ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122, 260, 264, and 265

[SWH-FRL 2172-8]

Hazardous Waste Management System; Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; and EPA Administered Permit Programs

AGENCY: Environmental Protection Agency.

ACTION: Interim final rule with request for comments.

SUMMARY: The Environmental Protection Agency (EPA) is required by the Resource Conservation and Recovery Act (RCRA) to issue standards applicable to owners and operators of hazardous waste management facilities. These standards are to be used in issuing permits for facilities that treat, store, or dispose of hazardous waste. Accordingly, EPA is today issuing interim final standards applicable to owners and operators of new and existing hazardous waste land disposal facilities and the corresponding procedures for permit applications. EPA is also issuing conforming amendments to some existing hazardous waste regulations.

DATES: Effective date: These interim final regulations become effective on January 26, 1983, which is six months from the date of promulgation as RCRA Section 3010(b) requires.

In accordance with the Paperwork Reduction Act of 1980, (44 U.S.C. 3507), the reporting or recordkeeping provisions that are included in this final rule will be submitted for approval to the Office of Management and Budget (OMB). They are not effective until OMB approval has been obtained under the Act. EPA will publish a notice of the effective date of the reporting and recordkeeping provisions of this rule after it obtains OMB approval.

Comments must be submitted on or before November 23, 1982.

ADDRESS: Comments should be sent to Docket Clerk, Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, telephone (202) 382-4487.

Comments on today's rule should identify the regulatory docket as follows: "Docket 3004, Permitting Standards for Land Disposal Facilities." Comments pertaining specifically to regulatory amendments to 40 CFR Part 122 should be marked "Docket 3005, Permitting Requirements for Land Disposal Facilities." The public docket for these regulations is located in Room S269C, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C., and is available for viewing from 9:00 a.m. to 4:00 p.m. Monday through Friday, excluding holidays.

FOR FURTHER INFORMATION CONTACT: For general information contact the RCRA hazardous waste hotline, Office of Solid Waste (WH-563), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, telephone (800) 424-9346, or in Washington, D.C., 382-3000.

For information on the technical aspects of this regulation contact: John P. Lehman, Director, Hazardous and Industrial Waste Division, and Acting Director, Land Disposal Division, Office of Solid Waste (WH-565), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, telephone (202) 755-9185.

SUPPLEMENTARY INFORMATION:

Preamble Outline

I. Authority

These regulations are issued under the authority of Sections 1006, 2002(a), 3004, and 3005 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. 6905, 6912(a), 6924, and 6925.

II. Background

A. Structure and Status of the Hazardous Waste Regulatory Program

1. *Program Structure.* Subtitle C of RCRA creates a "cradle-to-grave" management system intended to ensure that hazardous waste is safely treated, stored or disposed of. First, Subtitle C requires EPA to identify hazardous waste. Second, it creates a manifest system designed to track the movement of hazardous waste, and requires hazardous waste generators and transporters to employ appropriate management practices as well as procedures to ensure the effective operation of the manifest system. Third, owners and operators of treatment, storage and disposal facilities must comply with standards that "may be necessary to protect human health and the environment" which are established by EPA under Section 3004 of RCRA. These standards are generally implemented through permits that are issued by authorized states or EPA to owners and operators of hazardous waste treatment, storage, and disposal facilities.

All substantive RCRA Subtitle C regulations that impose new requirements (including today's permitting standards for land disposal facilities) become effective six months after their promulgation by EPA. Under Section 3005(a), on the effective date of the Section 3004 standards (the first set of which became effective on November 19, 1980), all treatment, storage, and disposal of hazardous waste is prohibited except in accordance with a permit that implements the Section 3004 standards.

Recognizing that not all permits would be issued within six months of the promulgation of Section 3004 standards, Congress created "interim status" in Section 3005(e) of RCRA. Owners and operators of existing hazardous waste treatment, storage, and disposal facilities who qualify for interim status are treated as having been issued a permit, until an authorized state or EPA takes final administrative action on their permit applications. Interim status does not relieve a facility owner or operator of complying with Section 3004 standards.

2. *Regulation Development Status.* To implement the various sections of Subtitle C of RCRA, EPA has issued the following sets of regulations in Title 40 of the Code of Federal Regulations:

Part 260.—Hazardous Waste Management System: General
Part 261.—Hazardous Waste Management System: Identification and Listing of Hazardous Wastes
Part 262.—Standards for Generators of Hazardous Wastes
Part 263.—Standards for Transporters of Hazardous Wastes
Part 264.—Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
Part 265.—Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
Part 267.—Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities
Parts 122–124.—Consolidated Permit Regulations (including permit regulations for hazardous waste facilities and State program authorization)

These regulations have been promulgated in several stages and are contained chiefly in the following Federal Register publications:

1. 45 FR 33066, May 19, 1980: Parts 260–263 and 265, general provisions of Part 264, and Parts 122–124.

2. 45 FR 47832, July 16, 1980: Listing of additional hazardous wastes in Part 261.

3. 46 FR 2804, January 12, 1981: Parts 264 and 122, standards for storage and treatment facilities; and Parts 264, 265, and 122, standards for closure, post-closure care, and financial responsibility.

4. 46 FR 7666, January 23, 1981: Parts 264 and 122, standards for incinerators.

5. 46 FR 12414, February 13, 1981: Part 267, interim permitting standards for four classes of new land disposal facilities.

While implementing these regulations, EPA has been continuously re-evaluating them. In some cases, EPA has discovered that implementing particular provisions could lead to unanticipated adverse consequences. In others, EPA has determined that certain requirements either were unnecessary to protect human health and the environment or could be modified to achieve the desired environmental result more effectively. Finally, some regulations required further clarification. As a result, EPA has at various times revised some of the regulations listed above. The regulatory amendments, notices of suspension, and notices of extension of compliance deadlines are listed below:

1. 45 FR 72024, October 30, 1980: Amended § 261.4 regarding when a hazardous waste generated in storage or transportation units or manufacturing processes becomes subject to RCRA; amended § 260.10 to modify the definition of "generator" and added other definitions.

2. 45 FR 72035, October 30, 1980: Temporarily excluded from hazardous waste status wastes that currently are deemed hazardous solely due to the presence of trivalent chromium.

3. 45 FR 72037, October 30, 1980: Delisted waste from the leather tanning and titanium dioxide production industries.

4. 45 FR 72040, October 30, 1980: Technical amendment to clarify the "Analytical Procedures for Analyzing Extract Contaminants" in Appendix II of Part 261.

5. 45 FR 74884, November 12, 1980: Published a final list of certain hazardous wastes previously listed in an interim final regulation.

6. 45 FR 76074, November 17, 1980: Suspended the applicability of Parts 122, 264, and 265 to owners and operators of wastewater treatment tanks under the NPDES program and to owners and operators of neutralization transport vehicles, or containers and tanks that neutralize wastes that are hazardous only because they exhibit the "corrosivity" characteristic or are listed only for that reason.

7. 45 FR 76618, November 19, 1980: Excluded from Subtitle C regulation (1) solid waste from certain mining operations, and (2) cement kiln dust.

8. 45 FR 76620, November 19, 1980: Clarified the special requirements for generators of small quantities of hazardous waste.

9. 45 FR 76624, November 19, 1980: Eliminated the distinction between on-site and off-site accumulation for treatment, storage, or disposal.

10. 45 FR 76626, November 19, 1980: Clarified that the Part 264 and 265 standards and Part 122 permitting requirements for treatment and storage of hazardous wastes are not applicable to (1) actions taken to immediately contain and treat spills of hazardous wastes, and (2) materials that, when spilled, become hazardous wastes.

11. 45 FR 76630, November 19, 1980: Clarified the circumstances under which hazardous waste management facilities may qualify for interim status.

12. 45 FR 78524, November 25, 1980: Clarified the situations in which residues of hazardous wastes in drums, barrels, tank trucks, or other types of containers must be managed as hazardous wastes.

13. 45 FR 78530, November 25, 1980: Delisted wastes that are hazardous solely because they exhibit the "EP toxicity" characteristic, are generated in the arsenical treatment of wood or wood products, and are generated by people who use such wood or wood products for the wood's intended end use.

