be posted at each entrance to the active portion of a facility, and at other locations, in sufficient numbers to be seen from any approach to this active portion. The legend must be written in English and in any other language predominant in the area surrounding the facility (e.g., facilities in counties bordering the Canadian province of Quebec must post signs in French; facilities in counties bordering Mexico must post signs in Spanish), and must be legible from a distance of at least 25 feet. Existing signs with a legend other than "Danger—Unauthorized Personnel Keep Out" may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the active portion, and that entry onto the active portion can be dangerous.

(Comment: See § 264.117(b) for discussion of security requirements at disposal facilities during the post-closure care period.)

(Approved by the Office of Management and Budget under control number 3050-0012)

(16 FR 33221, May 19, 1980, as amended at 48 FR 2846, Jan. 12, 1983; 48 FR 14294, Apr. 1, 1983; 60 FR 4614, Jan. 31, 1995)

§ 264.16 General inspection requirements.

(a) The owner or operator must inspect his facility for malfunctions and deterioration, operator errors, and discharges which may be causing—or may lead to—(1) release of hazardous waste constituents to the environment or (2) a threat to human health. The owner or operator must conduct these inspections often enough to identify problems in time to correct them before they harm human health or the environment.

(b)(1) The owner or operator must develop and follow a written schedule for inspecting monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump pumps) that are important

to preventing, detecting, or responding to environmental or human health hazards.

(2) He must keep this schedule at the facility.

(3) The schedule must identify the types of problems (e.g., malfunctions or deterioration) which are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, eroding dike, etc.).

(4) The frequency of inspection may vary for the items on the schedule. However, it should be based on the rate of possible deterioration of the equipment and the probability of an environmental or human health incident if the deterioration or malfunction of any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use. At a minimum, the inspection schedule must include the terms and frequencies called for in §§ 264.174, 264.194, 264.226, 264.253, 264.254, 264.303, and 264.347, where applicable.

(Comment: Part 270 of this chapter requires the inspection schedule to be submitted with Part B of the permit application. EPA will evaluate the schedule along with the rest of the application to ensure that it adequately protects human health and the environment. As part of this review, EPA may modify or amend the schedule as may be necessary.)

(c) The owner or operator must remedy any deterioration or malfunction of equipment or structures which the inspection reveals on a schedule which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, remedial action must be taken immediately.

(d) The owner or operator must record inspections in an inspection log or summary. He must keep these records for at least three years from the date of inspection. At a minimum, these records must include the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

§ 264.76

ous waste generator from which the facility received a hazardous waste during the year; for imported shipments, the report must give the name and address of the foreign generator;

(d) A description and the quantity of each hazardous waste the facility received during the year. For off-site facilities, this information must be listed by EPA identification number of each generator;

(e) The method of treatment, storage, or disposal for each hazardous waste;

(f) [Reserved]

(g) The most recent closure cost estimate under § 264.142, and, for disposal facilities, the most recent post-closure cost estimate under § 264.144; and

(h) The certification signed by the owner or operator of the facility or his authorized representative.

(Approved by the Office of Management and Budget under control number 2050-0024)

[45 FR 33221, May 19, 1980, as amended at 48 FR 2849, Jan. 12, 1983; 48 FR 3982, Jan. 28, 1983; 50 FR 4514, Jan. 31, 1985]

§ 264.76 Unmanifested waste report.

If a facility accepts for treatment, storage, or disposal any hazardous waste from an off-site source without an accompanying manifest, or without an accompanying shipping paper as described in § 263.20(e)(2) of this chapter, and if the waste is not excluded from the manifest requirement by § 261.5 of this chapter, then the owner or operator must prepare and submit a single copy of a report to the Regional Administrator within fifteen days after receiving the waste. The unmanifested waste report must be submitted on EPA form 3700-13B. Such report must be designated "Unmanifested Waste Report" and include the following information:

(a) The EPA identification number, name, and address of the facility;

(b) The date the facility received the waste;

(c) The EPA identification number, name, and address of the generator and the transporter, if available;

(d) A description and the quantity of each unmanifested hazardous waste and facility received;

(e) The method of treatment, storage, or disposal for each hazardous waste;

(f) The certification signed by the owner or operator of the facility or his authorized representative; and

(g) A brief explanation of why the waste was unmanifested, if known.

[Comment: Small quantities of hazardous waste are excluded from regulation under this part and do not require a manifest. Where a facility receives unmanifested hazardous wastes, the Agency suggests that the owner or operator obtain from each generator a certification that the waste qualifies for exclusion. Otherwise, the Agency suggests that the owner or operator file an unmanifested waste report for the hazardous waste movement.]

(Approved by the Office of Management and Budget under control number 2050-0012)

[45 FR 33221, May 19, 1980, as amended at 48 FR 3982, Jan. 28, 1983; 50 FR 4514, Jan. 31, 1985]

§ 264.77 Additional reports.

In addition to submitting the biennial reports and unmanifested waste reports described in §§ 264.75 and 264.76, the owner or operator must also report to the Regional Administrator:

(a) Releases, fires, and explosions as specified in § 264.56(j);

(b) Facility closures specified in § 264.115; and

(c) As otherwise required by Subparts F and K through N.

[48 FR 2849, Jan. 12, 1983, as amended at 47 FR 32350, July 26, 1982; 48 FR 3982, Jan. 28, 1983]

Subpart F—Releases From Solid Waste Management Units

Source: 47 FR 32350, July 26, 1982, unless otherwise noted.

§ 264.90 Applicability.

(a)(1) Except as provided in paragraph (b) of this section, the regulations in this subpart apply to owners or operators of facilities that treat, store or dispose of hazardous waste. The owner or operator must satisfy the requirements identified in paragraph (a)(2) of this section for all wastes (or constituents thereof) contained in solid waste management

units at the facility, regardless of the time at which waste was placed in such units.

(2) All solid waste management units must comply with the requirements in § 264.101. A surface impoundment, waste pile, and land treatment unit or landfill that receives hazardous waste after July 26, 1982 (hereinafter referred to as a "regulated unit") must comply with the requirements of §§ 264.91 through 264.100 in lieu of § 264.101 for purposes of detecting, characterizing and responding to releases to the uppermost aquifer. The financial responsibility requirements of § 264.101 apply to regulated units.

(b) The owner or operator's regulated unit or units are not subject to regulation for releases into the uppermost aquifer under this subpart if:

(1) The owner or operator is exempted under § 264.1; or

(2) He operates a unit which the Regional Administrator finds:

(i) Is an engineered structure,

(ii) Does not receive or contain liquid waste or waste containing free liquids,

(iii) Is designed and operated to exclude liquid, precipitation, and other run-on and run-off,

(iv) Has both inner and outer layers of containment enclosing the waste,

(v) Has a leak detection system built into each containment layer,

(vi) The owner or operator will provide continuing operation and maintenance of these leak detection systems during the active life of the unit and the closure and post-closure care periods, and

(vii) To a reasonable degree of certainty, will not allow hazardous constituents to migrate beyond the outer containment layer prior to the end of the the post-closure care period.

(3) The Regional Administrator finds, pursuant to § 264.90(a), that the treatment zone of a land treatment unit that qualifies as a regulated unit does not contain levels of hazardous constituents that are above background levels of those constituents by an amount that is statistically significant, and if an unsaturated zone monitoring program meeting the requirements of § 264.278 has not shown a statistically significant increase in hazardous constituents below the treat-

ment zone during the operating life of the unit. An exemption under this paragraph can only relieve an owner or operator of responsibility to meet the requirements of this subpart during the post-closure care period; or

(4) The Regional Administrator finds that there is no potential for migration of liquid from a regulated unit to the uppermost aquifer during the active life of the regulated unit (including the closure period) and the post-closure care period specified under § 264.117. This demonstration must be certified by a qualified geologist or geotechnical engineer. In order to provide an adequate margin of safety in the prediction of potential migration of liquid, the owner or operator must base any predictions made under this paragraph on assumptions that maximize the rate of liquid migration.

(5) He designs and operates a pile in compliance with § 264.250(c).

(c) The regulations under this subpart apply during the active life of the regulated unit (including the closure period). After closure of the regulated unit, the regulations in this subpart:

(1) Do not apply if all waste, waste residues, contaminated containment system components, and contaminated soils are removed or decontaminated at closure;

(2) Apply during the post-closure care period under § 264.117 if the owner or operator is conducting a detection monitoring program under § 264.98; or

(3) Apply during the compliance period under § 264.98 if the owner or operator is conducting a compliance monitoring program under § 264.99; a corrective action program under § 264.100.

[47 FR 32350, July 26, 1982, as amended 50 FR 28746, July 18, 1985]

§ 264.91 Required programs.

(a) Owners and operators subject to this subpart must conduct a monitoring and response program as follows:

(1) Whenever hazardous constituents under § 264.93 from a regulated unit are detected at the compliance point under § 264.95, the owner or

§ 264.92

erator must institute a compliance monitoring program under § 264.99.

(2) Whenever the ground water protection standard under § 264.92 is exceeded, the owner or operator must institute a corrective action program under § 264.100;

(3) Whenever hazardous constituents under § 264.93 from a regulated unit exceed concentration limits under § 264.94 in ground water between the compliance point under § 264.95 and the downgradient facility property boundary, the owner or operator must institute a corrective action program under § 264.100; or

(4) In all other cases, the owner or operator must institute a detection monitoring program under § 264.98.

(b) The Regional Administrator will specify in the facility permit the specific elements of the monitoring and response program. The Regional Administrator may include one or more of the programs identified in paragraph (a) of this section in the facility permit as may be necessary to protect human health and the environment and will specify the circumstances under which each of the programs will be required. In deciding whether to require the owner or operator to be prepared to institute a particular program, the Regional Administrator will consider the potential adverse effects on human health and the environment that might occur before final administrative action on a permit modification application to incorporate such a program could be taken.

§ 264.92 Ground-water protection standard.

The owner or operator must comply with conditions specified in the facility permit that are designed to ensure that hazardous constituents under § 264.93 entering the ground water from a regulated unit do not exceed the concentration limits under § 264.94 in the uppermost aquifer underlying the waste management area beyond the point of compliance under § 264.95 during the compliance period under § 264.98. The Regional Administrator will establish this ground water protection standard in the facility permit when hazardous constituents have en-

tered the ground water from a regulated unit.

§ 264.93 Hazardous constituents.

(a) The Regional Administrator will specify in the facility permit the hazardous constituents to which the ground-water protection standard of § 264.92 applies. Hazardous constituents are constituents identified in Appendix VIII of Part 261 of this chapter that have been detected in ground water in the uppermost aquifer underlying a regulated unit and that are reasonably expected to be in or derived from waste contained in a regulated unit, unless the Regional Administrator has excluded them under paragraph (b) of this section.

(b) The Regional Administrator will exclude an Appendix VIII constituent from the list of hazardous constituents specified in the facility permit if he finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment. In deciding whether to grant an exemption, the Regional Administrator will consider the following:

- (1) Potential adverse effects on ground-water quality, considering:
 - (i) The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration;
 - (ii) The hydrogeological characteristics of the facility and surrounding land;
 - (iii) The quantity of ground water and the direction of ground-water flow;
 - (iv) The proximity and withdrawal rates of ground-water users;
 - (v) The current and future uses of ground water in the area;
 - (vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;
 - (vii) The potential for health risks caused by human exposure to waste constituents;
 - (viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;

(ix) The persistence and permanence of the potential adverse effects; and
 (2) Potential adverse effects on hydraulically-connected surface water quality, considering:

- (i) The volume and physical and chemical characteristics of the waste in the regulated unit;
- (ii) The hydrogeological characteristics of the facility and surrounding land;
- (iii) The quantity and quality of ground water, and the direction of ground-water flow;
- (iv) The patterns of rainfall in the region;
- (v) The proximity of the regulated unit to surface waters;

(vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;

(vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality;

(viii) The potential for health risks caused by human exposure to waste constituents;

(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

(x) The persistence and permanence of the potential adverse effects.

(c) In making any determination under paragraph (b) of this section about the use of ground water in the area around the facility, the Regional Administrator will consider any identification of underground sources of drinking water and exempted aquifers made under § 144.8 of this chapter.

[47 FR 32360, July 26, 1982, as amended at 48 FR 14264, Apr. 1, 1983]

§ 264.94 Concentration limits.

(a) The Regional Administrator will specify in the facility permit concentration limits in the ground water for hazardous constituents established under § 264.93. The concentration of a hazardous constituent:

(1) Must not exceed the background level of that constituent in the ground water at the time that limit is specified in the permit; or

(2) For any of the constituents listed in Table 1, must not exceed the respec-

tive value given in that table if the background level of the constituent is below the value given in Table 1; or

TABLE 1—MAXIMUM CONCENTRATION OF CONSTITUENTS FOR GROUND-WATER PROTECTION

Constituent	Maximum concentration (micrograms per liter)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.01
Selenium	0.05
Silver	0.05
Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,8,7,8a-octahydro-1,4-endo-5,8-dimethano naphthalene)	0.00
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.05
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenyl)ethane)	0.1
Teaophane (C ₁₂ H ₁₀ O ₂ , technical dibrominated isomers, 67-69 percent dibrominated)	0.05
2,4-D (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Sevan (2,4,5-Trichlorophenoxypropionic acid)	0.0

¹ Micrograms per liter.

(3) Must not exceed an alternate limit established by the Regional Administrator under paragraph (b) of this section.

(b) The Regional Administrator will establish an alternate concentration limit for a hazardous constituent if he finds that the constituent will pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded. In establishing alternate concentration limits, the Regional Administrator will consider the following factors:

- (1) Potential adverse effects on ground-water quality, considering:
 - (i) The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration;
 - (ii) The hydrogeological characteristics of the facility and surrounding land;
 - (iii) The quantity of ground water and the direction of ground-water flow;
 - (iv) The proximity and withdrawal rates of ground-water users;

- (vi) The current and future uses of ground water in the area.
- (vii) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground water quality.
- (viii) The potential for health risks caused by human exposure to waste constituents.
- (ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents.
- (x) The persistence and permanence of the potential adverse effects; and
- (2) Potential adverse effects on hydraulically connected surface-water quality, considering:
 - (i) The volume and physical and chemical characteristics of the waste in the regulated unit;
 - (ii) The hydrogeological characteristics of the facility and surrounding land;
 - (iii) The quantity and quality of ground water, and the direction of ground water flow;
 - (iv) The patterns of rainfall in the region;
 - (v) The proximity of the regulated unit to surface waters;
 - (vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;
 - (vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface water quality;
 - (viii) The potential for health risks caused by human exposure to waste constituents.
 - (ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
 - (x) The persistence and permanence of the potential adverse effects.
- (c) In making any determination under paragraph (b) of this section about the use of ground water in the area around the facility the Regional Administrator will consider any identification of underground sources of drinking water and exempted aquifers made under § 141.8 of this chapter.