14. 45 FR 78532, November 25, 1980: Finalized the lists of commercial chemical products, off-specification products, and intermediates that when discarded or intended to be discarded are considered to be hazardous wastes, and removed all trade names from the lists.

15. 45 FR 80286, December 4, 1980: Provided that a hazardous waste generated in a product or raw material pipeline is not subject to regulation until it is removed from the pipeline in which it was generated, unless it remains in the pipeline for more than 90 days after the pipeline ceases to be operated for the purpose of transporting product or raw materials.

16. 45 FR 86966, December 31, 1980: Clarified when a transporter handling shipments of hazardous waste is required to obtain a storage permit.

17. 46 FR 2344, January 9, 1981: Amended definition of "existing hazardous waste management facility"; clarified "construction"; added definition of "Federal, State, or local . . . approvals or permit"; and amended permit requirements to allow new hazardous waste management facilities (other than land disposal facilities) to commence construction before receiving permits.

18. 46 FR 4614, January 16, 1981: Finalized the listing of thirteen hazardous wastes from specific sources; deleted two wastes from the interim final hazardous waste list; and deferred action on and suspended the effectiveness of the listing of nine wastes in interim final form on July 16, 1980, and deferred action on one waste proposed on that date.

19. 46 FR 5616, January 19, 1981: Revised public participation requirements in the state enforcement process during interim authorization.

20. 46 FR 7964, 8298 and 8312, January 26, 1981: Amended Part 123 requirements for authorization of state programs.

21. 46 FR 13492, February 20, 1981: Amended interim status regulations to allow liquid ignitable wastes in containers to be disposed of in landfills until May 19, 1981, under specified conditions.

22. 46 FR 18025, March 23, 1981: Corrected hazardous waste regulations issued on January 12, 1981.

23. 46 FR 27119, May 18, 1981: Deferred effective date of financial requirements from July 13, 1981, to October 13, 1981.

24. 46 FR 27473, May 20, 1981: Made technical corrections to many of the rules listed above.

25. 46 FR 33502, June 29, 1981: Extended to November 19, 1981, the date for compliance with the interim status standards that prohibited the diposal of containerized liquid ignitable wastes in landfills. Also allowed (without time limitation) the landfilling of solid ignitable wastes.

26. 46 FR 36704, July 15, 1981: Specified new procedures for public participation in hazardous waste permitting.

27. 46 FR 48147, October 1, 1981: Deferred the effective date of financial requirements from October 13, 1981, to April 13, 1982.

28. 46 FR 55110, November 6, 1981: Amended Part 264 and Part 122 regulations concerning piles and containers to better tailor the standards to the types of hazard posed by specific situations.

29. 46 FR 56582, November 17, 1981: Exempted certain categories of mixtures of solid wastes and hazardous wastes from the presumption of hazardousness.

30. 46 FR 56592, November 17, 1981: Amended the interim status standards for the disposal of ignitable, reactive, and containerized liquid wastes in landfills to allow the land-disposal of small containers of liquid and solid waste that are placed in overpacked drums (lab packs).

31. 47 FR 1248, January 11, 1982: Amended the regulations waiving permit requirements for accumulation of wastes on-site for less than 90 days to (1) clarify that the provision applies to all generators, including those who accumulate hazardous waste for the purpose of use, reuse, recycling, and reclamation; (2) remove the requirements for the use of Department of Transportation-approved containers; (3) revise labelling requirements for accumulated wastes; and (4) allow an extension of the 90-day accumulation limit in certain circumstances.

32. 47 FR 1254, January 11, 1982: Provided an opportunity for neutralization surface impoundments to obtain waivers from interim status ground-water monitoring requirements.

33. 47 FR 7841, February 23, 1982: Delayed the compliance dates for: (1) the submission of annual reports; (2) the submission of initial-year quarterly ground-water monitoring data; and (3) the preparation of ground-water quality program assessment outlines.

34. 47 FR 8304, February 25, 1982: Delayed the date for compliance with the interim status standard prohibiting the disposal of containerized liquid wastes in landfills.

35. 47 FR 12316, March 22, 1982: Amended the interim status regulations governing the disposal of containerized liquid hazardous wastes in landfills.

36. 47 FR 15032, April 7, 1982: Amended the financial responsibility regulations to provide additional options for owners or operators to demonstrate financial responsibility.

37. 47 FR 15304, April 8, 1982: Amended the Part 122 regulations to make minor changes in miscellaneous requirements.

38. 47 FR 16544, April 16, 1982: Amended the liability coverage requirements to: (1) add an option of a financial test as a means of demonstrating liability coverage; (2) add an option of submitting a certificate of insurance as evidence of insurance; and (3) change the requirements for the endorsement and certificate.

39. 47 FR 27520, June 24, 1982: Amended the permitting and interim status regulations for hazardous waste incinerators to: (1) exempt certain corrosive and reactive wastes; (2) change the performance standards for hydrogen chloride and particulate emissions; and (3) clarify permit requirements before, during, and after trial burns.

The regulations discussed above have covered most aspects of hazardous waste control under Subtitle C of RCRA, but have failed to fully address a major component—Part 264 permitting standards for land disposal facilities. Today's promulgation contains those standards for new and existing land disposal facilities (except underground injection wells).

B. History of Rulemaking for Land Disposal Standards

EPA has promulgated today's permitting standards for hazardous waste land disposal facilities after considering, and obtaining public comments on, a wide range of regulatory options. Over a period of several years, EPA has proposed two different sets of standards and, in two separate Federal Register notices, solicited comments on various land disposal issues. Furthermore, as discussed in the next section, EPA has already promulgated interim standards for four classes of new land disposal facilities.

EPA originally proposed technical standards for permitting land disposal facilities on December 18, 1978 (43 FR 58982). The basic approach was to set uniform design requirements for land disposal facilities, subject to opportunities for variences when alternative designs could achieve equivalent environmental protection. A 90-day comment period was provided. Many commenters criticized the proposal, arguing that it was not sufficiently flexible (despite its incorporation of variances) and not adequately oriented toward a clearly articulated regulatory goal.

In response to public comments, EPA reconsidered the proposed approach of design standards. Based on this reconsideration, EPA tentatively selected a risk assessment approach. On October 8, 1980, EPA published a supplemental notice of proposed rulemaking (45 FR 66816), in which EPA outlined four regulatory options and announced its tentative selection of the risk assessment approach. EPA provided a 30-day comment period.

On February 5, 1981, EPA reproposed technical standards for permitting land disposal facilities (46 FR 11126). The reproposal adopted a site-specific risk-assessment approach. This approach would have required the permit writer, based on information and predictions submitted by the applicant, to evaluate the potential risks to human health and the environment that would be posed by a particular facility's location, design, construction, and operation. Due to the complexity of the proposed regulation and the importance of the issues involved, an eight-month comment period was provided.

To further promote full discussion of the complex technical and policy issues concerning the various types of land disposal practices and the appropriate means of regulating them, EPA published a supplemental notice of reproposed rulemaking on May 26, 1981 (46 FR 28314). The notice presented many questions relating to these issues and requested comment on them. The questions addressed various regulatory approaches, including site-specific risk assessment, broad design standards, location standards, containment standards, and alternatives to land disposal. It also invited comment on diverse technical questions and on practical considerations, such as the administrative burdens that are likely to be imposed by various regulatory approaches and the likelihood of public acceptance of facilities permitted under these different approaches.

Finally, on December 21, 1981, EPA held a public meeting to discuss EPA's reappraisal of its regulatory approach and its movement towards the combined approach of ground-water protection standards plus design and operating standards. A 14-day comment period was provided. Thus, the public was provided opportunity to comment on the outline of today's regulatory approach, which grows out of (and modifies

somewhat) the basic elements discussed in December 1981.

Together, the various proposals and notices outlined above have addressed the basic features of many different options for regulating land disposal under Subtitle C of RCRA. Furthermore, numerous public hearings, meetings, and technical symposia have been held to assist EPA to develop appropriate land disposal standards. The regulations promulgated today are based upon prior proposals and public comments responding to the proposals and combine those features that the Agency believes will best effectuate the purposes of RCRA. These features are discussed later in this preamble in the context of the specific regulatory provisions promulgated today.