[47 FR 32190, July 28, 1992, as amended at 48 FR 14284, Apr. 1, 1983]

§ 264.95 Point of compliance.

- (a) The Regional Administrator will specify in the facility permit the point of compliance at which the ground-water protection standard of § 264.92 applies and at which monitoring must be conducted. The point of compliance is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units.
- (b) The waste management area is the limit projected in the horizontal plane of the area on which waste will be placed during the active life of a regulated unit.
 - (1) The waste management area includes horizontal space taken up by any liner, dike, or other barrier designed to contain waste in a regulated unit.
 - (2) If the facility contains more than one regulated unit, the waste management area is described by an imaginary line circumscribing the several regulated units.

§ 264.96 Compliance period.

- (a) The Regional Administrator will specify in the facility permit the compliance period during which the ground-water protection standard of § 264.92 applies. The compliance period is the number of years equal to the active life of the waste management area (including any waste management activity prior to permitting, and the closure period.)
- (b) The compliance period begins when the owner or operator initiates a compliance monitoring program meeting the requirements of § 264.99.
- (c) If the owner or operator is engaged in a corrective action program at the end of the compliance period specified in paragraph (a) of this section, the compliance period is extended until the owner or operator can demonstrate that the ground-water protection standard of § 264.92 has not been exceeded for a period of three consecutive years.

§ 264.97 General ground water monitoring requirements.

The owner or operator must comply with the following requirements for

any ground water monitoring program developed to satisfy § 264.98, § 264.99, or § 264.100:

- (a) The ground-water monitoring system must consist of a sufficient number of wells, installed at appropriate locations and depths to yield ground water samples from the uppermost aquifer that:
 - (1) Represent the quality of back-ground water that has not been affected by leakage from a regulated unit; and
 - (2) Represent the quality of ground water passing the point of compliance.
- (b) If a facility contains more than one regulated unit, separate ground-water monitoring systems are not required for each regulated unit provided that provisions for sampling the ground water in the uppermost aquifer will enable detection and measurement at the compliance point of hazardous constituents from the regulated units that have entered the ground water in the uppermost aquifer.
- (c) All monitoring wells must be cased in a manner that maintains the integrity of the monitoring-well bore hole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of ground-water samples. The annular space (i.e., the space between the bore hole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the ground water.
- (d) The ground-water monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide a reliable indication of ground water quality below the waste management area. At a minimum the program must include procedures and techniques for:
 - (1) Sample collection;
 - (2) Sample preservation and shipment;
 - (3) Analytical procedures; and
 - (4) Chain of custody control.
- (e) The ground water monitoring program must include sampling and analytical methods that are appropriate for ground-water sampling and that accurately measure hazardous constituents in ground-water samples.

(f) The ground water monitoring program must include a determination of the ground-water surface elevation each time ground water is sampled.

(g) Where appropriate, the ground water monitoring program must establish background ground water quality for each of the hazardous constituents or monitoring parameters or constituents specified in the permit.

(1) In the detection monitoring program under § 264.98, background ground water quality for a monitoring parameter or constituent must be based on data from quarterly sampling of wells upgradient from the waste management area for one year.

(2) In the compliance monitoring program under § 264.99, background ground-water quality for a hazardous constituent must be based on data from upgradient wells that:

- (i) Is available before the permit is issued;
- (ii) Accounts for measurement errors in sampling and analysis; and
- (iii) Accounts, to the extent feasible, for seasonal fluctuations in background ground-water quality if such fluctuations are expected to affect the concentration of the hazardous constituent.

(3) Background quality may be based on sampling of wells that are not upgradient from the waste management area where:

(i) Hydrogeologic conditions do not allow the owner or operator to determine what wells are upgradient; or

(ii) Sampling at other wells will provide an indication of background ground-water quality that is as representative or more representative than that provided by the upgradient wells.

(4) In developing the data base used to determine a background value for each parameter or constituent, the owner or operator must take a minimum of one sample from each well and a minimum of four samples from the entire system used to determine background ground water quality, each time the system is sampled.

(h) The owner or operator must use the following statistical procedure in determining whether background values or concentration limits have been exceeded:

(1) If, in a detection monitoring program, the level of a constituent at the compliance point is to be compared to the constituent's background value and that background value has a sample coefficient of variation less than 100

(4) The owner or operator must take at least four portions from a sample at each well at the compliance point and determine whether the difference between the mean of the constituent at each well (using all portions taken) and the background value for the constituent is significant at the 0.05 level using the Cochran's Approximation to the Behrens-Fisher Student's *t* test as described in Appendix IV of this part. If the test indicates that the difference is significant, the owner or operator must repeat the same procedure (with at least the same number of portions as used in the first test) with a fresh sample from the monitoring well. If this second round of analyses indicates that the difference is significant, the owner or operator must conclude that a statistically significant change has occurred, or

(4) The owner or operator may use an equivalent statistical procedure for determining whether a statistically significant change has occurred. The Regional Administrator will specify such a procedure in the facility permit if he finds that the alternative procedure reasonably balances the probability of falsely identifying a non-contaminating regulated unit and the probability of failing to identify a contaminating regulated unit in a manner that is comparable to that of the statistical procedure described in paragraph (b)(1)(i) of this section.

(2) In all other situations in a detection monitoring program and in a compliance monitoring program, the owner or operator must use a statistical procedure providing reasonable confidence that the migration of hazardous constituents from a regulated unit into and through the aquifer will be indicated. The Regional Administrator will specify a statistical procedure in the facility permit that he finds:

(1) Is appropriate for the distribution of the data used to establish back-

ground values or concentration limits; and

(4) Provides a reasonable balance between the probability of falsely identifying a non-contaminating regulated unit and the probability of failing to identify a contaminating regulated unit.

(Approved by the Office of Management and Budget under control number 2050-0033)

(47 FR 32360, July 26, 1982, as amended at 50 FR 4514, Jan. 31, 1985)

§ 264.98 Detection monitoring program.

An owner or operator required to establish a detection monitoring program under this subpart must, at a minimum, discharge the following responsibilities:

(a) The owner or operator must monitor for indicator parameters (e.g., specific conductance, total organic carbon, or total organic halogen), waste constituents, or reaction products that provide a reliable indication of the presence of hazardous constituents in ground water. The Regional Administrator will specify the parameters or constituents to be monitored in the facility permit, after considering the following factors:

(1) The types, quantities, and concentrations of constituents in wastes managed at the regulated unit;

(2) The mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the waste management area;

(3) The detectability of indicator parameters, waste constituents, and reaction products in ground water; and

(4) The concentrations or values and coefficients of variation of proposed monitoring parameters or constituents in the ground water background.

(b) The owner or operator must install a ground water monitoring system at the compliance point as specified under § 264.95. The ground-water monitoring system must comply with § 264.97(a)(2), (b), and (c).

(c) The owner or operator must establish a background value for each monitoring parameter or constituent specified in the permit pursuant to paragraph (a) of this section. The

permit will specify the background values for each parameter or specify the procedures to be used to calculate the background values.

(1) The owner or operator must comply with § 264.97(g) in developing the data base used to determine background values.

(2) The owner or operator must express background values in a form necessary for the determination of statistically significant increases under § 264.97(h).

(3) In taking samples used in the determination of background values, the owner or operator must use a ground-water monitoring system that complies with § 264.97(a)(1), (b), and (c).

(d) The owner or operator must determine ground-water quality at each monitoring well at the compliance point at least semi-annually during the active life of a regulated unit (including the closure period) and the post closure care period. The owner or operator must express the ground-water quality at each monitoring well in a form necessary for the determination of statistically significant increases under § 264.97(h).

(e) The owner or operator must determine the ground-water flow rate and direction in the uppermost aquifer at least annually.

(f) The owner or operator must use procedures and methods for sampling and analysis that meet the requirements of § 264.97 (d) and (e).

(g) The owner or operator must determine whether there is a statistically significant increase over background values for any parameter or constituent specified in the permit pursuant to paragraph (a) of this section each time he determines ground-water quality at the compliance point under paragraph (d) of this section.

(1) In determining whether a statistically significant increase has occurred, the owner or operator must compare the ground water quality at each monitoring well at the compliance point for each parameter or constituent to the background value for that parameter or constituent, according to the statistical procedure specified in the permit under § 264.97(h).

(2) The owner or operator must determine whether there has been a sta-

istically significant increase at each monitoring well at the compliance point within a reasonable time period after completion of sampling. The Regional Administrator will specify that time period in the facility permit, after considering the complexity of the statistical test and the availability of laboratory facilities to perform the analysis of ground-water samples.

(h) If the owner or operator determines, pursuant to paragraph (g) of this section, that there is a statistically significant increase for parameters or constituents specified pursuant to paragraph (a) of this section at any monitoring well at the compliance point, he must:

(1) Notify the Regional Administrator of this finding in writing within seven days. The notification must indicate what parameters or constituents have shown statistically significant increases;

(2) Immediately sample the ground water in all monitoring wells and determine the concentration of all constituents identified in Appendix VIII of Part 261 of this chapter that are present in ground water;

(3) Establish a background value for each Appendix VIII constituent that has been found at the compliance point under paragraph (h)(2) of this section, as follows:

(i) The owner or operator must comply with § 264.97(g) in developing the data base used to determine background values;

(ii) The owner or operator must express background values in a form necessary for the determination of statistically significant increases under § 264.97(h); and

(iii) In taking samples used in the determination of background values, the owner or operator must use a ground-water monitoring system that complies with § 264.97(a)(1), (b), and (c);

(4) Within 90 days, submit to the Regional Administrator an application for a permit modification to establish a compliance monitoring program meeting the requirements of § 264.99. The application must include the following information:

(i) An identification of the concentration of any Appendix VIII constitu-

ents found in the ground water at each monitoring well at the compliance point.

(ii) Any proposed changes to the ground water monitoring system at the facility necessary to meet the requirements of § 264.99;

(iii) Any proposed changes to the monitoring frequency, sampling and analysis procedures or methods, or statistical procedures used at the facility necessary to meet the requirements of § 264.99;

(iv) For each hazardous constituent found at the compliance point, a proposed concentration limit under § 264.94(a)(1) or (2), or a notice of intent to seek a variance under § 264.94(b); and

(v) Within 180 days, submit to the Regional Administrator:

(i) All data necessary to justify any variance sought under § 264.94(b); and

(ii) An engineering feasibility plan for a corrective action program necessary to meet the requirements of § 264.100, unless:

(A) All hazardous constituents identified under paragraph (h)(2) of this section are listed in Table 1 of § 264.94 and their concentrations do not exceed the respective values given in that Table; or

(B) The owner or operator has sought a variance under § 264.94(b) for every hazardous constituent identified under paragraph (h)(2) of this section.

(i) If the owner or operator determines, pursuant to paragraph (g) of this section, that there is a statistically significant increase of parameters or constituents specified pursuant to paragraph (a) of this section at any monitoring well at the compliance point, he may demonstrate that a source other than a regulated unit caused the increase or that the increase resulted from error in sampling, analysis, or evaluation. While the owner or operator may make a demonstration under this paragraph in addition to, or in lieu of, submitting a permit modification application under paragraph (h)(3) of this section, he is not relieved of the requirement to submit a permit modification application within the time specified in paragraph (h)(4) of this section unless the demonstration made under this para-

graph successfully shows that a source other than a regulated unit caused the increase or that the increase resulted from error in sampling, analysis, or evaluation. In making a demonstration under this paragraph, the owner or operator must:

(1) Notify the Regional Administrator in writing within seven days of determining a statistically significant increase at the compliance point that he intends to make a demonstration under this paragraph;

(2) Within 90 days, submit a report to the Regional Administrator which demonstrates that a source other than a regulated unit caused the increase, or that the increase resulted from error in sampling, analysis, or evaluation;

(3) Within 90 days, submit to the Regional Administrator an application for a permit modification to make any appropriate changes to the detection monitoring program at the facility; and

(4) Continue to monitor in accordance with the detection monitoring program established under this section.

(j) If the owner or operator determines that the detection monitoring program no longer satisfies the requirements of this section, he must, within 90 days, submit an application for a permit modification to make any appropriate changes to the program.

(k) The owner or operator must assure that monitoring and corrective action measures necessary to achieve compliance with the ground water protection standard under § 264.92 are taken during the term of the permit.

(Approved by the Office of Management and Budget under control number 2050-0033)

(47 FR 32360, July 26, 1982, as amended at 50 FR 4614, Jan. 31, 1985)

§ 264.99 Compliance monitoring program.

An owner or operator required to establish a compliance monitoring program under this subpart must, at a minimum, discharge the following responsibilities:

(a) The owner or operator must monitor the ground water to determine whether regulated units are in

compliance with the ground water protection standard under § 264.92. The Regional Administrator will specify the ground water protection standard in the facility permit, including:

(1) A list of the hazardous constituents identified under § 264.93;

(2) Concentration limits under § 264.94 for each of those hazardous constituents;

(3) The compliance point under § 264.95; and

(4) The compliance period under § 264.96.

(b) The owner or operator must install a ground water monitoring system at the compliance point as specified under § 264.95. The ground water monitoring system must comply with § 264.97(a)(2), (b), and (c).

(c) Where a concentration limit established under paragraph (a)(2) of this section is based on background ground water quality, the Regional Administrator will specify the concentration limit in the permit as follows:

(1) If there is a high temporal correlation between upgradient and compliance point concentrations of the hazardous constituents, the owner or operator may establish the concentration limit through sampling at upgradient wells each time ground water is sampled at the compliance point. The Regional Administrator will specify the procedures used for determining the concentration limit in this manner in the permit. In all other cases, the concentration limit will be the mean of the pooled data on the concentration of the hazardous constituent.

(2) If a hazardous constituent is identified on Table 1 under § 264.94 and the difference between the respective concentration limit in Table 1 and the background value of that constituent under § 264.97(g) is not statistically significant, the owner or operator must use the background value of the constituent as the concentration limit. In determining whether this difference is statistically significant, the owner or operator must use a statistical procedure providing reasonable confidence that a real difference will be indicated. The statistical procedure must:

(i) Be appropriate for the distribution of the data used to establish background values; and

(ii) Provide a reasonable balance between the probability of falsely identifying a significant difference and the probability of failing to identify a significant difference.

(3) The owner or operator must:

(i) Comply with § 264.97(g) in developing the data base used to determine background values;

(ii) Express background values in a form necessary for the determination of statistically significant increases under § 264.97(h); and

(iii) Use a ground water monitoring system that complies with § 264.97(a)(1), (b), and (c).

(d) The owner or operator must determine the concentration of hazardous constituents in ground water at each monitoring well at the compliance point at least quarterly during the compliance period. The owner or operator must express the concentration at each monitoring well in a form necessary for the determination of statistically significant increases under § 264.97(h).

(e) The owner or operator must determine the ground water flow rate and direction in the uppermost aquifer at least annually.

(f) The owner or operator must analyze samples from all monitoring wells at the compliance point for all constituents contained in Appendix VIII of Part 261 of this chapter at least annually to determine whether additional hazardous constituents are present in the uppermost aquifer. If the owner or operator finds Appendix VIII constituents in the ground water that are not identified in the permit as hazardous constituents, the owner or operator must report the concentrations of these additional constituents to the Regional Administrator within seven days after completion of the analysis.

(g) The owner or operator must use procedures and methods for sampling and analysis that meet the requirements of § 264.97(d) and (e).

(h) The owner or operator must determine whether there is a statistically significant increase over the concentration limits for any hazardous constituents specified in the permit pursu-

ant to paragraph (a) of this section each time he determines the concentration of hazardous constituents in ground water at the compliance point.

(1) In determining whether a statistically significant increase has occurred, the owner or operator must compare the ground water quality at each monitoring well at the compliance point for each hazardous constituent to the concentration limit for that constituent according to the statistical procedures specified in the permit under § 264.97(h).

(2) The owner or operator must determine whether there has been a statistically significant increase at each monitoring well at the compliance point, within a reasonable time period after completion of sampling. The Regional Administrator will specify that time period in the facility permit, after considering the complexity of the statistical test and the availability of laboratory facilities to perform the analysis of ground water samples.

(3) If the owner or operator determines, pursuant to paragraph (b) of this section, that the ground water protection standard is being exceeded at any monitoring well at the point of compliance, he must:

(1) Notify the Regional Administrator of this finding in writing within seven days. The notification must indicate what concentration limits have been exceeded.

(2) Submit to the Regional Administrator an application for a permit modification to establish a corrective action program meeting the requirements of § 264.100 within 180 days, or within 90 days if an engineering feasibility study has been previously submitted to the Regional Administrator under § 264.98(h)(5). The application must at a minimum include the following information:

(i) A detailed description of corrective actions that will achieve compliance with the ground water protection standard specified in the permit under paragraph (a) of this section, and

(ii) A plan for a ground water monitoring program that will demonstrate the effectiveness of the corrective action. Such a ground water monitoring program may be based on a compliance monitoring program developed

to meet the requirements of this section.

(j) If the owner or operator determines, pursuant to paragraph (b) of this section, that the ground water protection standard is being exceeded at any monitoring well at the point of compliance, he may demonstrate that a source other than a regulated unit caused the increase or that the increase resulted from error in sampling, analysis or evaluation. While the owner or operator may make a demonstration under this paragraph in addition to, or in lieu of, submitting a permit modification application under paragraph (i)(2) of this section, he is not relieved of the requirement to submit a permit modification application within the time specified in paragraph (i)(2) of this section unless the demonstration made under this paragraph successfully shows that a source other than a regulated unit caused the increase or that the increase resulted from error in sampling, analysis, or evaluation. In making a demonstration under this paragraph, the owner or operator must:

(1) Notify the Regional Administrator in writing within seven days that he intends to make a demonstration under this paragraph;

(2) Within 90 days, submit a report to the Regional Administrator which demonstrates that a source other than a regulated unit caused the standard to be exceeded or that the apparent noncompliance with the standards resulted from error in sampling, analysis, or evaluation;

(3) Within 90 days, submit to the Regional Administrator an application for a permit modification to make any appropriate changes to the compliance monitoring program at the facility; and

(4) Continue to monitor in accord with the compliance monitoring program established under this section.

(k) If the owner or operator determines that the compliance monitoring program no longer satisfies the requirements of this section, he must, within 90 days, submit an application for a permit modification to make any appropriate changes to the program.

(l) The owner or operator must assure that monitoring and corrective

action measures necessary to achieve compliance with the ground water protection standard under § 264.92 are taken during the term of the permit.

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(47 FR 32350, July 26, 1982, as amended at 50 FR 4514, Jan. 31, 1985)

§ 264.100 Corrective action program.

An owner or operator required to establish a corrective action program under this subpart must, at a minimum, discharge the following responsibilities:

(a) The owner or operator must take corrective action to ensure that regulated units are in compliance with the ground water protection standard under § 264.92. The Regional Administrator will specify the ground water protection standard in the facility permit, including:

(1) A list of the hazardous constituents identified under § 264.93;

(2) Concentration limits under § 264.94 for each of those hazardous constituents;

(3) The compliance point under § 264.95; and

(4) The compliance period under § 264.96.

(b) The owner or operator must implement a corrective action program that prevents hazardous constituents from exceeding their respective concentration limits at the compliance point by removing the hazardous waste constituents or treating them in place. The permit will specify the specific measures that will be taken.

(c) The owner or operator must begin corrective action within a reasonable time period after the ground water protection standard is exceeded. The Regional Administrator will specify that time period in the facility permit. If a facility permit includes a corrective action program in addition to a compliance monitoring program, the permit will specify when the corrective action will begin and such a requirement will operate in lieu of § 264.99(d)(2).

(d) In conjunction with a corrective action program, the owner or operator must establish and implement a ground water monitoring program to

demonstrate the effectiveness of the corrective action program. Such a monitoring program may be based on the requirements for a compliance monitoring program under § 264.99 and must be as effective as that program in determining compliance with the ground water protection standard under § 264.92 and in determining the success of a corrective action program under paragraph (e) of this section, where appropriate.

(e) In addition to the other requirements of this section, the owner or operator must conduct a corrective action program to remove or treat in place any hazardous constituents under § 264.93 that exceed concentration limits under § 264.94 in ground water between the compliance point under § 264.95 and the downgradient facility property boundary. The permit will specify the measures to be taken.

(1) Corrective action measures under this paragraph must be initiated and completed within a reasonable period of time considering the extent of contamination.

(2) Corrective action measures under this paragraph may be terminated once the concentration of hazardous constituents under § 264.93 is reduced to levels below their respective concentration limits under § 264.94.

(f) The owner or operator must continue corrective action measures during the compliance period to the extent necessary to ensure that the ground water protection standard is not exceeded. If the owner or operator is conducting corrective action at the end of the compliance period, he must continue that corrective action for as long as necessary to achieve compliance with the ground water protection standard. The owner or operator may terminate corrective action measures taken beyond the period equal to the active life of the waste management area (including the closure period) if he can demonstrate, based on data from the ground water monitoring program under paragraph (d) of this section, that the ground water protection standard of § 264.92 has not been exceeded for a period of three consecutive years.

(g) The owner or operator must report in writing to the Regional Administrator on the effectiveness of the corrective action program. The owner or operator must submit these reports semi-annually.

(h) If the owner or operator determines that the corrective action program no longer satisfies the requirements of this section, he must, within 90 days, submit an application for a permit modification to make any appropriate changes to the program.

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(47 FR 32350, July 26, 1985, as amended at 50 FR 4514, Jan. 31, 1985)

§ 264.101 Corrective action for solid waste management units.

(a) The owner or operator of a facility seeking a permit for the treatment, storage or disposal of hazardous waste must institute corrective action as necessary to protect human health and the environment for all releases of hazardous waste or constituents from any solid waste management unit at the facility, regardless of the time at which waste was placed in such unit.

(b) Corrective action will be specified in the permit. The permit will contain schedules of compliance for such corrective action (where such corrective action cannot be completed prior to issuance of the permit) and assurances of financial responsibility for completing such corrective action.

(50 FR 28747, July 15, 1985)

§§ 264.102—264.109 [Reserved]

Subpart G—Closure and Post-Closure

Source: 51 FR 16444, May 2, 1986, unless otherwise noted.

EFFECTIVE DATE NOTE: At 51 FR 16444, May 2, 1986, in Part 264, §§ 264.110 through 264.120 (Subpart G) were revised, effective October 29, 1986. For the convenience of the user, the superseded text is set forth at the end of this subpart.

§ 264.110 Applicability.

Except as § 264.1 provides otherwise: (a) Sections 264.111 through 264.115 (which concern closure) apply to the

owners and operators of all hazardous waste management facilities; and

(b) Sections 264.110 through 264.120 (which concern post-closure care) apply to the owners and operators of:

(1) All hazardous waste disposal facilities; and

(2) Waste piles and surface impoundments from which the owner or operator intends to remove the wastes at closure to the extent that these sections are made applicable to such facilities in § 264.228 or § 264.258.

§ 264.111 Closure performance standard.

The owner or operator must close the facility in a manner that:

(a) Minimizes the need for further maintenance; and

(b) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and

(c) Complies with the closure requirements of this subpart including, but not limited to, the requirements of §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310 and 264.351.

§ 264.112 Closure plan; amendment of plan.

(a) *Written plan.* (1) The owner or operator of a hazardous waste management facility must have a written closure plan. In addition, certain surface impoundments and waste piles from which the owner or operator intends to remove or decontaminate the hazardous waste at partial or final closure are required by §§ 264.228(c)(1)(i) and 264.258(c)(1)(i) to have contingent closure plans. The plan must be submitted with the permit application, in accordance with § 270.14(b)(13) of this chapter, and approved by the Regional Administrator as part of the permit issuance procedures under Part 124 of this chapter. In accordance with § 270.32 of this chapter, the approved closure plan will become a condition of any RCRA permit.

(2) The Regional Administrator's approval of the plan must ensure that

the approved closure plan is consistent with §§ 264.111 through 264.115 and the applicable requirements of §§ 264.90 *et seq.*, 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, and 264.351. Until final closure is completed and certified in accordance with § 264.115, a copy of the approved plan and all approved revisions must be furnished to the Regional Administrator upon request, including request by mail.

(b) *Content of plan.* The plan must identify steps necessary to perform partial and/or final closure of the facility at any point during its active life. The closure plan must include, at least:

(1) A description of how each hazardous waste management unit at the facility will be closed in accordance with § 264.111;

(2) A description of how final closure of the facility will be conducted in accordance with § 264.111. The description must identify the maximum extent of the operations which will be unclosed during the active life of the facility; and

(3) An estimate of the maximum inventory of hazardous wastes ever on-site over the active life of the facility and a detailed description of the methods to be used during partial closures and final closure, including, but not limited to, methods for removing, transporting, treating, storing, or disposing of all hazardous wastes, and identification of the type(s) of the off-site hazardous waste management units to be used, if applicable; and

(4) A detailed description of the steps needed to remove or decontaminate all hazardous waste residues and contaminated containment system components, equipment, structures, and soils during partial and final closure, including, but not limited to, procedures for cleaning equipment and removing contaminated soils, methods for sampling and testing surrounding soils, and criteria for determining the extent of decontamination required to satisfy the closure performance standard; and

(5) A detailed description of other activities necessary during the closure period to ensure that all partial closures and final closure satisfy the clo-

sure performance standards, including, but not limited to, ground-water monitoring, leachate collection, and run-on and run-off control; and

(6) A schedule for closure of each hazardous waste management unit and for final closure of the facility. The schedule must include, at a minimum, the total time required to close each hazardous waste management unit and the time required for intervening closure activities which will allow tracking of the progress of partial and final closure. (For example, in the case of a landfill unit, estimates of the time required to treat or dispose of all hazardous waste inventory and of the time required to place a final cover must be included.)

(7) For facilities that use trust funds to establish financial assurance under § 264.143 or § 264.145 and that are expected to close prior to the expiration of the permit, an estimate of the expected year of final closure.

(c) *Amendment of plan.* The owner or operator must submit a written request for a permit modification to authorize a change in operating plans, facility design, or the approved closure plan in accordance with the procedures in Parts 124 and 270. The written request must include a copy of the amended closure plan for approval by the Regional Administrator.

(1) The owner or operator may submit a written request to the Regional Administrator for a permit modification to amend the closure plan at any time prior to the notification of partial or final closure of the facility.

(2) The owner or operator must submit a written request for a permit modification to authorize a change in the approved closure plan whenever:

(i) Changes in operating plans or facility design affect the closure plan, or

(ii) There is a change in the expected year of closure, if applicable, or

(iii) In conducting partial or final closure activities, unexpected events require a modification of the approved closure plan.

(3) The owner or operator must submit a written request for a permit modification including a copy of the amended closure plan for approval at least 60 days prior to the proposed

change in facility design or operation, or no later than 60 days after an unexpected event has occurred which has affected the closure plan. If an unexpected event occurs during the partial or final closure period, the owner or operator must request a permit modification no later than 30 days after the unexpected event. An owner or operator of a surface impoundment or waste pile that intends to remove all hazardous waste at closure and is not otherwise required to prepare a contingent closure plan under § 264.228(c)(1)(i) or § 264.258(c)(1)(i), must submit an amended closure plan to the Regional Administrator no later than 60 days from the date that the owner or operator or Regional Administrator determines that the hazardous waste management unit must be closed as a landfill, subject to the requirements of § 264.310, or no later than 30 days from that date if the determination is made during partial or final closure. The Regional Administrator will approve, disapprove, or modify this amended plan in accordance with the procedures in Parts 124 and 270. In accordance with § 270.32 of this chapter, the approved closure plan will become a condition of any RCRA permit issued.

(4) The Regional Administrator may request modifications to the plan under the conditions described in § 264.112(c)(2). The owner or operator must submit the modified plan within 60 days of the Regional Administrator's request, or within 30 days if the change in facility conditions occurs during partial or final closure. Any modifications requested by the Regional Administrator will be approved in accordance with the procedures in Parts 124 and 270.

(d) *Notification of partial closure and final closure.* (1) The owner or operator must notify the Regional Administrator in writing at least 60 days prior to the date on which he expects to begin closure of a surface impoundment, waste pile, land treatment or landfill unit, or final closure of a facility with such a unit. The owner or operator must notify the Regional Administrator in writing at least 45 days prior to the date on which he expects to begin final closure of a facility with

only treatment or storage tanks, container storage, or incinerator units to be closed.

(2) The date when he "expects to begin closure" must be either no later than 30 days after the date on which any hazardous waste management unit receives the known final volume of hazardous wastes or, if there is a reasonable possibility that the hazardous waste management unit will receive additional hazardous wastes, no later than one year after the date on which the unit received the most recent volume of hazardous waste. If the owner or operator of a hazardous waste management unit can demonstrate to the Regional Administrator that the hazardous waste management unit or facility has the capacity to receive additional hazardous wastes and he has taken, and will continue to take, all steps to prevent threats to human health and the environment, including compliance with all applicable permit requirements, the Regional Administrator may approve an extension to this one-year limit.