C. Promulgation of Part 267 Standards for New Land Disposal Facilities

At the time of the February 5, 1981, reproposal of land disposal standards, EPA was particularly concerned about the lack of permitting standards for new land disposal facilities. The lack of such standards precluded the construction and operation of new environmentally sound facilities and posed potential difficulties for new industrial facilities that needed to rely upon the on-site disposal of hazardous wastes. To alleviate this short-term problem, EPA promulgated interim standards for four classes of new land disposal facilities (landfills, surface impoundments, land treatment units, and Class I underground injection wells) in 40 CFR Part 267 on February 13, 1981 (46 FR 12414).

Section 267.2 provides that Part 267 applies only to the owner or operator of a new hazardous waste landfill, surface impoundment, land treatment unit, or Class I underground injection well, who has applied for a permit and for whom public notice of the preparation of a draft permit has been issued either prior to February 13, 1983, or six months after Part 264 regulations for the facility become effective, whichever is sooner. Thus, the Part 267 regulations will cease to apply to landfills, surface impoundments, and land treatment units six months from today—January 26, 1983. After that date, only permit applications that have already reached the draft permit stage will continue to be processed under Part 267.

The Part 267 standards for injection wells will remain in effect until February 13, 1983. EPA intends to extend the Part 267 standards for injection wells beyond February 13, 1983, if Part 264 standards for such units are not promulgated by that date. EPA requests comments on this approach. The development of Part 264 standards for injection wells is discussed in section IV.B.3 of this preamble.

D. Court Order Requiring the Promulgation of Today's Regulations

Based upon the public comments submitted in response to the February 5, 1981, proposal and the May 26, 1981, supplemental notice, EPA concluded that a thorough review and modification of its regulatory strategy for land disposal of hazardous wastes would be required. To ensure that all aspects of this complex issue could be integrated into the land disposal standards, EPA intended to promulgate these standards in the fall of 1983. However, on November 13, 1981, EPA was directed by a court order in *State of Illinois* v. *Gorsuch* (D.D.C., Civil Action No. 78–1689) "to promulgate regulations for existing hazardous waste land disposal facilities on or before February 1, 1982". After unsuccessfully moving for reconsideration of the court order, EPA filed an appeal with the U.S. Court of Appeals for the District of Columbia Circuit. The D.C. Circuit granted EPA a stay of the Court order pending the outcome of the appeal. On June 7, 1982, the D.C. Circuit ordered EPA to promulgate today's regulations by July 15, 1982.

EPA has promulgated today's regulations ahead of the schedule which the Agency had desired, in order to comply with the D.C. Circuit's court order. While the Agency feels that today's regulations are reasonable and comply with the requirements of Section 3004 of RCRA, they are not the same regulations that EPA would have liked to issue in the fall of 1983. As discussed elsewhere in this preamble, EPA hopes to improve these regulations in the future by developing (1) numerical criteria for certain design performance standards expressed today only in narrative terms, and (2) specific standards that are tailored to specific wastes, locations, and management practices.

III. Summary of the Part 264 Land Disposal Regulations

The regulations promulgated today in 40 CFR Part 264 apply to all landfills, surface impoundments, waste piles, and land treatment units used to treat, store, or dispose of hazardous waste. They apply to both new and existing waste management units and distinguish between these units in appropriate circumstances.

Conforming changes have been made in the permitting standards in Part 122, the definitions in Part 260, and the interim status standards in Part 265. The regulations will, upon their effective date, supersede the Part 267 regulations for new landfills, surface impoundments, and land treatment units that were promulgated on February 13, 1981. They will also supersede the Part 264 Subparts K and L standards for surface impoundments and waste piles that were promulgated on January 12, 1981.

The regulations consist primarily of two sets of performance standards. One (Subparts K–N of Part 264) is a set of design and operating standards separately tailored to each of the four types of units covered by the regulations. The other (Subpart F) is a single set of ground-water monitoring and response requirements applicable to each of these units. The former is intended to ensure that owners or operators minimize the formation of leachate and the migration of leachate to the adjacent subsurface soils and to ground water and surface waters. The latter is intended to ensure that owners or operators detect any ground-water contamination, and perform corrective action when such contamination threatens human health and the environment.

The design and operating standards require units (other than land treatment units) to have liners to prevent migration of wastes to the subsurface soil or to ground water and surface waters during the active life of the unit. Landfills and piles are also required to have leachate collection and removal systems (such as drains that collect leachate and pumps that remove it) to minimize the leachate remaining after closure. Surface impoundments, for which leachate collection and removal systems are inappropriate (due to the large quantities of liquid that regularly enter the impoundments), are required to remove liquid wastes and/or solidify the wastes at closure to minimize post-closure leaching of wastes. A variance from the liner and leachate collection requirements is available to units where owners or operators demonstrate that wastes from their units will never migrate to ground water or surface water. In addition, existing portions of units are exempt from these requirements.

At closure, all wastes and waste residues must be removed from piles and from surface impoundments that are permitted as storage or treatment facilities at the request of the owner or operator. (Piles may be permitted only as storage or treatment facilities.) Other surface impoundments, as well as landfills, will be closed with the wastes left in place and must be provided with a final cover (capped) at closure. They

must then be maintained and monitored for ground-water contamination during the post-closure care period.

The ground-water protection requirements contained in Subpart F establish a three-stage program to detect, evaluate, and, if necessary, correct ground-water contamination during the active life of the unit plus a compliance period designated in the permit.

The first stage of the ground-water monitoring and response program is a detection monitoring program, which requires the permittee to install a ground-water monitoring system at the waste boundary (including both upgradient and downgradient wells) to monitor the ground water for parameters that would indicate whether a leachate plume has reached the waste boundary. If a plume is detected, a second stage—a compliance monitoring program—is established. The compliance monitoring program tracks the migration of hazardous constituents (constituents on Appendix VIII of Part 261 that are reasonably expected to be in or derived from waste disposed at the facility and that are found in ground water).

The results of compliance monitoring are compared against a ground-water protection standard. The standard requires that hazardous constituents not exceed the following concentration limits:

(1)(a) For any constituent, the background level in the ground water, or

(b) For any of the 14 hazardous constituents covered by the National Interim Primary Drinking Water Regulations (NIPDWR), the maximum concentration limits (MCLs) for drinking water established in those regulations, if the background level of the constituent is below the MCLs, or

(2) Any other limits shown by the owner or operator to not harm human health and the environment.

If the ground-water protection standard is violated, the the third stage—corrective action—is activated. Corrective action must continue until the standard is complied with. Corrective action consists of the removal of the contamination (by pumping or other means) or in-situ treatment of the hazardous constituents.

The regulations provide an option whereby owners or operators may comply with a more stringent set of design and operating standards and thereby obtain a waiver of ground-water monitoring and response requirements. These special standards include two bottom liners (instead of the single liner generally required for new portions of units) and a leak detection system between the liners (in addition to the leachate collection and removal system above the liners generally required for new landfills and piles). If a leak is discovered, the leaking liner must be repaired or replaced, or else the owner or operator then becomes subject to the ground-water monitoring and response requirements. (An additional exemption from the ground-water monitoring and response requirements is provided for piles that are periodically removed from their liner so that the liner may be inspected for leaks.)

Both the design and operating standards and the ground-water monitoring and response program will be implemented through the issuance of permits. In the case of the ground-water monitoring and response program, permit modifications may be required when there is a need to progress from one stage of the program to the next.

IV. Present and Future Regulatory Activities Related to Today's Regulations

Although today's regulations nearly complete the regulatory framework for hazardous waste land disposal facilities, EPA plans to continue working to improve the regulations. Major activities in this regard are discussed below.

A. Interim Final Promulgation of Land Disposal Standards

To comply with the court order in *State of Illinois* v. *Gorsuch,* EPA is promulgating land disposal standards that are in interim final form and thus will become effective six months after promulgation in accordance with Section 3010 of RCRA. As noted above in Section II. B. of this preamble, EPA has previously proposed, discussed in Federal Register notices, or received public comment on, the issues relevant to today's promulgation. However, while based upon previously discussed regulatory approaches, today's standards differ from previous proposals in how they integrate various elements of those approaches. Therefore, EPA desires further public comment on these standards before they take effect. Consequently, EPA is promulgating today's regulation in interim final form. A 120-day comment period is being provided. EPA requests that significant issues be brought to the Agency's attention as soon as possible to enable EPA to make appropriate modifications of the regulations before they become effective.