(3) If the facility's permit is terminated, or if the facility is otherwise ordered, by judicial decree or final order under section 3008 of RCRA, to cease receiving hazardous wastes or to close, then the requirements of this paragraph do not apply. However, the owner or operator must close the facility in accordance with the deadlines established in § 264.113.

(e) *Removal of wastes and decontamination or dismantling of equipment.* Nothing in this section shall preclude the owner or operator from removing hazardous wastes and decontaminating or dismantling equipment in accordance with the approved partial or final closure plan at any time before or after notification of partial or final closure.

§ 264.113 Closure; time allowed for closure.

(a) Within 90 days after receiving the final volume of hazardous wastes at a hazardous waste management unit or facility, the owner or operator must treat, remove from the unit or facility, or dispose of on-site, all hazardous wastes in accordance with the

approved closure plan. The Regional Administrator may approve a longer period if the owner or operator complies with all applicable requirements for requesting a modification to the permit and demonstrates that:

(1)(i) The activities required to comply with this paragraph will, of necessity, take longer than 90 days to complete; or

(i)(A) The hazardous waste management unit or facility has the capacity to receive additional hazardous wastes; and

(B) There is a reasonable likelihood that he or another person will recommence operation of the hazardous waste management unit or the facility within one year; and

(C) Closure of the hazardous waste management unit or facility would be incompatible with continued operation of the site; and

(2) He has taken and will continue to take all steps to prevent threats to human health and the environment, including compliance with all applicable permit requirements.

(b) The owner or operator must complete partial and final closure activities in accordance with the approved closure plan and within 180 days after receiving the final volume of hazardous wastes at the hazardous waste management unit or facility. The Regional Administrator may approve an extension to the closure period if the owner or operator complies with all applicable requirements for requesting a modification to the permit and demonstrates that:

(1)(i) The partial or final closure activities will, of necessity, take longer than 180 days to complete; or

(i)(A) The hazardous waste management unit or facility has the capacity to receive additional hazardous wastes; and

(B) There is reasonable likelihood that he or another person will recommence operation of the hazardous waste management unit or the facility within one year; and

(C) Closure of the hazardous waste management unit or facility would be incompatible with continued operation of the site; and

(2) He has taken and will continue to take all steps to prevent threats to

human health and the environment from the unclosed but not operating hazardous waste management unit or facility, including compliance with all applicable permit requirements.

(c) The demonstrations referred to in § 264.113(a) and (b) must be made as follows: (1) The demonstrations in paragraph (a) must be made at least 30 days prior to the expiration of the 90-day period in paragraph (a); and (2) the demonstration in paragraph (b) must be made at least 30 days prior to the expiration of the 180-day period in paragraph (b) of this section.

§ 264.114 Disposal or decontamination of equipment, structures and soils.

During the partial and final closure periods, all contaminated equipment, structures and soils must be properly disposed of or decontaminated unless otherwise specified in §§ 264.228, 264.258, 264.280, or 264.310. By removing any hazardous wastes or hazardous constituents during partial and final closure, the owner or operator may become a generator of hazardous waste and must handle that waste in accordance with all applicable requirements of Part 262 of this chapter.

§ 264.115 Certification of closure.

Within 60 days of completion of closure of each hazardous waste surface impoundment, waste pile, land treatment, and landfill unit, and within 60 days of the completion of final closure, the owner or operator must submit to the Regional Administrator, by registered mail, a certification that the hazardous waste management unit or facility, as applicable, has been closed in accordance with the specifications in the approved closure plan. The certification must be signed by the owner or operator and by an independent registered professional engineer. Documentation supporting the independent registered professional engineer's certification must be furnished to the Regional Administrator upon request until he releases the owner or operator from the financial assurance requirements for closure under § 234.143(i).

§ 264.116 Survey plat.

No later than the submission of the certification of closure of each hazardous waste disposal unit, the owner or operator must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Regional Administrator, a survey plat indicating the location and dimensions of landfills cells or other hazardous waste disposal units with respect to permanently surveyed benchmarks. This plat must be prepared and certified by a professional land surveyor. The plat filed with the local zoning authority, or the authority with jurisdiction over local land use, must contain a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit in accordance with the applicable Subpart G regulations.

§ 264.117 Post-closure care and use of property.

(a)(1) Post-closure care for each hazardous waste management unit subject to the requirements of §§ 264.117 through 264.120 must begin after completion of closure of the unit and continue for 30 years after that date and must consist of at least the following:

(i) Monitoring and reporting in accordance with the requirements of Subparts F, K, L, M, and N of this part; and

(ii) Maintenance and monitoring of waste containment systems in accordance with the requirements of Subparts F, K, L, M, and N of this part.

(2) Any time preceding partial closure of a hazardous waste management unit subject to post-closure care requirements or final closure, or any time during the post-closure period for a particular unit, the Regional Administrator may, in accordance with the permit modification procedures in Parts 124 and 270

(i) Shorten the post-closure care period applicable to the hazardous waste management unit, or facility if all disposal units have been closed, if he finds that the reduced period is sufficient to protect human health and the environment (e.g., leachate or ground water monitoring results, characteristics of the hazardous wastes, ap-

plication of advanced technology, or alternative disposal, treatment, or reuse techniques indicate that the hazardous waste management unit or facility is secure); or

(ii) Extend the post-closure care period applicable to the hazardous waste management unit or facility if he finds that the extended period is necessary to protect human health and the environment (e.g., leachate or ground water monitoring results indicate a potential for migration of hazardous wastes at levels which may be harmful to human health and the environment).

(b) The Regional Administrator may require, at partial and final closure, continuation of any of the security requirements of § 264.14 during part or all of the post-closure period when:

(1) Hazardous wastes may remain exposed after completion of partial or final closure; or

(2) Access by the public or domestic livestock may pose a hazard to human health.

(c) Post-closure use of property on or in which hazardous wastes remain after partial or final closure must never be allowed to disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the facility's monitoring systems, unless the Regional Administrator finds that the disturbance:

(1) Is necessary to the proposed use of the property, and will not increase the potential hazard to human health or the environment; or

(2) Is necessary to reduce a threat to human health or the environment.

(d) All post-closure care activities must be in accordance with the provisions of the approved post-closure plan as specified in § 264.118.

§ 264.118 Post-closure plan; amendment of plan.

(a) *Written Plan.* The owner or operator of a hazardous waste disposal unit must have a written post-closure plan. In addition, certain surface impoundments and waste piles, from which the owner or operator intends to remove or decontaminate the hazardous wastes at partial or final closure are

required by §§ 264.228(c)(1)(ii) and 264.258(c)(1)(ii) to have contingent post-closure plans. Owners or operators of surface impoundments and waste piles not otherwise required to prepare contingent post-closure plans under §§ 264.228(c)(1)(ii) and 264.258(c)(1)(ii) must submit a post-closure plan to the Regional Administrator within 90 days from the date that the owner or operator or Regional Administrator determines that the hazardous waste management unit must be closed as a landfill, subject to the requirements of §§ 264.117 through 264.120. The plan must be submitted with the permit application, in accordance with § 270.14(b)(13) of this chapter, and approved by the Regional Administrator as part of the permit issuance procedures under Part 124 of this chapter. In accordance with § 270.32 of this chapter, the approved post-closure plan will become a condition of any RCRA permit issued.

(b) For each hazardous waste management unit subject to the requirements of this section, the post-closure plan must identify the activities that will be carried on after closure of each disposal unit and the frequency of these activities, and include at least:

(1) A description of the planned monitoring activities and frequencies at which they will be performed to comply with Subparts F, K, L, M, and N of this part during the post-closure care period; and

(2) A description of the planned maintenance activities, and frequencies at which they will be performed, to ensure:

(i) The integrity of the cap and final cover or other containment systems in accordance with the requirements of Subparts K, L, M, and N of this part; and

(ii) The function of the monitoring equipment in accordance with the requirements of Subparts F, K, L, M, and N of this part; and

(3) The name, address, and phone number of the person or office to contact about the hazardous waste disposal unit or facility during the post-closure care period.

(c) Until final closure of the facility, a copy of the approved post-closure plan must be furnished to the Region-

al Administrator upon request, including request by mail. After final closure has been certified, the person or office specified in § 264.188(b)(3) must keep the approved post-closure plan during the remainder of the post-closure period.

(d) *Amendment of plan.* The owner or operator must request a permit modification to authorize a change in the approved post-closure plan in accordance with the applicable requirements of Parts 124 and 270. The written request must include a copy of the amended post-closure plan for approval by the Regional Administrator.

(1) The owner or operator may submit a written request to the Regional Administrator for a permit modification to amend the post-closure plan at any time during the active life of the facility or during the post-closure care period.

(2) The owner or operator must submit a written request for a permit modification to authorize a change in the approved post-closure plan whenever:

(i) Changes in operating plans or facility design affect the approved post-closure plan; or

(ii) There is a change in the expected year of final closure, if applicable, or

(iii) Events which occur during the active life of the facility, including partial and final closures, affect the approved post-closure plan.

(3) The owner or operator must submit a written request for a permit modification at least 60 days prior to the proposed change in facility design or operation, or no later than 60 days after an unexpected event has occurred which has affected the post-closure plan. An owner or operator of a surface impoundment or waste pile that intends to remove all hazardous waste at closure and is not otherwise required to submit a contingent post-closure plan under §§ 264.228(c)(1)(ii) and 264.258(c)(1)(ii) must submit a post-closure plan to the Regional Administrator no later than 90 days after the date that the owner or operator or Regional Administrator determines that the hazardous waste management unit must be closed as a landfill, subject to the requirements of § 264.310.

The Regional Administrator will approve, disapprove or modify this plan in accordance with the procedures in Parts 124 and 270. In accordance with § 270.32 of this chapter, the approved post-closure plan will become a permit condition.

(4) The Regional Administrator may request modifications to the plan under the conditions described in § 264.118(d)(2). The owner or operator must submit the modified plan no later than 60 days after the Regional Administrator's request, or no later than 90 days if the unit is a surface impoundment or waste pile not previously required to prepare a contingent post-closure plan. Any modifications requested by the Regional Administrator will be approved, disapproved, or modified in accordance with the procedures in Parts 124 and 270.

§ 264.119 Post-closure notices.

(a) No later than 60 days after certification of closure of each hazardous waste disposal unit, the owner or operator must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Regional Administrator a record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility. For hazardous wastes disposed of before January 12, 1981, the owner or operator must identify the type, location, and quantity of the hazardous wastes to the best of his knowledge and in accordance with any records he has kept.

(b) Within 60 days of certification of closure of the first hazardous waste disposal unit and within 60 days of certification of closure of the last hazardous waste disposal unit, the owner or operator must:

(1) Record, in accordance with State law, a notation on the deed to the facility property or on some other instrument which is normally examined during title search that will in perpetuity notify any potential purchaser of the property that:

(i) The land has been used to manage hazardous wastes; and

(ii) Its use is restricted under 40 CFR Subpart G regulations; and

(iii) The survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility required by §§ 264.118 and 264.119(a) have been filed with the local zoning authority or the authority with jurisdiction over local land use and with the Regional Administrator; and

(2) Submit a certification, signed by the owner or operator, that he has recorded the notation specified in paragraph (b)(1) of this section, including a copy of the document in which the notation has been placed, to the Regional Administrator.

(c) If the owner or operator or any subsequent owner or operator of the land upon which a hazardous waste disposal unit is located wishes to remove hazardous wastes and hazardous waste residues, the liner, if any, or contaminated soils, he must request a modification to the post-closure permit in accordance with the applicable requirements in Parts 124 and 270. The owner or operator must demonstrate that the removal of hazardous wastes will satisfy the criteria of § 264.117(c). By removing hazardous waste, the owner or operator may become a generator of hazardous waste and must manage it in accordance with all applicable requirements of this chapter. If he is granted a permit modification or otherwise granted approval to conduct such removal activities, the owner or operator may request that the Regional Administrator approve either:

(1) The removal of the notation on the deed to the facility property or other instrument normally examined during title search; or

(2) The addition of a notation to the deed or instrument indicating the removal of the hazardous waste.

§ 264.120 Certification of completion of post-closure care.

No later than 60 days after completion of the established post-closure care period for each hazardous waste disposal unit, the owner or operator must submit to the Regional Administrator, by registered mail, a certification that the post-closure care period

for the hazardous waste disposal unit was performed in accordance with the specifications in the approved post-closure plan. The certification must be signed by the owner or operator and an independent registered professional engineer. Documentation supporting the independent registered professional engineer's certification must be furnished to the Regional Administrator upon request until he releases the owner or operator from the financial assurance requirements for post-closure care under § 264.145(i).

EFFECTIVE DATE NOTE: At 51 FR 16444, May 2, 1986, in Part 264, §§ 264.110 through 264.120 (Subpart G) were revised, effective October 29, 1986. For the convenience of the user, the superseded text is set forth as follows:

Subpart G—Closure and Post-Closure

SOURCE: 46 FR 2649, Jan. 12, 1981, unless otherwise noted.

§ 264.110 Applicability.

Except as § 264.1 provides otherwise:

(a) Sections 264.111–264.115 (which concern closure) apply to the owners and operators of all hazardous waste management facilities; and

(b) Sections 264.117–264.120 (which concern post-closure care) apply to the owners and operators of:

(1) All hazardous waste disposal facilities; and

(2) Piles, and surface impoundments from which the owner or operator intends to remove the wastes at closure, to the extent that these sections are made applicable to such facilities in §§ 264.228 and 264.268.

[46 FR 2649, Jan. 12, 1981, as amended at 47 FR 32366, July 26, 1982]

§ 264.111 Closure performance standard.

The owner or operator must close the facility in a manner that:

(a) Minimizes the need for further maintenance; and

(b) Controls, minimizes or eliminates, to the extent necessary to prevent threats to human health and the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere.

§ 264.112 Closure plan; amendment of plan.

(a) The owner or operator of a hazardous waste management facility must have a written closure plan. The plan must be sub-

mitted with the permit application, in accordance with § 270.14(b)(13) of this chapter, and approved by the Regional Administrator as part of the permit issuance proceeding under Part 124 of this chapter. In accordance with § 122.29 of this chapter, the approved closure plan will become a condition of any RCRA permit. The Regional Administrator's decision must assure that that approved closure plan is consistent with §§ 264.111, 264.113, 264.114, 264.115, and the applicable requirements of §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, and 264.351. A copy of the approved plan and all revisions to the plan must be kept at the facility until closure is completed and certified in accordance with § 264.115. The plan must identify steps necessary to completely or partially close the facility at any point during its intended operating life and to completely close the facility at the end of its intended operating life. The closure plan must include, at least:

(1) A description of how and when the facility will be partially closed, if applicable, and finally closed. The description must identify the maximum extent of the operation which will be unclosed during the life of the facility, and how the requirements of §§ 264.111, 264.113, 264.114, 264.115, and the applicable closure requirements of §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, and 264.351 will be met.

(2) An estimate of the maximum inventory of wastes in storage and in treatment at any time during the life of the facility. (Any change in this estimate is a minor modification under § 270.42);

(3) A description of the steps needed to decontaminate facility equipment during closure; and

(4) An estimate of the expected year of closure and a schedule for final closure. The schedule must include, at a minimum, the total time required to close the facility and the time required for intervening closure activities which will allow tracking of the progress of closure. (For example, in the case of a landfill, estimates of the time required to treat and dispose of all waste inventory and of the time required to place a final cover must be included.)

(b) The owner or operator may amend his closure plan at any time during the active life of the facility. (The active life of the facility is that period during which wastes are periodically received.) The owner or operator must amend the plan whenever changes in operating plans or facility design affect the closure plan, or whenever there is a change in the expected year of closure. When the owner or operator requests a permit modification to authorize a change in operating plans or facility design, he must request a modification of the closure plan at the same time (see § 124.5(a)). If a

agement plan for these wastes that is approved by the Regional Administrator pursuant to the standards set out in this paragraph, and in accord with all other applicable requirements of this part. The factors to be considered are:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

(b) The Regional Administrator may determine that additional design, operating, and monitoring requirements are necessary for land treatment facilities managing hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27 in order to reduce the possibility of migration of these wastes to ground water, surface water, or air so as to protect human health and the environment.

(50 FR 2004, Jan. 14, 1985)

§§ 264.284-264.299 [Reserved]

Subpart N—Landfills

SOURCE: 47 FR 52366, July 28, 1982, unless otherwise noted.

§ 264.300 Applicability.

The regulations in this subpart apply to owners and operators of facilities that dispose of hazardous waste in landfills, except as § 264.1 provides otherwise.

§ 264.301 Design and operating requirements.

(a) Any landfill that is not covered by paragraph (c) of this section or § 265.301(a) of this chapter must have a liner system for all portions of the landfill (except for existing portions of such landfill). The liner system must have:

(1) A liner that is designed, constructed, and maintained to prevent any

migration of wastes out of the landfill to the adjacent subsurface soil or ground water or surface water at any time during the active life (including the closure period) of the landfill. The liner must be constructed of materials that prevent wastes from passing into the liner during the active life of the facility. The liner must be:

(i) Constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrogeologic forces), physical contact with the waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;

(ii) Placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression, or uplift; and

(iii) Installed to cover all surrounding earth likely to be in contact with the waste or leachate; and

(2) A leachate collection and removal system immediately above the liner that is designed, constructed, maintained, and operated to collect and remove leachate from the landfill. The Regional Administrator will specify design and operating conditions in the permit to ensure that the leachate depth over the liner does not exceed 30 cm (one foot). The leachate collection and removal system must be:

(i) Constructed of materials that are:

(A) Chemically resistant to the waste managed in the landfill and the leachate expected to be generated; and

(B) Of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes, waste cover materials, and by any equipment used at the landfill; and

(ii) Designed and operated to function without clogging through the scheduled closure of the landfill.

(b) The owner or operator will be exempted from the requirements of paragraph (a) of this section if the Regional Administrator finds, based on a demonstration by the owner or operator, that alternative design and operating practices, together with location characteristics, will prevent the migra-

tion of any hazardous constituents (see § 264.93) into the ground water or surface water at any future time. In deciding whether to grant an exemption, the Regional Administrator will consider:

- (1) The nature and quantity of the wastes;
- (2) The proposed alternate design and operation;
- (3) The hydrogeologic setting of the facility, including the attenuative capacity and thickness of the liners and soils present between the landfill and ground water or surface water; and
- (4) All other factors which would influence the quality and mobility of the leachate produced and the potential for it to migrate to ground water or surface water.

(c) The owner or operator of each new landfill, each new landfill unit at an existing facility, each replacement of an existing landfill unit, and each lateral expansion of an existing landfill unit, must install two or more liners and a leachate collection system above and between the liners. The liners and leachate collection systems must protect human health and the environment. The requirement for the installation of two or more liners in this paragraph may be satisfied by the installation of a top liner designed, operated and constructed of materials to prevent the migration of any constituent into such liner during the period such facility remains in operation (including any post-closure monitoring period), and a lower liner designed, operated, and constructed to prevent the migration of any constituent through such liner during such period. For the purpose of the preceding sentence, a lower liner shall be deemed to satisfy such requirement if it is constructed of at least a 3-foot thick layer of re-compacted clay or other natural material with a permeability of no more than 1×10^{-7} centimeter per second.

(d) Paragraph (c) of this section will not apply if the owner or operator demonstrates to the Regional Administrator, and the Regional Administrator finds for such landfill, that alternative design and operating practices, together with location characteristics, will prevent the migration of any hazardous constituent into the ground

water or surface water at least as effectively as such liners and leachate collection systems.

(e) The double liner requirement set forth in paragraph (c) of this section may be waived by the Regional Administrator for any monofill, if:

(1) The monofill contains only hazardous wastes from foundry furnace emission controls or metal casting molding sand, and such wastes do not contain constituents which would render the wastes hazardous for reasons other than the EP toxicity characteristics in § 261.24 of this chapter; and

(2)(XA) The monofill has at least one liner for which there is no evidence that such liner is leaking;

(B) The monofill is located more than one-quarter mile from an underground source of drinking water (as that term is defined in § 144.3 of this chapter); and

(C) The monofill is in compliance with generally applicable ground-water monitoring requirements for facilities with permits under RCRA 3005(c); or

(1) The owner or operator demonstrates that the monofill is located, designed and operated so as to assure that there will be no migration of any hazardous constituent into ground water or surface water at any future time.

(f) The owner or operator must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the landfill during peak discharge from at least a 25-year storm.

(g) The owner or operator must design, construct, operate, and maintain a run-off management system to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

(h) Collection and holding facilities (e.g., tanks or basins) associated with run-on and run-off control systems must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.

(i) If the landfill contains any particulate matter which may be subject to wind dispersal, the owner or operator

must cover or otherwise manage the landfill to control wind dispersal.

(j) The Regional Administrator will specify in the permit all design and operating practices that are necessary to ensure that the requirements of this section are satisfied.

(k) Any permit under RCRA 3005(c) which is issued for a landfill located within the State of Alabama shall require the installation of two or more liners and a leachate collection system above and between such liners, notwithstanding any other provision of RCRA.

(Approved by the Office of Management and Budget under control number 2060-0007)

(47 FR 32366, July 26, 1982, as amended at 60 FR 4514, Jan. 31, 1995; 60 FR 28748, July 18, 1995)

§ 264.302 [Reserved]

§ 264.303 Monitoring and inspection.

(a) During construction or installation, liners (except in the case of existing portions of landfills exempt from § 264.301(a)) and cover systems (e.g., membranes, sheets, or coatings) must be inspected for uniformity, damage, and imperfections (e.g., holes, cracks, thin spots, or foreign materials). Immediately after construction or installation:

(1) Synthetic liners and covers must be inspected to ensure tight seams and joints and the absence of tears, punctures, or bilsters; and

(2) Soil-based and admixed liners and covers must be inspected for imperfections including lenses, cracks, channels, root holes, or other structural non-uniformities that may cause an increase in the permeability of the liner or cover.

(b) While a landfill is in operation, it must be inspected weekly and after storms to detect evidence of any of the following:

(1) Deterioration, malfunctions, or improper operation of run-on and run-off control systems;

(2) Proper functioning of wind dispersal control systems, where present; and

(3) The presence of leachate in and proper functioning of leachate collec-

tion and removal systems, where present.

(47 FR 32366, July 26, 1982, as amended at 60 FR 28748, July 18, 1995)

§ 264.304—264.306 [Reserved]

§ 264.309 Surveying and recordkeeping.

The owner or operator of a landfill must maintain the following items in the operating record required under § 264.73:

(a) On a map, the exact location and dimensions, including depth, of each cell with respect to permanently surveyed benchmarks; and

(b) The contents of each cell and the approximate location of each hazardous waste type within each cell.

(Approved by the Office of Management and Budget under control number 2060-0007)

(47 FR 32366, July 26, 1982, as amended at 60 FR 4514, Jan. 31, 1995)

§ 264.310 Closure and post-closure care.

(a) At final closure of the landfill or upon closure of any cell, the owner or operator must cover the landfill or cell with a final cover designed and constructed to:

(1) Provide long-term minimization of migration of liquids through the closed landfill;

(2) Function with minimum maintenance;

(3) Promote drainage and minimize erosion or abrasion of the cover;

(4) Accommodate settling and subsidence so that the cover's integrity is maintained; and

(5) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

(b) After final closure, the owner or operator must comply with all post-closure requirements contained in §§ 264.117 through 264.120, including maintenance and monitoring throughout the post-closure care period (specified in the permit under § 264.117). The owner or operator must:

(1) Maintain the integrity and effectiveness of the final cover, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events;

(2) Continue to operate the leachate collection and removal system until leachate is no longer detected;

(3) Maintain and monitor the ground-water monitoring system and comply with all other applicable requirements of Subpart F of this part;

(4) Prevent run-on and run-off from eroding or otherwise damaging the final cover; and

(5) Protect and maintain surveyed benchmarks used in complying with § 264.309.

147 FR 32365, July 26, 1982, as amended at 50 FR 28748, July 16, 1985

§ 264.311 [Reserved]

§ 264.312 Special requirements for ignitable or reactive waste.

(a) Except as provided in paragraph (b) of this section, and in § 264.316, ignitable or reactive waste must not be placed in a landfill, unless the waste is treated, rendered, or mixed before or immediately after placement in a landfill so that:

(1) The resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under § 261.21 or § 261.23 of this chapter; and

(2) Section 264.17(b) is complied with.

(b) Ignitable wastes in containers may be landfilled without meeting the requirements of paragraph (a) of this section, provided that the wastes are disposed of in such a way that they are protected from any material or conditions which may cause them to ignite. At a minimum, ignitable wastes must be disposed of in non-leaking containers which are carefully handled and placed so as to avoid heat, sparks, rupture, or any other condition that might cause ignition of the wastes; must be covered daily with soil or other non-combustible material to minimize the potential for ignition of the wastes; and must not be disposed of in cells that contain or will contain other wastes which may generate heat sufficient to cause ignition of the waste.

§ 264.313 Special requirements for incompatible wastes.

Incompatible wastes, or incompatible wastes and materials, (see Appendix V of this part for examples) must not be placed in the same landfill cell, unless § 264.17(b) is complied with.

§ 264.314 Special requirements for bulk and containerized liquids.

(a) Bulk or non-containerized liquid waste or waste containing free liquids may be placed in a landfill prior to May 8, 1985 only if:

(1) The landfill has a liner and leachate collection and removal system that meet the requirements of § 264.301(a); or

(2) Before disposal, the liquid waste or waste containing free liquids is treated or stabilized, chemically or physically (e.g., by mixing with an absorbent solid), so that free liquids are no longer present.

(b) Effective May 8, 1985, the placement of bulk or non-containerized liquid hazardous waste or hazardous waste containing free liquids (whether or not absorbents have been added) in any landfill is prohibited.

(c) To demonstrate the absence or presence of free liquids in either a containerized or a bulk waste, the following test must be used: Method 9005 (Paint Filter Liquids Test) as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods." [EPA Publication No. SW-846].

(d) Containers holding free liquids must not be placed in a landfill unless:

(1) All free-standing liquid: (i) has been removed by decanting, or other methods; (ii) has been mixed with absorbent or solidified so that free-standing liquid is no longer observed; or (iii) has been otherwise eliminated; or

(2) The container is very small, such as an ampule; or

(3) The container is designed to hold free liquids for use other than storage, such as a battery or capacitor; or

(4) The container is a lab pack as defined in § 264.316 and is disposed of in accordance with § 264.316.

(e) Effective November 8, 1985, the placement of any liquid which is not a hazardous waste in a landfill is prohib-

ATTACHMENT C

Drinking Water ARARs

<u>INORGANICS</u>	<u>MCL</u>	<u>pMCL</u>	<u>MCLG</u>	<u>pMCLG</u>	<u>SMCL</u>
Arsenic	0.05			0.05	
Barium	1.0			1.5	
Cadmium	0.01			0.005	
Chloride					250
Chromium	0.05			0.12	
Copper				1.3	1
Cyanide					
Iron					0.3
Lead	0.05			0.02	
Mercury	0.002			0.003	
Nickel					
Selenium	0.01			0.045	
Silver	0.05				
<u>ORGANICS</u>					
Benzene	0.005		0		
Chloro- benzene				0.6	
Carbon Tetrachloride	0.005		0		
1,4 Dichloro- benze (para)	0.075		0.075		
1,2-Dichloro- ethane	0.005		0		
1,1-Dichloro- ethylene	0.007		0.007		

	<u>MCL</u>	<u>pMCL</u>	<u>MCLG</u>	<u>pMCLG</u>	<u>SMCL</u>
cis-1,2-Dichloroethylene				0.07	
trans-1,2-Dichloroethylene				0.07	
Ethylbenzene				0.68	
Pentachlorophenol				0.22	
Styrene				0.14	
1,1,1-Tri-chloroethane	0.20		0.20		
Trichloroethylene	0.005		0		
2,4,5 TP (Silvex)	0.01			0.052	0.2
Vinyl Chloride	0.002		0		
Total ylenes				0.44	

Definitions

MCL - Maximum Contaminant Level; enforceable drinking water standard for public (community and noncommunity) water supplies promulgated pursuant to the Safe Drinking Water Act (SDWA)

pMCL - proposed Maximum Contaminant Level

MCLG - Maximum Contaminant Level Goal; nonenforceable goal based solely upon health effects, with an adequate margin of safety

pMCLG - proposed Maximum Contaminant Level Goal

RSC - Relative Source Contribution from drinking water ingestion

All values in mg/l unless otherwise noted.

ATTACHMENT D

TBCs

Air

Some of the substances which may be released into the air from the site do not yet have promulgated standards. When health effects information for these substances exists, a risk assessment should be conducted to determine if quantities which may be released during remedial action or after site clean-up are harmful to public health or the environment. Table 1 of this attachment lists the health effects information U.S. EPA has compiled for a variety of substances. Other substances currently under review for systemic toxic effects are listed in Table 2 of this attachment. Table 2 is included so that you can be kept informed of Agency reference dose levels under development and which should be available soon, probably before remedial action is begun. Table 3 is a list of additional NESHAPS standards under development which may need to be considered. Appendix 1 to this attachment lists concerns regarding the potential release of naturally occurring radioactive materials to be considered.