B. Future Regulatory Activity

1. *Financial Responsibility for Corrective Action.* Section 3004(6) of RCRA requires EPA to establish financial responsibility standards for owners and operators of hazardous waste management facilities as may be necessary or desirable to protect human health and the environment. Thus far the Agency has established standards requiring demonstration of financial responsibility for closure, post-closure care, and liability coverage (Subpart H, Parts 264 and 265, revised interim final regulations promulgated April 7, 1982 (47 FR 15032–15074) and April 16, 1982 (47 FR 16544–16561)). The Agency is considering whether it would be appropriate to establish standards requiring owners and operators of hazardous waste management facilities to demonstrate financial responsibility for any corrective actions required to be taken to comply with the ground-water protection standard. The Agency therefore invites public comment on this and other issues discussed in this section relating to financial responsibility for corrective action.

At those facilities where all other ground-water protection measures have failed and a leachate plume is migrating beyond the compliance point (a point at the waste boundary where compliance with the ground-water protection standard is being measured), corrective action measures are the key means for protecting human health and the environment. EPA believes it important, therefore, that the owner or operator be able to perform corrective action measures if and when they are needed. This certainly suggests a need for financial responsibility to cover corrective action. There are, however, several factors that must be considered in deciding whether such financial responsibility is either necessary or desirable and in formulating requirements for such financial responsibility.

The primary purpose of the financial responsibility requirements for closure and post-closure care is to assure that funds will be available when needed to perform those activities. The Agency established these requirements in light of its conclusion that in their absence, some owners or operators of hazardous waste management facilities would be unwilling or unable to perform closure and post-closure care or make funds available to do so. The Agency imposed these requirements during the operating life of the facility because there is very little economic incentive for an owner or operator of a facility to perform closure and post-closure activities at the end of that facility's useful life when its value is minimal.

Similarly, the primary purpose of any financial responsibility requirements for corrective action would be to assure

that money will be available when needed to conduct necessary corrective action measures. The Agency expects that any financial responsibility requirements for corrective action which it may establish would be similar to the existing financial responsibility requirements for closure and post-closure care. However, there are fundamental differences between the nature of the requirements for corrective action and those for closure and post-closure care. These differences pose difficult questions regarding whether similar financial responsibility requirements are appropriate for corrective action as those established for closure and post-closure care. Unlike the closure and post-closure care requirements, it may be very difficult to determine with a reasonable degree of certainty during the operating life of a facility whether corrective action measures will be required at a facility and if so, the amount of money necessary to perform those measures. Unless these issues are properly resolved, the financial responsibility requirements for corrective action may either provide very little assurance that the necessary corrective action will be performed at a facility when needed, or impose a very high cost upon owners and operators of hazardous waste management facilities which, in many cases, will not require any corrective action.

The most difficult issue facing the Agency is determining when it should require the owners or operators of a facility to demonstrate financial responsibility for corrective action. In developing the financial responsibility requirements for closure and post-closure care, the Agency learned that the cost of demonstrating financial responsibility for activities like corrective action can be quite substantial. However, in the case of the financial responsibility requirements for closure and post-closure care, the Agency concluded that those requirements were appropriate even though the costs are substantial because it is certain that closure and post-closure care will be needed at facilities and they must be provided promptly to protect human health and the environment. In contrast, however, the Agency expects that for many facilities, the only time at which it will be certain that corrective action will be required is shortly before the corrective action measures are to be undertaken. This, in many cases, will be after the facility has closed. Consequently, the Agency is faced with at least three options: (1) requiring the owners or operators of all facilities to demonstrate financial responsibility for corrective action during the operating life of the facility; (2) requiring owners or operators of only those facilities at which the need for corrective action has been established to demonstrate financial responsibility for that action; or (3) requiring the owners or operators of certain facilities to demonstrate financial responsibility only upon the occurrence of some other event (such as the commencement of compliance monitoring).

Each of these options has significant drawbacks. Under the first option, there is a substantial likelihood that many owners and operators will be required to spend substantial amounts of money to demonstrate financial responsibility for corrective action which they will never be required to undertake. Under the second option, there may be a substantial number of owners or operators that will be unable or unwilling to assure that funds will be available for corrective action after their facility has closed, leaving no funds available to perform the needed corrective action. The third option may suffer from the problems presented under both options one and two. The Agency solicits comments on this issue and is specifically interested in suggestions on alternative approaches.

A second major issued relating to the financial responsibility requirements is the appropriate method for determining the amount of funds to be assured. Unlike the closure and post-closure requirements, the amount of money necessary to complete required corrective action may be extremely difficult to estimate before the need for corrective action has been established and may even be difficult to estimate once its need has been established. Consequently, if the Agency were to establish a financial responsibility requirement for corrective action, the Agency would have to develop a basis for determining and appropriate amount of funds to be assured. One alternative is a schedule which establishes various amounts to be assured depending upon the size and type of facility, the number of years which the facility has been in operation, conformity to design and operating standards, and other relevant factors. Comments are requested on these issues.

The Agency expects that financial responsibility for corrective action could be demonstrated by the same financial assurance mechanisms which may be used to demonstrate financial responsibility for closure and post-closure care (trust funds, surety bonds, letters of credit, insurance, financial test and corporate guarantee, and state guarantees). The Agency believes these mechanisms would provide an appropriate level of assurance that funds would be available when needed for necessary corrective action. Insurance, such as is available for on-site cleanup of nuclear waste facilities, may be particularly appropriate for corrective action because of the contingent nature of corrective action. Insurors will be able to spread the risk associated with funding corrective action and thus should be able to reduce the costs which owners and operators would have to bear to provide financial responsibility for this activity. Comments are solicited on whether any other financial mechanism might be used to provide financial assurance for corrective action and whether any modifications of the closure and post-closure mechanisms would be required to make them appropriate for corrective action.

An additional issue related to financial responsibility requirements for land disposal facilities concerns the relationship of the Post-closure Liability Trust Fund under Section 232 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to these regulations. Under CERCLA Section 107(k), the liabilities of a hazardous waste disposal facility are transferred to the Fund only if the following conditions are met:

1. The facility has received a permit under Subtitle C of RCRA;
2. The facility has complied with its permit and has been properly closed in accordance with the permit; and
3. The facility and surrounding area has been monitored for up to five years after closure to demonstrate that there is no substantial likelihood for hazardous substances to migrate off-site or to be released from confinement, or for other risks to public health or welfare.

The Fund does not begin to build up, via a tax on hazardous waste received at qualified hazardous waste disposal facilities, until October 1, 1983.

As EPA develops its approach to financial responsibility for corrective action, it will consider how best to relate that approach to the provisions of the Post-closure Liability Trust Fund under CERCLA. EPA solicits comments on this issue.

2. *Monofills and Neutralization Surface Impoundments.* The Agency believes that two types of waste management units covered by today's Part 264 permitting standards should not be subject to the full set of standards promulgated today. These are monofills and neutralization surface

impoundments. EPA intends to propose separate standards for these units.

Monofills are landfills, surface impoundments, or waste piles used to treat, store or dispose of one or more of a small group of inorganic wastes. This group includes wastes that are hazardous solely because they exhibit the characteristic of EP toxicity (defined in § 261.24). EP toxicity is a characteristic that indicates the likelihood that certain metals and other constituents could be leached by an acidic leaching medium in significant concentrations. This group is further limited to specific wastes that the Agency formally finds would not leach significant concentrations of these constituents in the absence of an acid leaching medium. At present, the Agency expects that the following wastes may meet the above criteria and thus would be eligible for inclusion in a future regulation concerning monofills:

1. Incinerator ash;
2. Residues from foundry furnace emissions controls;
3. Metal casting molding sand;
4. Cement kiln dust and clinker;
5. Hydroxide and carbonate sludges resulting from the treatment of plating bath waste;
6. Residues from titanium dioxide production;
7. Oven residue from the production of chrome and oxide green pigments (listed in § 261.32 as waste K008); and
8. Emission control dust or sludge from the production of steel (including the waste listed in § 261.32 as K061).