If the substances are volatile, emissions are likely to occur from liquid or solid media. Emissions are likely to increase under circumstances which increase the air interface or contribute energy to the system (thermal treatment, volatilization, excavation, etc.). If the substances are not volatile, emissions from solid media are likely to occur during natural erosion or under disturbance scenarios. In the case of incineration, products of combustion should also be evaluated for potential health hazards via the air pathway.

Evaluations of health hazards can be accomplished with modeling estimates of exposure and risk, if emission rates can be estimated. For evaluations of substances which have been determined by U.S. EPA to be carcinogens and for which Agency risk numbers are available, the use of systemic health end points is inappropriate, unless they are more protective than the unit risk factors coupled with a specific risk level. For example, the level of benzene established by the Association of Government and Industrial Hygienists is listed as 24 ppb in the "Recommended Air Quality Guidelines." However, the ambient level of benzene (a U.S. EPA group A carcinogen), associated with a 10^{-6} risk is 4×10^{-2} ppb. Further, we recommend reviewing the "Recommended Air Quality Guideline" numbers and using available Agency numbers (see Table 1). Where no specific risk number is available, but the substance has been shown to have carcinogenic potential, caution should be used. Where U.S. EPA has associated **safe levels** with systemic effects, they should be used instead of time weighted **threshold limit values (TLVs)**. If TLVs are used in some form, **safety factors to account for sensitive populations, as well as time adjustments, should be included.**

RCRA

The CERCLA Off-site Policy is a hazardous substance TBC and so is included under this heading.

TBCs cont.

Water

Drinking water health advisories are to be considered under circumstances when MCLs, MCLGs, or AWQCs do not exist for compounds of concern. Table 4 of this attachment lists the existing health advisories. In addition, a risk assessment must be conducted to determine if substances without applicable standards present a risk to human health or the environment and to determine the level of clean-up to be achieved if these substances do present an unacceptable risk.

State

No State TBCs have been identified yet.

Table 1

C-24

OCT 1 1987

Update to SPHEM Tables

Date Prepared: October 1, 1986

EXHIBIT C-4

TOXICITY DATA FOR POTENTIAL CARCINOGENIC EFFECTS
-- RISK CHARACTERIZATION --

Chemical Name	Oral Route		Inhalation Route	
	Potency Factor (PF) (mg/kg/d)-1 Source ²	EPA Weight of Evidence	Potency Factor (PF) (mg/kg/d)-1 Source ²	EPA Weight of Evidence
2-Acetylaminofluorene		B2		B2
Acrylonitrile	5.40E-1	B1	2.40E-01	CAG B1
Aflatoxin B1	2.90E+03	CAG B2		B2
Aldrin	1.7 1.1E+01	CAG B2		B2
Amitrole		B2		B2
Arsenic and Compounds	1.50E+01	HEA CAG A	5.00E+01	HEA A
Asbestos		A		A
Auramine		B2		B2
Azaserine		B2		B2
Aziridine		B2		B2
Benzene	5.20E-02	HEA A	2.60E-02	HEA A
Benzidine	2.30E+02	IRIS A	2.30E+02	CAG A
Benz(a)anthracene		B2	111	B2
Benz(c)acridine	reanalysis pending	C	reanalysis pending	C
Benzo(a)pyrene	1.15E+01	HEA B2	6.10E+00	HEA B2
Benzo(b)fluoranthene		B2		B2
Benzo(k)fluoranthene		D		D
Benzotrichloride		B2		B2
Benzyl Chloride		C		C
Beryllium and Compounds	NA	B1	4.86E+00	CAG B1
Bis(2-chloroethyl)ether	1.10E+00	CAG IRIS B2	1.10E+00	IRIS B2
Bis(chloromethyl)ether		A	9.30E+03	CAG A
Bis(2-ethylhexyl)phthalate (DEHP)	6.84E-04	CAG B2		B2
Cacodylic Acid		D		D
Cadmium and Compounds	NA		6.10E+00	HEA (IRIS) B1
Carbon Tetrachloride	1.30E-01	HEA IRIS B2	1.30E-01	(IRIS) B2
Chlordane	1.30 1.61E+00	HEA ODW B2		B2
Chloroform	8.10E-02	HEA B2		B2
4-Chloro-o-toluidine Hydrochloride		B2		B2
Chromium VI and Compounds	NA		4.10E+01	HEA A
Chrysene		B2		B2
Cyclophosphamide		B1		B1
DDD		B2		B2
DDE		B2		B2
DDT	3.40E-01	HEA B2		B2
Chloromethane	1.26E-02	HEA	6.32E-03	
Bromodichloromethane	1.3E-01	HEA	not determined	
Chlorodibromomethane	8.4E-02	HEA	not determined	

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Date Prepared: October 1, 1986

EXHIBIT C-4
(Continued)TOXICITY DATA FOR POTENTIAL CARCINOGENIC EFFECTS
-- RISK CHARACTERIZATION

Chemical Name	Oral Route		Inhalation Route	
	Potency Factor (PF) (mg/kg/d)-1 Source ² -	EPA Weight of Evidence	Potency Factor (PF) (mg/kg/d)-1 Source ² -	EPA Weight of Evidence
Diallate		C		B2
Diaminotoluene (mixed)		B2		B2
1,2,7,8-Dibenzopyrene		B2		B2
Dibenz(a,h)anthracene		B2		B2
1,2-Dibromo-3-chloropropane		B2		B2
Dibutylnitrosamine	5.40E+00	CAG	5.40E+00 (IAS)	B2
3,3'-Dichlorobenzidine	1.70E+00	CAG		B2
1,2-Dichloroethane (EDC)	9.10E-02	HEA IRIS	9.10E-02	HEA IRIS
1,1-Dichloroethylene (vinylidene chloride)	5.80E-01	HEA	1.16E+00	HEA C
Dichloromethane	7.50E-03	HEA IRIS	1.43E-02	HEA IRIS
Dieldrin	3.00E+01	CAG		B2
Diepoxybutane		B2		B2
Diethanolnitrosamine		B2		B2
Diethyl Arsine		D		D
1,2-Diethylhydrazine		B2		B2
Diethylnitrosamine	4.60E+01/50	CAG IRIS	150	IRIS
Diethylstilbestrol (DES)		A		A
Dihydrosofrole		B2		B2
3,3'-Dimethoxybenzidine		B2		B2
Dimethyl Sulfate		B2		B2
Dimethylaminoazobenzene		B2		B2
7,12-Dimethylbenz(a)anthracene		B2		B2
3,3'-Dimethylbenzidine		B2		B2
Dimethylcarbamoyl Chloride		B2		B2
1,1-Dimethylhydrazine		B2		B2
1,2-Dimethylhydrazine		B2		B2
Dimethylnitrosamine	2.60E+01/51	CAG IRIS	51	IRIS
Dinitrotoluene (mixed)	6.8	B2		B2
2,4-Dinitrotoluene	2.10E-01	CAG HEA		B2
2,6-Dinitrotoluene		C		B2
1,4-Dioxane		B2		B2
1,2-Diphenylhydrazine	7.70E-01	CAG IRIS	8.00E-01	IRIS
Dipropylnitrosamine		B2		B2
Epiclorohydrin	9.90E-01/3	CAG	9.90E-03	IRIS
Ethyl-4,4'-dichlorobenzilate		B2		B2
Ethylene Dibromide (EDB)	4.10E+01	CAG		B2
1,1-Dichloroethane	9.1E-2	HEA		B2

Date Prepared: OCT 1 1986EXHIBIT C-4
(Continued)TOXICITY DATA FOR POTENTIAL CARCINOGENIC EFFECTS
-- RISK CHARACTERIZATION

Chemical Name	Oral Route			Inhalation Route		
	Potency Factor (PF) (mg/kg/d)-1	Source ²⁾	EPA Weight of Evidence	Potency Factor (PF) (mg/kg/d)-1	Source ²⁾	EPA Weight of Evidence
Ethylene Oxide			B1/B2	3.50E-01	CAG	B1/B2
Ethylenethiourea			B2			B2
Ethyl Methanesulfonate			B2			B2
1-Ethyl-nitrosourea	3.30E+01	CAG	B2			B2
Formaldehyde			B2			B2
Glycidaldehyde			B2			B2
Heptachlor	3.40E+00	CAG	B2			B2
Heptachlor Epoxide	2.60E+00	CAG	B2			B2
Hexachlorobenzene	1.69E+00	HEA	B2			B2
Hexachlorobutadiene	7.75E-02	HEA	C			C
alpha-Hexachlorocyclohexane (HCCH)	1.10E-01 63	CAG / IRIS	B2	6.3	IRIS	B2
beta-HCCH	1.80E+00	CAG	C			C
gamma-HCCH (Lindane)	1.33E+00	HEA	B2/C	1.40E-02	IRIS	B2/C
Hexachloroethane	1.40E-02	CAG/IRIS	C			C
Hydrazine			B2			B2
Indeno(1,2,3-cd)pyrene			C			C
Iodomethane			C			C
Isosafrole			B2			C
Kepon			B2			B2
Lasiocarpine			B2			B2
Melphalan			B1			B1
Methyl Chloride	1.26E-2	HEA	C	6.32E-3	HEA	C
3-Methylcholanthrene			B2			B2
4,4'-Methylene-bis-2-chloroaniline			B2			B2
Methylnitrosourea	3.00E+02	CAG	B2			B2
Methylnitrosourethane			B2			B2
Methylthiouracil			B2			B2
Methylvinyl nitrosamine			B2			B2
N-Methyl-N'-nitro-N-nitrosoguanadine			B2			B2
Mitomycin C			B2			B2
1-Naphthylamine			C			C
2-Naphthylamine			A	1.70 (N.S.) 8.4E-1 (Aluminum A)		A
Nickel and Compounds	NA		A	1.19E+00 (NEA dust)		A
N-Nitrosopiperidine			B2			B2
N-Nitrosopyrrolidine	2.10E+00	CAG	B2			B2
5-Nitro-o-toluidine			C			C
N-Nitrodiphenylamine	4.9E-03	IRIS	B2			B2
N-Nitrosodiphenylamine	7.00E+00	IRIS	B2			B2
N-Nitrosomethylethylamine	3.18E+01	IRIS	B2			B2
Isophthalic	4.1E-3	HEA				

*** October 1986 ***

LINDANE

1.33E00 HEA

Date Prepared: October 1, 1986EXHIBIT C-4
(Continued)TOXICITY DATA FOR POTENTIAL CARCINOGENIC EFFECTS
-- RISK CHARACTERIZATION

Chemical Name	Oral Route		Inhalation Route	
	Potency Factor (PF) (mg/kg/d)-1 Source ²⁾	EPA Weight of Evidence	Potency Factor (PF) (mg/kg/d)-1 Source ²⁾	EPA Weight of Evidence
Pentachloronitrobenzene		C		C
Pentachlorophenol		D		D
Phenacetin	7.00	B2		B2
Polychlorinated Biphenyls (PCBs)	4.34E+00 HEA CAG	B2		B2
Polynuclear Aromatic Hydrocarbons	4.15E+01 HEA	B2	6.11E+00 HEA	B2
Propane Sulfone	reanalysis pending	B2	reanalysis pending	B2
1,2-Propylenimine		B2		B2
Saccharin		C		C
Safrole		B2		B2
Streptozocin		B2		B2
2,3,7,8-TCDD (Dioxin)	1.56E+05	HEA		B2
1,1,1,2-Tetrachloroethane		B2		C
1,1,2,2-Tetrachloroethane	2.00E-01	HEA IRIS	2.00E-01	IRIS
Tetrachloroethylene	5.10E-02	HEA	1.70E-03 HEA	B2
Thioacetamide		B2	1.0E-3E-3	B2
Thiourea		B2		B2
o-Toluidine hydrochloride		B2		B2
Toxaphene	1.10E+00	CAG		B2
1,1,2-Trichloroethane	5.73E-02	HEA		C
Trichloroethylene	1.10E-02	HEA IRIS	4.60E-03	HEA IRIS
2,4,6-Trichlorophenol	2.0E-02	HEA IRIS	2.0E-02	IRIS
Tris(2,3-dibromopropyl)phosphate		B2		B2
Trypan Blue		B2		B2
Uracil Mustard		B2		B2
Urethane		B2		B2
Vinyl Chloride	2.30E+00	HEA	2.50E-02	HEA
			2.95E-01	IRIS

¹⁾ The list of chemicals presented in this exhibit is based on EPA's Reportable Quantities Analysis and should not be considered an all-inclusive list of suspected carcinogens. Refer to Exhibit C-3 for toxicity constants for indicator selection for the chemicals listed here.

²⁾ Sources for Exhibit C-4:

HEA = Health Effects Assessment, prepared by the Environmental Criteria and Assessment Office, U.S. EPA, Cincinnati, Ohio, 1985 (updated in May 1986).

CAG = Evaluation by Carcinogen Assessment Group, U.S. EPA, Washington, D.C., 1981.

Date Prepared: October 1, 1986

EXHIBIT C-6

OCT 1

TOXICITY DATA FOR NONCARCINOGENIC EFFECTS -- RISK CHARACTERIZATION 1-

Chemical Name	Oral Route			Inhalation Route		
	-----			-----		
	Acceptable Intake			Acceptable Intake		
	-----			-----		
	Subchron (AIS)	Chronic (AIC)	Source ²⁻	Subchron (AIS)	Chronic (AIC)	Source ²⁻
	--mg/kg/day--			--mg/kg/day--		
	-----			-----		
Acenaphthene @						
Acenaphthylene @						
Acetone	1.0E-00	1.00E-01	RFD	3.00E+01	3.00E+00	NEA
Acetonitrile						
2-Acetylaminofluorene @						
Acrylic Acid		8.00E-02	RFD ¹			
Acrylonitrile @						
Aflatoxin B1 @						
Aldicarb	1.3E-3	1.00E-02	RFD			
Aldrin @		3.00E-05	RFD			
Allyl Alcohol		5.00E-03	RFD			
Aluminum Phosphide		4.00E-04	RFD			
4-Aminobiphenyl @						
Amitrole @						
Ammonia						
Anthracene @						
Antimony and Compounds		4.00E-04	RFD			
Arsenic and Compounds @						
Asbestos @						
Auramine @						
Azaserine @						
Aziridine @						
Barium and Compounds		5.70E-02	SRS NEA	1.4E-3(T) ²	1.40E-04	NEA
Benefin		3.00E-01	RFD			
Benzene @						
Benzidine @						
Benz(a)anthracene @						
Benz(c)acridine @						
Benzo(a)pyrene @						
Benzo(b)fluoranthene @						
Benzo(ghi)perylene @						
Benzo(k)fluoranthene @						
Benzotrichloride @						
Benzyl Chloride @						
Beryllium and Compounds @		5.00E-04 ³	RFD			
1,1-Biphenyl		5.00E-02	RFD			
Bis(2-chloroethyl)ether @						
Bis(2-chloroisopropyl)ether						
Bis(chloromethyl)ether @						
Bis(2-ethylhexyl)phthalate (DEHP) @		2.00E-02	RFD			
Bromomethane	1.4E-2	1.4.00E-03	RFD	7E-2	7E-3	
Bromoxynil Octanoate		3.00E-02	RFD			
1,3-Butadiene						

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Boron

8.6E-2 8.6E-2 NEA

Not determined

Bromoform

2E-1 2E-2 SRS

Not determined

Date Prepared: October 1, 1986

EXHIBIT C-6
(Continued)

OCT 1 1986

TOXICITY DATA FOR NONCARCINOGENIC
EFFECTS -- RISK CHARACTERIZATION

Chemical Name	Oral Route		Source	Inhalation Route		Source
	Acceptable Intake Subchron (AIS) --mg/kg/day--	Chronic (AIC)		Acceptable Intake Subchron (AIS) --mg/kg/day--	Chronic (AIC)	
n-Butanol	1.00E-01		RFD			
Butylphthalyl Butylglycolate	1.00E+00		RFD			
Cacodylic Acid @	1.00E-02		RFD			
Cadmium and Compounds @	2.90E-04		HEA			
Captan	1.30E-02					
Carbaryl	1.00E-01		RFD			
Carbon Disulfide	1.00E-01		RFD			
Carbon Tetrachloride @	1.00E-01		RFD			
Chlordane @	7.00E-04					
Chlorobenzene	5.00E-05		RFD			
Chlorobenzilate @	2.70E-01	2.70E-02	HEA	5.70E-02	5.70E-03	HEA
Chlorodibromomethane						
Chloroform @	1.00E-02		RFD			
Chloromethyl Methyl Ether @						
4-Chloro-o-toluidine Hydrochloride@	1.40E+01	1.00E+00	RFD			
Chromium III and Compounds	2.50E-02	5.00E-03	HEA	5.10E-03		HEA
Chromium VI and Compounds @						
Chrysene @	3.70E-02	3.70E-02	HEA			
Copper and Compounds						
Creosote @						
Cresol				1.00E-02		HEA
Crotonaldehyde						
Cyanides (n.o.s.) @	reanalysis pending	5.00E-02	RFD	1.00E-01		HEA
-- Barium Cyanide		1.00E-02	RFD			
-- Calcium Cyanide	2.90	2.00E-02	RFD			
-- Cyanogen		7.00E-02	RFD			
-- Cyanogen Chloride		4.00E-02	RFD			
-- Copper Cyanide		4.00E-02	RFD			
-- Hydrogen Cyanide		5.00E-02	RFD			
-- Nickel Cyanide		7.00E-02	RFD			
-- Potassium Cyanide		2.00E-02	RFD			
-- Potassium Silver Cyanide		2.00E-02	RFD			
-- Silver Cyanide		5.00E-02	RFD			
-- Sodium Cyanide		2.00E-01	RFD			
-- Zinc Cyanide		1.00E-01	RFD			
Cyclophosphamide @		4.00E-02	RFD SAIS			
Dalapon		5.00E-02	RFD			
DDD @						
DDE @						
DDT @						
Decabromodiphenyl Ether		5.00E-04	RFD			
Diallate @		1.00E-02	RFD			

2-Chlorophenol

*** October 1986 ***

5.7E-3 5.7E-3 HEA

No data found

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Date Prepared: October 1, 1986EXHIBIT C-6
(Continued)

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TOXICITY DATA FOR NONCARCINOGENIC
EFFECTS -- RISK CHARACTERIZATION

Chemical Name	Oral Route			Inhalation Route		
	Subchron (AIS) --mg/kg/day--	Chronic (AIC)	Source	Subchron (AIS)	Chronic (AIC)	Source
2,4-Diaminotoluene @						
1,2,7,8-Dibenzopyrene @						
Dibenz(a,h)anthracene @						
1,2-Dibromo-3-chloropropane @						
Dibutyl nitrosamine @						
Dibutyl Phthalate		1.00E-01	RfD			
1,2-Dichlorobenzene						
1,3-Dichlorobenzene						
1,4-Dichlorobenzene						
3,3'-Dichlorobenzidine @						
Dichlorodifluoromethane		2.00E-01	RfD			
1,1-Dichloroethane	1.20E+00	1.20E-01	HEA	1.38E+00	1.38E-01	HEA
1,2-Dichloroethane (EDC) @						
1,1-Dichloroethylene @		9.00E-03	RfD			
1,2-Dichloroethylene (cis)						
1,2-Dichloroethylene (trans)						
Dichloromethane @		6.00E-02	RfD			
2,4-Dichlorophenol	3.0E-3	3.00E-03	RfD			
2,4-Dichlorophenoxyacetic Acid (2,4-D)		1.0E-02	RfD			
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)		8.00E-03	RfD			
Dichlorophenylarsine @						
1,2-Dichloropropane						
1,3-Dichloropropene						
Dieldrin @						
Diepoxybutane @						
Diethanol nitrosamine @						
Diethyl Arsine @						
1,2-Diethylhydrazine @						
Diethylnitrosamine @						
Diethyl Phthalate		1.30E+01	RfD			
Diethylstilbestrol (DES) @						
Dihydrosoafrole @						
Dimethoate		2.00E-02	RfD			
3,3'-Dimethoxybenzidine @						
Dimethylamine						
Dimethyl Sulfate @						
Dimethyl Terephthalate		1.00E-01	RfD			
Dimethylaminoazobenzene @						
7,12-Dimethylbenz(a)anthracene @						
3,3'-Dimethylbenzidine @						
*** October 1986 ***						
2,6-Dimethylphenol	5.7E-3	5.7E-4	HEA			Not determined
3,4-Dimethylphenol	1.4E-2	1.4E-3	HEA			Not determined

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Date Prepared: October 1, 1986EXHIBIT C-6
(Continued)

OCT 1 1986

TOXICITY DATA FOR NONCARCINOGENIC
EFFECTS -- RISK CHARACTERIZATION

Chemical Name	Oral Route		Inhalation Route	
	Subchron (AIS)	Chronic (AIC)	Subchron (AIS)	Chronic (AIC)
	--mg/kg/day--	Source	--mg/kg/day--	Source
Dimethylcarbamoyl Chloride @				
1,1-Dimethylhydrazine @				
1,2-Dimethylhydrazine @				
Dimethylnitrosamine @				
1,3-Dinitrobenzene				
4,6-Dinitro-o-cresol				
2,4-Dinitrophenol	2.00E-03	RFD		
2,3-Dinitrotoluene @				
2,4-Dinitrotoluene @				
2,5-Dinitrotoluene @				
2,6-Dinitrotoluene @				
3,4-Dinitrotoluene @				
Dinoseb	1.00E-03	RFD		
1,4-Dioxane @				
N,N-Diphenylamine @	2.50E-02	RFD		
1,2-Diphenylhydrazine @				
Dipropylnitrosamine @				
Disulfoton				
Endosulfan	5E-5		4.00E-05	RFD
Epichlorohydrin @			2.00E-03	RFD
Ethanol				
Ethyl Acetate			9.00E-01	RFD
Ethyl Methanesulfonate @				
Ethylbenzene	9.70E-01	1.00E-01		RFD IRLS
Ethyl-4,4'-dichlorobenzilate @				
Ethylene Dibromide (EDB) @				
Ethylene Oxide @				
Ethylenethiourea @				
1-Ethyl-nitrosourea @				
Ethylphthalyl Ethyl Glycolate			3.00E+00	RFD
Ferric Dextran @				
Fluoranthene @				
Fluorene @				
Fluorides			6.00E-02	RFD
Fluridone			8.00E-02	RFD
Formaldehyde				
Formic Acid			2.00E+00	RFD
Furan			1.00E-03	RFD
Glycidaldehyde @				
Glycol Ethers (n.o.s.)				
-- Diethylene Glycol,	5.00E+00	2.00E+00		HEA
Monoethyl Ether	5.00E+00	5.00E-1		HEA
*** October 1986 ***				
Endrin	4.3E-4	2.8E-4		HEA

not determined

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Date Prepared: October 1, 1986EXHIBIT C-6
(Continued)

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TOXICITY DATA FOR NONCARCINOGENIC
EFFECTS -- RISK CHARACTERIZATION

Chemical Name	Oral Route		Source	Inhalation Route		Source
	Subchron (AIS) --mg/kg/day--	Chronic (AIC)		Subchron (AIS) --mg/kg/day--	Chronic (AIC)	
-- 2-Ethoxyethanol	4.7E-1(T)	3.60E-01	HEA	6.9E-2(T)	5.00E-02	HEA
-- Ethylene Glycol, Monoburyl Ether		2.0E00	IRIS	1.60E-01	1.60E-02	HEA
-- 2-Methoxyethanol	1.4E-2	1.4E-3	2.9E-2	1.6E-1	1.4E-2	HEA
-- Propylene Glycol, Monoethyl Ether	6.80E+00	6.80E-01	HEA	4.9E00	4.9E-1	HEA
-- Propylene Glycol, Monomethyl Ether	6.80E+00	6.80E-01	HEA	4.80E+00	4.90E-01	HEA
Heptachlor @						
Heptachlor Epoxide @		1.300E-05	RfD			
Hexachlorobenzene @						
Hexachlorobutadiene @		2.00E-03	RfD			
Hexachlorocyclopentadiene	7.00E-02	7.00E-03	RfD	2.90E-03	6.60E-05	HEA
alpha-Hexachlorocyclohexane (HCCH)@						
beta-HCCH @						
gamma-HCCH (Lindane) @		3.00E-04	RfD			
delta-HCCH @						
Hexachloroethane @						
Hexachlorophene						
Hydrazine @						
Hydrogen Sulfide		3.00E-03	RfD			
Indeno(1,2,3-cd)pyrene @						
Iodomethane @						
Iron and Compounds				8.60E-03		HEA
Isobutanol		3.00E-01	RfD			
Isoprene						
Isosafrole @						
Isophorone		1.50E-01	RfD			
Isopropalin		1.50E-02	RfD			
Kepone @						
Lasiocarpine @						
Lead and Compounds (Inorganic)		1.40E-03	HEA	1.30E-04		HEA
Linuron		2.00E-03				
Malathion		2.00E-02	RfD			
Manganese and Compounds	5.30E-01	2.20E-01	HEA	3.00E-04	3.00E-04	HEA
Melphalan @						
Mercury and Compounds (Alkyl)	2.80E-04	3.00E-04	RfD	1.00E-04	1.00E-04	HEA
Mercury and Compounds (Inorganic)	2.00E-03	8.00E-03	RfD	5.10E-04	5.10E-03	HEA
Mercury Fulminate	4.4	3.00E-03	RfD			
Methanol		5.00E-01	RfD			
Methyl Chloride				9.1E-1	8.6E-2	
Methyl Ethyl Ketone	5.0E-1	5.00E-02	IRIS RfD	3.20E+00	2.20E-01	HEA
*** October 1986 ***						
LINDANE		3.00E-04	RfD IRIS			
Maleic Hydrazide		5.00E-01	RfD IRIS			
Naphthalene	4.1E-1	4.1E-1	HEA			not determined

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Date Prepared: October 1, 1986

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EXHIBIT C-6
(Continued)TOXICITY DATA FOR NONCARCINOGENIC
EFFECTS -- RISK CHARACTERIZATION

Chemical Name	Oral Route		Inhalation Route	
	Subchron (AIS)	Chronic (AIC)	Subchron (AIS)	Chronic (AIC)
	--mg/kg/day--	Source	--mg/kg/day--	Source
Methyl Ethyl Ketone Peroxide	<i>nanalysis pending</i>	8.00E-03	RFD	
Methyl Isobutyl Ketone	5E-1	5.00E-02	TRIS	2.3E-1 2.9E-2 HEA
Methyl Methacrylate				
Methyl Parathion	(HEA) 3.7E-3	2.50E-04	ATAIS	
2-Methyl-4-Chlorophenoxyacetic Acid		1.00E-03	RFD	
2(2-Methyl-4-Chlorophenoxy) propionic Acid		3.00E-03	RFD	
3-Methylcholanthrene @				
4,4'-Methylene-bis-2-chloroaniline@				
Methylnitrosourea @				
Methylthiouracil @				
Methylvinyl nitrosamine @				
N-Methyl-N'-nitro-N-nitrosoguanadine@				
Mitomycin C @				
Mustard Gas @				
1-Naphthylamine @				
2-Naphthylamine @				
Nickel and Compounds @	1.4 2.00E-02	1.00E-02	HEA	
Nitric Oxide		1.00E-01	RFD	
Nitrobenzene	5E-3	5.00E-04	TRIS	5.7E-3 5.7E-4 HEA
Nitrogen Dioxide		1.00E+00	RFD	
Nitrosomethylurethane @				
N-Nitrosopiperidine @				
N-Nitrosopyrrolidine @				
5-Nitro-o-toluidine @				
Osmium Tetroxide		1.00E-05	RFD	
Pentachlorobenzene		8.00E-04	RFD	
Pentachloronitrobenzene @		8.00E-03	RFD	
Pentachlorophenol	3.0E-2(T)	3.00E-02	TRIS	
Phenacetin @				
Phenanthrene @				
Phenobarbital @				
Phenol	(HEA) 4.00E-02	4.00E-02	TRIS	1.00E-01 3.00E-02 HEA
Phenylalanine Mustard @				
m-Phenylenediamine		6.00E-03	RFD	
Phenyl Mercuric Acetate		8.00E-05	RFD	
Phosphine		3.00E-04	RFD	
Polychlorinated Biphenyls (PCBs) @				
Propane Sulfone @				
Propyleneimine @				
Pyrene @				
Pyridine		2.00E-03	RFD	
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Methyl mercury		2.00E-04	HEA TRIS	
Octabromodiphenyl ether		3.00E-03	ATA TRIS	
Paracetamol		4.50E-03	ATA TRIS	
Pentabromodiphenyl ether		2.00E-03	ATA TRIS	

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Date Prepared: October 1, 1986EXHIBIT C-6
(Continued)TOXICITY DATA FOR NONCARCINOGENIC
EFFECTS -- RISK CHARACTERIZATION