Under management conditions that preclude contact between the above wastes and acids, EPA believes that there may be an extremely low likelihood that significant concentrations of hazardous constituents could leach into nearby ground waters. In essence, although these wastes have the potential to cause substantial harm if mismanaged (since they exhibit the characteristic of EP toxicity), they may be managed in a way that makes it very unlikely for this harm to occur. Therefore, EPA believes that it may be unnecessary to require monofills that prevent waste-acid contact to comply with the full Part 264 standards.

Neutralization surface impoundments are surface impoundments that (1) are used to neutralize wastes that are hazardous solely because they exhibit the characteristic of corrosivity (§ 261.22) or have been listed in Part 261 Subpart D solely for this reason; (2) contain no other wastes; and (3) neutralize the corrosive wastes sufficiently rapidly so that there is no potential for migration of hazardous wastes from the impoundment. EPA believes that, like monofills, neutralization surface impoundments may present low enough risks to ground water to justify the imposition of less than the full Part 264 standards. (Indeed, EPA recently promulgated a regulation that provides an opportunity for neutralization impoundments to obtain a waiver from the Part 265 interim status ground-water monitoring requirements. See 47 FR 1254, January 11, 1982.)

The Agency is preparing a proposal to establish a separate set of standards for monofills and neutralization surface impoundments that are less extensive than the general standards but are equally protective of human health and the environment. It expects to be able to publish this proposal soon. In the meantime, until the final set of reduced standards are promulgated, EPA will assign its lowest land-disposal permitting priority to monfills and neutralization surface impoundments and will focus its permitting efforts on other types of waste management units.

3. *Underground Injection Wells.* Underground injection wells are unique among waste management units in that they are specifically regulated under a separate statute as well as under RCRA. Under the Safe Drinking Water Act (SDWA), EPA regulates the subsurface injection of liquids in wells through the underground injection control (UIC) program. SDWA, Section 1421 *et seq.* UIC regulations are set forth in 40 CFR Parts 122–124 and 146. Where the liquids injected are hazardous wastes, there is overlapping jurisdiction between the UIC program and the RCRA hazardous waste program.

Because of the overlapping jurisdictions between SDWA and RCRA, EPA has promulgated a permit-by-rule for injection wells in § 122.26(b). That section provides that the owner or operator of an injection well disposing of hazardous waste will be deemed to have a RCRA permit if he (1) has and complies with an UIC permit, and (2) complies with special requirements in § 122.45 for wells injecting hazardous waste.

The development of UIC standards under SDWA addressing the injection of hazardous wastes is not yet complete. EPA recently settled two lawsuits that challenged the regulations initially promulgated to implement the UIC program. *Natural Resources Defense Council* v. *EPA* (D.C.Cir., No. 80–1607 and consolidated cases); *American Petroleum Institute* v. *EPA* (D.C.Cir., No. 80–1875A and consolidated cases). Based upon these settlements, EPA has promulgated revised UIC regulations 47 FR 4992, February 3, 1982. Those regulations contained standards for two types of hazardous waste injection wells: Class I wells (those that inject waste below underground sources of drinking water), and those Class IV wells in which waste is injected directly into underground sources of drinking water. UIC standards have not been promulgated for Class IV wells in which waste is injected above underground sources of drinking water.

Because of the interaction between the RCRA and UIC programs, EPA could not separately promulgate RCRA standards today for Class IV wells in which wastes are injected above underground sources of drinking water. However, EPA intends to develop standards for this limited set of facilities and issue them in a manner that ensures continued consistency between the UIC and RCRA regulatory programs.

4. *Tailoring of Standards for Specific Wastes.* Apart from the specific regulatory activities discussed immediately above, EPA is conducting regulatory impact analyses for each of the various types of waste management units. In addition, it is conducting a "degree-of-hazard" study which will examine various combinations of waste types and volumes, treatment and disposal technologies, and environmental settings. This study is intended to identify ways in which RCRA Subtitle C standards could be tailored to better address particular problems.

Based upon these studies, EPA hopes to propose appropriate regulatory amendments in 1983 and promulgate them in 1984.

5. *Units Not Covered by Promulgated Standards.* The Part 264 regulations promulgated to date, together with future regulations for underground injection facilities and for underground tanks that cannot be entered for inspection, are intended to regulate all types of treatment, storage, and disposal facilities. It is possible, however, that some hazardous waste management practice is currently used, or may be developed in the future, that does not fit the description of any of the specific units (containers, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, and underground injection wells) that are covered or are soon to be covered by specific Subparts of Part 264.

EPA is considering promulgating regulations in a separate Subpart to address waste management units that are not covered by another unit-specific Subpart. Such regulations would consist of general environmental performance standards similar to those contained in § 267.10.

EPA solicits comments on what type of units, if any, are currently in existence, or likely to come into existence in the near future that are not covered by the current Part 264 regulations. EPA also solicits comments on the appropriate means to write standards for such units in compliance with Section 3004 of RCRA.

V. Relationship of the Part 264 Land Disposal Standards to Other RCRA Subtitle C Regulations

A. Relationship to the Part 265 Interim Status Standards

EPA has made these land disposal standards consistent with the interim status land disposal standards. The basic interim status design and operating standards (*e.g.*, controls on run-on and run-off, freeboard for surface impoundments, inspection, and restrictions on landfilling liquid, ignitable, and reactive wastes) are continued in the Part 264 standards, although sometimes in modified form. In some instances, based upon comments submitted on the May 19, 1980 interim final regulations, EPA determined that some modification of the Part 265 interim status standards is warranted. In such cases, EPA has amended those standards in the Part 265 rules promulgated today and based the new Part 264 standards on the amended Part 265 standards.

One important area where EPA has ensured consistency is ground-water monitoring. As explained in Section VI of this preamble, ground-water protection standards and monitoring requirements are a central element of the Part 264 land disposal standards. Ground-water monitoring systems that have been installed at the limit of the waste management area to comply with the monitoring requirements of Part 265 Subpart F may also be used to perform the ground-water monitoring required by Part 264 Subpart F. Thus while the ground-water monitoring programs in Parts 264 and 265 differ, they are fully compatible.

B. Relationship to the Part 267 Standards for New Land Disposal Facilities

As discussed above in Section II.C. of this preamble, the temporary Part 267 standards for new landfills, surface impoundments, and waste piles expire on January 26, 1983, and will be superseded by today's Part 264 standards on that date.

C. Relationship to Standards for Storage Surface Impoundments and Storage Piles Promulgated on January 12, 1981

On January 12, 1981, EPA promulgated, in interim final form, Part 264 standards for new and existing surface impoundments and waste piles that are used for storage or treatment of hazardous wastes and are designed and operated to prevent discharges into the land, ground water, and surface water (except as authorized by a National Pollutant Discharge Elimination System permit). The standards (40 CFR Part 264, Subparts K and L) provided for the containment of all wastes during the unit's operating life, followed by removal of wastes at closure. No ground-water monitoring was required.

These standards will be entirely superseded by today's regulations on January 26, 1983. Consequently, EPA today is withdrawing its October 20, 1981, proposal to suspend the effective date of the January 12, 1981, standards as they apply to existing storage surface impoundments. (46 FR 51407) Discussions of the major differences between the January 12 regulations and today's regulations, and of how the transition from the January 12 regulations will be effected are contained in Sections VII.F. (Surface Impoundments) and VII.G. (Waste Piles) of this preamble.

D. Relationship to the Consolidated Permit Regulations

Procedures for issuing and modifying hazardous waste permits are contained in 40 CFR Parts 122 and 124. These procedures apply to permitting the land disposal facilities covered by the Part 264 technical standards promulgated today.

The permitting procedures in Parts 122 and 124 will be used in a variety of contexts other than initially permitting facilities. As discussed later in this preamble, the ground-water protection program in today's regulations contains several types of requirements that may need to be specified after the permit has been issued and would thus require interaction between the permittee and permit-issuing authority. These include detailed "compliance monitoring" programs which must be developed and implemented when initial "detection monitoring" indicates that waste constituents have entered the ground water beneath the waste boundary; and corrective action programs that must be developed and implemented when compliance monitoring indicates that the ground-water protection standard has been violated. In each of these cases, the Part 124 procedures will be used to modify the permit.