Chemical Name	Oral Route		Inhalation Route	
	Subchron (AIS) --mg/kg/day--	Chronic (AIC) Source	Subchron (AIS) --mg/kg/day--	Chronic (AIC) Source
Saccharin @				
Safrole @				
Selenium and Compounds (n.o.s.)	3.00E-03	3.00E-03	HEA	1.00E-03 HEA
-- Selenious Acid		3.00E-03	RFD IRIS	
-- Selenourea		5.00E-03	RFD IRIS	
-- Thallium Selenite		5.00E-04	RFD IRIS	
Silver and Compounds		3.00E-03	RFD	
Sodium Diethyldithiocarbamate		3.00E-02	RFD	
Streptozocin @				
Strychnine		3.00E-04	RFD	
Styrene		2.00E-01	RFD	
1,2,4,5-Tetrachlorobenzene		3.00E-04	RFD	
2,3,7,8-TCDD (Dioxin) @				
1,1,1,2-Tetrachloroethane @				
1,1,2,2-Tetrachloroethane @				
Tetrachloroethylene @		2.00E-02	RFD	
2,3,4,6-Tetrachlorophenol		1.00E-02	RFD	
2,3,5,6-Tetrachloroterephthalate Acid (DCPA)		5.00E-02	RFD	
Tetraethyl Lead @		1.00E-07	RFD	
Thallium and Compounds (n.o.s.)		4.00E-04	RFD	
-- Thallium Acetate		5.00E-04	RFD	
-- Thallium Carbonate		4.00E-04	RFD	
-- Thallium Chloride		4.00E-04	RFD	
-- Thallium Nitrate		5.00E-04	RFD	
-- Thallous Oxide		4.00E-04	RFD	
-- Thallium Sulfate		5.00E-04	RFD	
Thiocacetamide @		5.00E-04	RFD	
Thiourea @				
o-Tolidine @			IRIS	
Toluene	4.30E-01	3.00E-01	RFD	1.50E+00 1.50E+00 HEA
o-Toluidine Hydrochloride @				
Toxaphene @				
Tribromomethane (Bromoform)				
1,2,4-Trichlorobenzene		2.00E-02	RFD	
1,1,1-Trichloroethane	3.1	5.00E-02	HEA IRIS 1.10E+01 6.30E+00	HEA
1,1,2-Trichloroethane @	2.6E-2	2.00E-01	RFD IRIS	3.1
Trichloroethylene @				
Trichlorofon				
Trichloromonofluoromethane		3.00E-01	RFD	
2,4,5-Trichlorophenol	1.00E+00	1.00E-01	RFD	
2,4,6-Trichlorophenol @				
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1,2,4 Tribromobenzene		5.00E-03	RFD	
TIN		6.4E-1	HEA	not determined

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Date Prepared: October 1, 1986EXHIBIT C-6
(Continued)TOXICITY DATA FOR NONCARCINOGENIC
EFFECTS -- RISK CHARACTERIZATION

Chemical Name	Oral Route			Inhalation Route		
	Subchron (AIS)	Chronic (AIC)	Source	Subchron (AIS)	Chronic (AIC)	Source
2,4,5-Trichlorophenoxyacetic Acid		3.00E-02	RFD			
1,2,3-Trichloropropane		6.00E-03	RFD			
1,1,2-Trichloro-1,2,2-Trifluoroethane		3.00E+01	RFD			
Tris(2,3-dibromopropyl)phosphate @						
Trinitrotoluene (TNT)		2.00E-04	RFD			
Trypan Blue @						
Uracil Mustard @						
Uranium and Compounds						
Urethane @						
Vanadium and Compounds (pentoxide)		2.00E-02	RFD			
Vinyl Chloride @						
Warfarin		3.00E-04	RFD			
o-Xylene	4.0	1.00E-01	1.00E-02	2.0	HEA	4.4E-1 (T) 4.4
m-Xylene	4.0	1.00E-01	1.00E-02	2.0	HEA	1.00E+00 2.00E-01 HEA
p-Xylene	4.0	4.0	2.0	HEA	4.4E-1	4.4E-1
Xylenes (mixed)	4.0	1.00E-01	2.00E-02	2.0	HEA	4.4E-1 (T) 4.4E-1 HEA
Zinc and Compounds		2.10E-01	2.10E-01	HEA	1.00E-01	1.00E-01 HEA
-- Zinc Phosphide			3.00E-04	RFD	IRIS	
Zinc			5.00E-02	RFD	IRIS	

@ Potential carcinogenic effects also. See Exhibits C-3 and C-4.

¹⁾ Refer to Exhibit C-5 for toxicity data for indicator selection for the chemicals listed here.

²⁾ Sources for Exhibit C-6:

RFD = Agency-wide reference dose value, developed by an inter-office work group chaired by the Office of Research and Development, U.S. EPA, Washington, D.C., 1986.

HEA = Health Effects Assessment document, prepared by the Environmental Criteria and Assessment Office, U.S. EPA, Cincinnati, Ohio, 1985 (updated in May 1986).

³⁾ The RFD values listed here are EPA-verified numbers. All RFD values were derived based on oral exposure; however, in the absence of other more specific data, these values may also be useful in assessing risks of inhalation exposure.

⁴⁾ T indicates that teratogenic or fetotoxic effects are the basis for the AIS value listed.

⁵⁾ N.O.S. = not otherwise specified.

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Van metavanadate
Sodium (VOS)
Sulfate

1.4E-2 1.4E-3 HEA
5.7E-3 5.7E-3 HEA
2.3E-2 2.3E-2 HEA

not determined
not determined

Table 2

Pollutants for Which Inhalation RFDs will be Developed

<u>Pollutant Name</u>	<u>CAS #</u>
1. Acetone	67-64-1
2. Alkyl mercury	NA*
3. Barium	7440-39-3
4. Chlorobenzene	108-90-7
5. Chromium (trivalent)	15066-33-1
6. Cresol	1319-77-3
7. 1,1 Dichloroethane	76-34-3
8. 2 Ethoxyethanol	110-80-5
9. Ethylene glycol monobutyl ether	111-76-2
10. Hexachlorocyclopentadiene	77-47-4
11. Iron	15439-31-0
12. Manganese	7439-96-5
13. Mercury (inorganic)	7439-97-6
14. Methoxyethanol	109-86-4
15. Methyl chloroform	71-55-6
16. Methyl ethyl ketone	78-93-3
17. Phenol	108-95-2
18. Propylene glycol monomethyl ether	107-98-2
19. Selenium	7782-49-2
20. Toluene	108-88-3
21. Xylene, o	95-47-6
22. Xylene, m	108-38-3
23. Xylene, mixed	1330-20-7
24. Xylene, p	106-42-3

* Not applicable

Table 3

Proposed NESHAPS and Planned Development of NESHAPS

FY 1987

Propose 4 NESHAP

Asbestos Revision
Chromium-Comfort Cooling Tower*
Coke By-Product-Final Cool
Coke Chg, TPS, Door Leaks

Promulgate 2 NESHAP

Coke By-Product
Mercury Revision

Develop 10 NESHAP

Chromium-Electroplating
Chromium-Cooling Towers
Municipal Waste Combust (MWC)***
Hazardous Organic NESHAP*
Degreasing
Methylene Chloride
Machinery Mfg. Reblgd.
Drycleaning
Ethylene Oxide-Commercial
Sterilization
Industrial Wastewater

Source Assessments (24)****

Gasoline Marketing
Naphthalene
Toluene diisocyanate
Xylene
Methyl isocyanate
Asbestiform fibers
Ethyl chloride
Propylene
Methyl methacrylate
Maleic anhydride
Phthalic anhydride
Phosphorus
Sodium hydroxide
Hydrocyanic acid
Dimethylamine
Methanol
Contaminant asbestos
Selenium and compounds
Mercuric chloride
Hydrogen fluoride
Bromine & inorganic compounds
Acetaldehyde
Acrolein
Phosgene

FY 1988

Propose 6 NESHAP

Chromium-Cooling Towers
Chromium-Electroplating
Drycleaning
Ethylene Oxide-Commercial Sterilization
Hazardous Organic NESHAP*
MWC-New

Promulgate 2 NESHAP

Asbestos Revision
Coke Chg, TPS, Door Leaks

Develop 8 NESHAP

MWC-Existing
Landfills
Industrial Wastewater
Degreasing
Methylene Chloride
Machinery Mfg. Reblgd.
Chromium-Comfort Cooling Tower
Coke By-Product Final Cooler**

Source Assessments (24)****

Gasoline Marketing
Carbon Disulfide
2,4 Toluene Diamine
Hexahydro Azepin
Methyl Chloride
Allyl Chloride
Cumene Hydroperoxide
Camphechlor
Phthalates
Titanium Dioxide
Organophosphate Pesticides
Warfarin
Carbofuran
Pentachlorophenol
Nicotine
Dibromoethane
Legionella
Unspecified (7)

Table 4

Drinking Water Health Advisories

<u>INORGANICS</u>	<u>Health Advisories</u>		
	<u>1-day</u>	<u>10-day</u>	<u>Lifetime w/RSC</u>
Arsenic			0.05(20%)
Barium	0.51	0.51	1.5(83%)
Cadmium	0.43	0.43	0.005(25%)
Chromium	1.4	1.4	0.12(71%)
Cyanide	0.22	0.22	0.154(20%)
Lead	0.02mg/day	0.02mg/day	
Mercury	0.002	0.002	0.0011(20%)
Nickel	1.0	1.0	
<u>ORGANICS</u>			
Benzene	0.235	0.235	
Chlorobenzene	4.3	4.3	0.3(20%)
Carbon Tetrachloride	4.0	0.16	
1,4 Dichlorobenze(para)	10.7	10.7	
1,2-Dichloroethane	0.74	0.74	
1,1-Dichloroethylene	2.0	1.0	0.07(20%)
cis-1,2-Dichloroethylene	4.0	1.0	0.07(20%)
trans-1,2-Dichloroethylene	20	1.43	0.07(20%)
Ethylbenzene	32.0	3.2	
Pentachlorophenol	1.0	0.3	0.22(20%)
Styrene	22.5	2.0	0.14(20%)
1,1,1-Trichloroethane	140	35	0.2(20%)
2,4,5 TP (Silvex)	0.2		0.052(20%)
Vinyl Chloride	2.6	2.6	
Napthalene			(2.8) ^a

^a calculation based on draft data

RSC - Relative Source Contribution from drinking ingestion

All values in mg/liter unless otherwise noted

Radiation problems can originate with air stripping and soil vapor extraction systems because soils and groundwater can contain substantial concentrations of radioactive radon (radon-222) and thoron (radon-220) gases. Radon and thoron are evacuated along with chemical contaminants during these operations. Also under conditions of long and/or high volume pumping with air stripping systems trace amounts of radon, thoron, and their decay products from the ambient air may also accumulate on the collection media (e.g. charcoal, plastic, etc.). Additional radiation problems may also arise when ion exchange resins used to clean groundwater leads to concentration of naturally occurring radium.

The primary areas of concern are discussed below.

- ° Buildup of radon, thoron and their decay products on the collection media may lead to personnel exposure problems.

Site measurements at several sites to date have detected the buildup of gamma-ray emitters. The amount of buildup will vary depending on the radon and thoron concentrations in the soil or groundwater, the pumping rate, the pumping time and the characteristics of the packing or collection media. Whole body exposure rates that may lead to personnel doses must be determined and doses kept within relevant requirements. Inhalation and ingestion of alpha and beta emitters and skin doses from beta emitters must be considered for personnel working with the contaminated media. In some cases, personnel protection measures and film badging may be required.

- ° Buildup of radon and thoron decay products on collection media may subject them to special transport conditions under the Department of Transportation regulations.

The buildup of decay products on the collection media may lead to concentrations that meet the definition of "radioactive" under DOT regulations. Some of these decay products may have to be handled through storage until decay leads to lower concentrations. Other decay products have long half-lives so that they will not decay appreciably in any reasonable amount of time. Those radionuclides, whether short-lived or long-lived that have not decayed sufficiently at the time of shipment, may have to receive special handling according to DOT regulations in Title 49 of the Code of Federal Regulations.

- ° Buildup of radon decay products on collection media may foreclose their continued or repeated use of the collection media.

Consideration must be made as to whether collection media contaminated with long-lived radionuclides may be reused or recycled back to collection sites. Continued reuse may lead to buildup of long-lived radionuclides that is undesirable.

- ° Buildup of radon decay products on collection media may require their disposal as radioactive wastes.

Where radionuclides with long half-lives have built up on collection media to quantities that can not be sufficiently reduced by storage for radioactive decay, these materials may have to be treated as a radioactive waste depending upon the residual concentrations and the applicable State requirements.

- ° Release of adsorbed radionuclides during the regeneration of collection media may lead to emissions that are subject to State and/or Federal standards or regulations.

The presence of radionuclides on collection media in substantial quantities (shown possible through calculation) may mean these materials might be released during regeneration and may subject the regenerator to State and/or Federal radionuclide emission regulations.

- ° Breakthrough of radon and thoron through the collection media may violate State radioactive emission standards and/or create occupational or public radiation exposure problems.

Breakthrough of radon-222 from charcoal collection media has been shown. Stack emission levels have been measured to 78 picocuries per liter (pCi/L). To compare, the most relevant unrestricted area standards, where the workers or the general public need not be considered occupationally exposed, are the Nuclear Regulatory Commission's (NRC) regulatory limit of 3 picocuries per liter (pCi/L) for radon-222 and 10 pCi/L for radon-220. Strictly, the NRC regulations do not directly apply to Naturally Occurring Radioactive Material (NARM), but State regulations which can govern NARM, are usually identical to the NRC's. Thus, if annual average ambient concentrations for radon and thoron that result from these site cleanup operations exceed 3 pCi/L and 10 pCi/L, respectively, they may be in violation of State radiation emission standards.

- ° Emission of radon and thoron when collection media are not used may be substantially greater than when collection media are in place.

Radon and thoron exist naturally in the ground at high concentrations. Without collection media, these radioactive materials would be emitted out system stacks and directly into the environment. Emission levels are anticipated to be higher than when collection media are in place. Consequently, there is an even greater likelihood of the State or relevant Federal radiation requirements being violated.

- ° Use of ion exchange resins in water treatment systems may lead to a buildup of radium on the resins that must be handled in accordance with State radiation requirements.

Where groundwater is treated by ion exchange technology subsequent to air stripping, a potential exists for the concentration of soluble and insoluble radium in the backwash and sludge respectively. Radium is controlled by State radiation programs (not the Nuclear Regulatory Commission). Buildup of radium may lead to greater than exempt quantities so that these materials will have to be treated in accordance with State radiation rules. Moreover, the disposal of liquid and solid radioactive materials will have to be in accordance with State radiation rules.

Region V Radiation Staff are continuing to investigate these problems through calculations, through site studies and through regulatory investigations. As our understanding of the problems and their ramifications develop we will make this information available.