Today's regulations contain some amendments to the Part 122 permitting standards. These are designed to conform the permit requirements, and especially the permit application requirements, to the new standards promulgated today. See the discussion below in Section VII. K. of this preamble.

E. Relationship to Requirements for State Program Authorization

1. *General Discussion.* Like several other Federal environmental statutes, RCRA authorizes EPA to approve State programs. Once approved, these programs operate in lieu of the Federal program within their respective jurisdictions. See Section 3006 of RCRA. Regulations governing EPA approval of State hazardous waste programs are contained in 40 CFR Part 123 (45 FR 33456, May 19, 1980; 46 FR 7964 and 8298–8310, January 26, 1981).

RCRA is unique among the Federal environmental statutes in providing for two types of approvals of State programs, "interim authorization" and "final authorization". Interim authorization is a temporary approval lasting up to 24 months after a full Federal program has been established; it may be granted to States whose programs are "substantially equivalent" to the Federal program. Final authorization is a permanent approval (subject to withdrawal by EPA for causes specified in Section 3006(e) of RCRA); a State may obtain final authorization by demonstrating that its program (1) is "equivalent to" the Federal program, (2) is "consistent with" the Federal program, and (3) provides adequate enforcement.

2. *Interim Authorization.* Because EPA has promulgated its Section 3004 standards in several stages, it has provided that States may apply for and receive interim authorization in stages. Phase I allows States to administer programs in lieu of and corresponding to that portion of the Federal program which covers identification and listing of hazardous waste (40 CFR Part 261) and generators and transporters of hazardous waste (Part 262 and 263), and establishes interim status standards for hazardous waste treatment, storage, and disposal facilities (Part 265). Phase II allows States to administer permit programs for hazardous waste treatment, storage, and disposal facilities; the permits must apply standards substantially equivalent to the Federal Part 264 standards. As each component of Part 264 standards is

promulgated, EPA announces in a Federal Register notice that States may apply for interim authorization for that component (as well as previously promulgated components). See 40 CFR 123.121(c)(2). In a separate notice in today's Federal Register, EPA is announcing the contents of Component C of Phase II interim authorization, which addresses State program analogs to today's regulations.

3. *Final Authorization.* With the promulgation today of permanent Part 264 standards for landfills, surface impoundments, waste piles and land treatment units, the RCRA Subtitle C program is now virtually complete. Because the Federal regulatory program is almost complete, EPA believes it is now appropriate to begin granting final authorization to States whose programs are consistent with and equivalent to the Federal program and which provide adequate enforcement. In the notice in today's Federal Register announcing the contents of Component C, EPA is also announcing that States may now apply for final authorization.

VI. Strategy For Protection

In assuring that today's regulations adequately protect human health and the environment, EPA has addressed potential adverse effects on ground water, surface water, and air quality. This section describes generally how today's regulations protect each of these three environmental media and how EPA intends to refine its regulatory approach over time.

A. Ground Water

Ground-water protection has been one of EPA's central concerns in devising a regulatory strategy for hazardous waste land disposal. A large number of the documented damage cases from hazardous waste land disposal have involved ground-water contamination. Likewise the legislative history of RCRA, including the damage cases cited in the 1976 Senate Report, indicates that the Congress was quite concerned about ground-water contamination when it created the hazardous waste program. Accordingly, today's regulations deal very explicitly with ground-water protection.

1. *Considerations Guiding the Ground-water Protection Strategy.* EPA's ground-water protection strategy under these regulations has been shaped by a variety of policy concerns. EPA's decisions on the regulations have been particularly influenced by five general considerations of regulatory policy. While several of these have been discussed in previous Federal Register notices on land disposal, it is helpful to discuss them here because they provide a useful context in which to explain the overall strategy of today's regulations. First, EPA has concluded that the regulations should be designed to reduce some of the uncertainties associated with hazardous waste disposal. Such an approach allows owners and operators to do intelligent planning for their operations and helps to assure the public that safe practices are being used. EPA wants to make sure that the issuance of a RCRA permit for a facility means that a certain level of protection is provided and that the public can be assured that the prescribed level of protection will be achieved.

The way to meet this objective is to avoid regulatory schemes that principally rely on complicated predictions about the long term fate, transport, and effect of hazardous constituents in the environment. Such predictions are often subject to scientific uncertainties about the behavior of particular constituents in the hydrogeologic environment and about the effects of those constituents on receptor populations. Likewise, the magnitude of the potential effects depends on future institutional factors (*e.g.*, land-use patterns in the area around the facility, the intentions of the owner or operator to remain at the site) that can also be a source of uncertainty. Therefore, while EPA acknowledges that there are situations where predictions of future effects can be made reasonably, it intends to emphasize regulatory measures that do not require such predictions.

Second, EPA's strategy for protection must consider the unique characteristics of ground water. Ground water is a fragile resource. Once contaminated, an aquifer remains polluted for a relatively long time and it may be extremely difficult to restore the quality of the water in the aquifer. At the same time, it is often easier to limit the impact of polluted ground water on human health and the environment than it is to limit the impact of polluted surface water or air. Ground water does not rovide a habitat for fish or wildlife, and human use of ground water is usually limited to situations where the ground water is withdrawn for particular purposes. Thus by assuring that ground-water quality is compatible with the various uses to which it may be put, EPA can be reasonably sure that human health and the environment will be protected.

Third, EPA has concluded that the standards issued today should not stifle innovation. The recent attention given to hazardous waste management in this country is a relatively new phenomenon. EPA expects that the state of scientific knowledge about how to control hazardous wastes will make significant strides in the next few decades. In order to avoid creating impediments to such technological innovation, EPA has tried to use performance standards whenever possible. Performance standards establish environmental, design, or operating objectives and leave to the owner or operator and the permit-issuing authority the decision of what the most appropriate design and operating measures are for achieving the standard. Besides being more cost-effective, such an approach keeps EPA, the States, and the public focused on the issue that is of greatest concern—the environmental results that can be expected from the facility.

Fourth, EPA has concluded that the purposes of RCRA cannot be achieved unless the standards for land disposal facilities are capable of being implemented in the context of the permit program. Permitting agencies (at the State and Federal level) must be able to issue permits to environmentally-acceptable facilities and to deny permits to those facilities that cannot provide adequate levels of environmental protection.

In order to meet this need, EPA's regulatory approach must be one that can be implemented quickly and that limits the need to conduct complex, time-consuming analyses on the behavior and effects of hazardous constituents in the environment. This latter consideration is particularly important because the national pool of experts on such topics as the fate and transport of hazardous waste constituents in the subsurface environment is quite limited and should be conserved for those situations where such analysis must be done. Therefore, EPA believes that the strategy for protection under these regulations should emphasize standards that provide a clear indication to the regulated community of what is expected. Such certainty should reduce the time involved in acting on permits and should avoid the need for complex analyses with uncertain outcomes.

Fifth, EPA has concluded that the regulated community should be required to devote the bulk of its environmental protection expenditures to measures that are most likely to produce significant environmental results. There is a limited amount of resources available to provide environmental protection and these resources should be used in the most cost-effective manner possible. A regulatory strategy which tends to require exhaustive data collection and analysis prior to

permitting doesn't serve that goal. Expenditures on such analysis are often better spent on design and operating measures that have been shown to be effective in controlling hazardous waste. While EPA is willing to explore new ideas in hazardous waste management with permit applicants, it does not intend to establish standards that require exhaustive analyses in order to determine whether they have been met.

2. *Alternatives Examined.* In the course of rulemaking on the land disposal regulations, EPA has considered (and sought comment) on a variety of alternative approaches to regulation. In previous **Federal Register** notices EPA has identified at least five possible regulatory approaches:

1. Design and Operating Standards—Such standards would require installation of specific equipment or use of particular practices. An example is a liner specification such as 2 feet of clay with a permeability of 10^{-7} cm/sec.

2. Technical Performance Standards—Such standards establish an engineering objective and allow the permit applicant to develop a design or set of practices to achieve the objective. An example is a requirement to develop a run-off control system that can accommodate the water volume from a specified storm event (*e.g.*, 24-hour, 25-year storm).

3. Containment Standard—Such a performance standard would require that the permittee keep waste or waste constituents within a certain area for a fixed period of time. An example is a liner standard requiring that the liner be able to contain waste for 100 years.

4. Environmental Performance Standards—Such standards specify limits (usually numerical) on levels of contamination that may be tolerated in the environment. An example is a ground-water quality standard for the ground water below the facility.

5. Risk Assessment Standard—Such a standard would establish broad narrative criteria to guide the permit-issuing authority in doing a site-specific assessment of the risks associated with the facility and in developing permit conditions that reduce the risk to acceptable levels. An example is a standard which requires the permit applicant to demonstrate that there will be no significant risk of cancer resulting from the facility.

Each of these approaches has its own advantages. Generally, EPA believes that technical performance standards in conjunction with environmental performance standards provide the right mix of certainty and flexibility to be implementable and to assure the proper emphasis on the environmental results of control measures. Wherever possible, today's regulations have relied on these approaches. Performance standards, however, are often difficult to develop and it has not been possible in the time allowed to promulgate these regulations for EPA to develop performance standards for all situations. Therefore, some of the standards in today's regulations draw upon other regulatory approaches (e.g., design standards). Over time EPA intends to refine the land disposal regulations to develop performance standards that apply to more situations and to make more explicit the performance standards established in today's regulations.

3. *Control Strategy.* Based on the considerations outlined above and on the comments received during rulemaking, EPA has developed a strategy for ground-water protection at land disposal facilities that it believes is adequate to protect human health and the environment. The fundamental goal of the regulations is to minimize the migration into the environment of the hazardous component of waste placed in land disposal units. EPA's strategy for achieving this goal has two basic elements. One element is a liquids management strategy for the disposal units at the facility that is intended to minimize leachate generation in the waste management units and to remove leachate from the waste management units before it enters the subsurface environment. This is the "first line of defense" in the sense that it seeks to prevent ground-water contamination by controlling the source of the contamination. The other element of the general strategy is a ground-water monitoring and response program that is designed to remove leachate from the ground water if it is detected. The monitoring and response program serves as a backup to the liquids management strategy.

a. *Liquids Management Program*—When hazardous wastes are in liquid form or are mixed with other liquids, they are in a form which presents the greatest threat to ground water because of their potential for migration in the subsurface environment. EPA believes, therefore, that a systematic effort to reduce the volume of liquids that can potentially enter the subsurface environment should be a basic tenet of any ground-water protection strategy. There are two aspects of a prudent liquids management strategy. First, the generation of leachate should be minimized, primarily by keeping liquids out of the waste management units. Second, reasonable steps should be taken to remove liquids from the units before they enter the subsurface environment.

Today's regulations establish a liquids management strategy for each type of land disposal unit under Subparts K–N. These portions of the regulations establish the principal technical requirements for surface impoundments, waste piles, land treatment units, and landfills. These requirements vary somewhat between Subparts depending on the characteristics of each unit type, but they do fall into a few general categories. To avoid the generation of leachate, the owner or operator of some types of units will be required to control run-on to the unit, to substantially restrict the placement of liquid waste or waste containing free liquids, or to place a cap on the unit at closure. To prevent the migration of liquids into the environment, the owner or operator may be required to place underliners below the waste, to install leachate collection and removal systems, to assure the structural integrity of any dikes used at the unit, to control run-off from the unit, to treat hazardous constituents, or to remove free liquids at closure.

Today's regulations have stated these requirements as performance standards to the extent possible. EPA also intends to issue guidance that will describe specific design and operating measures that may be used to satisfy the performance standards.

EPA believes that the placement of liners beneath the waste in a land disposal unit is often a key element in a general liquids management strategy. It should be emphasized, however, that liners must be viewed as components of an overall liquids management system. A liner is a barrier technology that prevents or greatly restricts migration of liquids into the ground. No liner, however, can keep all liquids out of the ground for all time. Eventually liners will either degrade, tear, or crack and will allow liquids to migrate out of the unit. It is, therefore, important that other measures be taken to remove liquids from the unit during the time that the liner is most effective (*i.e.*, during the active life of the facility). Leachate collection and removal systems at landfills and measures to remove free liquids from surface impoundments at closure are the principal techniques used to remove liquids.

EPA's view of the function of a liner contrasts somewhat with that of some members of the public and the regulated community. Some have argued that liners are devices that provide a perpetual seal against any migration from a waste management unit. EPA has concluded that the more reasonable

assumption, based on what is known about the pressures placed on liners over time, is that any liner will begin to leak eventually. Others have argued that liners should be viewed as a means of retarding the movement of liquids from a unit for some period of time. While this view accords with how liners do in fact operate, EPA does not believe that this is a sound regulatory strategy for ground-water protection because it is principally designed to delay the appearance of ground water contamination rather than to achieve a more permanent solution. Accordingly, EPA views liners as a barrier technology that can be best used to facilitate the removal of liquids from a waste management unit during its active life (including the closure period) and thereby provide a greater assurance of long-term protection at the facility.

While liners may remain effective at preventing migration from the unit until well after closure, their principal role occurs during the active life. After closure, EPA believes that a protective cap becomes the prime element of the liquids management strategy. A well-designed and carefully maintained cap can be quite effective at reducing the volume of liquids entering a unit and therefore can substantially reduce the potential for leachate generation at the unit for long periods.

b. *Ground-Water Monitoring and Response Program*—The second element of the overall ground-water protection strategy in the regulations is the monitoring and response program established in Subpart F. This is a program that requires graduated levels of monitoring and corrective action responsibilities that increase as the evidence of ground water contamination increases.

When there is no evidence of ground-water contamination, the owner or operator is simply required to montor to detect whether leachate has entered the ground water. Once there is evidence that a unit is leaking, the owner or operator takes on the responsibility of defining the potentially dangerous component of the leachate entering the ground water and monitoring to assure that the level of hazardous constituents in the ground water does not exceed concentrations that could adversely affect human health and the environment. If the leachate causes increases that exceed a specified ground-water protection standard for the unit, corrective action measures must be taken to achieve compliance with that standard.

Unlike the liquids management strategy for the unit, which seeks to minimize the total rate and volume of all liquids emerging from the unit, the monitoring and response program forces EPA and the owner or operator to address specific chemical constituents in the leachate coming from the unit. EPA believes that this increased concern with the specific chemical components of leachate is appropriate considering the situation addressed by the monitoring and response program. This element of the ground-water protection strategy is concerned with hazardous waste leachate that has actually entered the ground water and thus is at a point where adverse environmental impacts are most imminent. EPA believes that a careful examination and consideration of the potential effects of the specific constituents in hazardous waste leachate is necessary at that time in order to assure that the statutory mandate to protect human health and the environment is achieved.

In contrast, it is not necessary to know the complete chemical composition of hazardous waste at stages that are more remote from the point of actual impact on the environment. For example, it is not necessary to know every element of a waste before listing it as a hazardous waste. The presence of some constituents which could cause potential hazards to human health or the environment under some management scenario is sufficient to warrant identifying a waste as hazardous. Likewise, at the time of placement of waste in a land disposal unit it would be appropriate to focus on the broad characteristics of the waste, such as the liquid content or corrosive characteristics of the waste. Thus the increased level of concern with the specific makeup of hazardous waste leachate at the time of its discovery in ground water is fully consistent with the general philosophy of the monitoring and response program—increasing attention to the constituents in the waste as the evidence of imminent adverse impact on ground water increases.

The monitoring and response program in today's regulations is to be instituted in the ground water immediately outside the waste management area. EPA believes that the owner and operator should be capable of controlling hazardous constituents in the environment as soon as possible after they appear in the environment. As will be discussed later, there may be some situations in which human health and the environment will not be threatened if hazardous constituents in the ground water move beyond the waste management boundary. This possibility does not, however, obviate the need to establish the monitoring and response program as close to the waste as possible.

Early detection of contamination allows the owner or operator as well as the permitting authority the additional time needed to develop corrective action measures that will be successful and cost-effective. It is also sound policy to conduct corrective action close to the waste in order to minimize ground-water depletion on the aquifer, to increase the cost-effectiveness of the corrective action, and to reduce substantially the possibility that a plume of contamination will migrate beyond the owner or operator's control.

A key element of the monitoring and response program is the establishment of a ground-water protection standard for the waste management units. The principal purpose of this standard is to indicate the level of ground-water contamination that triggers the need for corrective action measures. The ground-water protection standard also defines the constituents that must be addressed in the compliance monitoring program (the monitoring scheme that must be used when hazardous waste leachate has entered the ground water).

Where possible, the ground-water protection standard is based on environmental performance standards that establish numerical concentration limits for individual contaminants. Specifically, EPA has relied on the National Interim Primary Drinking Water Regulations to establish maximum contaminant limits for a particular set of toxic metals and pesticides. EPA hopes to eventually expand the list of constituents for which specific health-based concentration limits may be used.

Where such environmental performance standards are not available for chemical constituents that are known to be hazardous, EPA has provided that the action level which triggers corrective action will be any statistically significant increase over the background level of the constituent in the ground water below the waste management unit. EPA believes that this is a reasonable approach for three reasons. First, as will be discussed in more detail later, it is the best of the available alternatives. Second, a "no increase over background" standard assures that causation (namely the fact that the facility is the source of the increased concentration) is established at the same time that noncompliance with the ground-water protection standard is determined. This approach avoids the possibility that the owner or

operator would be forced to clean up the ground water even though hazardous constituents had not migrated from his units into ground water.

Third, this approach is consistent with a ground-water protection philosophy that seeks to maintain ground-water quality necessary for current and future uses. Background ground-water quality, independent of the effects of hazardous waste disposal, will define the highest use to which a particular aquifer may be put. An aquifer which is already too dirty to be used as a drinking water source will certainly not be transformed into a prime drinking water supply with the advent of hazardous waste disposal activities in the area. A regulatory strategy that prevents increases over background levels of contamination assures that the existing and potential uses of that aquifer will be maintained. In some cases, state authorities may have clearly defined what those uses are. In other areas, these uses may be established by custom or by agreements between private parties. In any case, the maintenance of background quality should ensure that hazardous waste disposal activities will not adversely affect other uses of ground water in the area.

This latter justification for the "no increase over background" standard also suggests a basis for modification of the ground-water protection standard. It is possible that some increases in the levels of particular constituents in ground water can be tolerated without adversely affecting current and future use of the ground water beyond the facility. Accordingly, EPA has provided a mechanism for allowing the establishment of alternative concentration limits, above background levels, for hazardous constituents covered by the ground-water protection standard. EPA has concluded that such an option is a reasonable element of any ground-water protection scheme and does not create a major loophole in the regulatory scheme.

Rational choices can be made about the uses of ground water in an area and about the limits on contamination that are necessary to protect those uses. EPA has concluded that public confidence in such decisions will be enhanced, however, by assuring that a decision to establish an alternative concentration limit is the result of a deliberative process. Therefore EPA has required that there be a full consideration of all relevant factors before setting alternative concentrations limits. Likewise, EPA has made it clear that the burden of proof in justifying an alternative concentration limit lies with the permit applicant.

The effectiveness of the monitoring and response program depends ultimately on the success of corrective action measures. EPA expects that corrective action measures will prove to be effective in many places. The national experience with ground-water cleanup, however, is relatively limited at this time. EPA expects that over time the state of knowledge about ground-water cleanup measures will improve. As our experience with corrective action measures improves, it may be necessary to broaden or narrow the use of corrective action measures in the land disposal regulations.

There are two aspects of the corrective action program established in today's regulations that reflect a recognition of the uncertainties associated with ground-water cleanup. First, EPA has not made corrective action the only means for ensuring ground-water protection at land disposal facilities. EPA has concluded that a sound liquids management strategy can be the prime method for providing long-term protection of ground water at land disposal facilities. The monitoring and response program is a back up program which becomes most important if the liquids management strategy fails. Ultimately, then, this regulatory approach relies on corrective action measures only when all other reasonable measures to control ground-water pollution have failed.

Second, any corrective action program required under today's regulations must be designed to meet the ground-water protection standard by removing waste constituents or by treating them in place. Thus, the program emphasizes measures that are most likely to achieve relatively permanent results, in contrast to corrective action measures that simply create barriers or modify the gradient in the ground water to prevent migration. Such techniques may provide good controls for some period of time but their effects are necessarily less permanent than a strategy that emphasizes removal or in place treatment of contaminants. As discussed below, EPA has decided that owners and operators will not be expected generally to conduct compliance monitoring and corrective action programs forever. It is, therefore, all the more appropriate to emphasize corrective action measures that can be expected to achieve relatively permanent results.

c. *Time Frame of Protection Strategy*—There is often a substantial lag time between the act of waste disposal and the appearance of any adverse effects on ground water from that disposal. This simple physical fact has raised major policy issues that have been some of the most difficult questions that EPA has had to consider in the development of today's regulations.

In the Agency's view, there seems little doubt that the general goal of any strategy for protecting ground water from hazardous waste should be to provide protection for a very long time. Ground water is a relatively abundant resource in this country, but it is also a fragile one that is not easily cleaned up once it is contaminated. Moreover, many of the chemical constituents present in hazardous waste do not degrade over time or do so at very slow rates. Thus, it can be expected that a hazardous waste land disposal unit presents some risk to ground water well into the future.

While this line of thinking may suggest that the regulations should be aimed at perpetual protection, EPA has concluded that no useful purpose is served by announcing a regulatory strategy that professes to protect ground water forever. First, such a professed objective is ultimately misleading. While proper hazardous waste management practices can provide long-term protection, it is impossible to specify with any degree af accuracy how those technologies will perform several hundred years from now. Certainly it is impossible to attempt to predict and design for all potential future turns in human events (e.g., acts of war) and geologic history (e.g., another Ice Age).

Second, such a regulatory philosophy does not reflect a proper attitude toward the future. We cannot assume that our ability to cope with the environmental risks associated with hazardous waste disposal will not improve in the future. (The technology for controlling hazardous wastes in particular is currently in an embryonic stage and EPA expects that substantial progress will be made in this field in the near future.) This is not a misplaced faith in the salvation of future technology but rather a simple recognition that future generations may be much better able to cope with problems of ground-water pollution than we are today.

Therefore, EPA has concluded that its regulatory strategy should seek to provide long-term protection, but it should not profess to provide protection for infinity. EPA considered whether it should specify some fixed time period that would provide an outer bound on how long it can reasonably expect to assure ground-water protection. At this

time, EPA simply has not been able to develop an adequate rationale for such a time frame. (As will be discussed later, EPA intends to initiate several studies to explore whether there is a reasonable basis for specifying such a time frame.)

Therefore, EPA has decided that the basic strategy for today's regulations is to require the owner or operator to take reasonable steps (including the installation of various control technologies) that are likely to provide long-term protection of ground water, without specifying exactly how long these steps are expected to be effective. The liquids management strategy embodied in today's regulations, for example, emphasizes design and operating measures that are designed to reduce the present and future likelihood of leachate migration to ground water. In the monitoring and response program, the owner or operator must be prepared, while he is present at the facility, to take needed corrective action as soon as ground-water contamination appears. Where variances from this responsibility are allowed, the owner or operator must be able to demonstrate that relatively permanent conditions are present in and around the facility that are expected to prevent adverse effects on human health or the environment. Conditions that simply delay the time when adverse effects would occur do not provide a basis for the owner or operator to be relieved of his responsibilites under the monitoring and response program.

In some areas, however, it has been necessary to specify time periods in the regulation in order to make the regulations workable. One such time period is the compliance period (i.e., the time period over which the owner or operator must be ready to perform corrective action once hazardous constituents have appeared in ground water.) The other time period is the post-closure care period. This period defines how long the owner or operator must maintain design features aimed at long-term ground-water protection and how long he must monitor the ground water as long as contamination is not detected.

The compliance period is linked to the active life of the waste management area. It is a time period that is at least equal to the number of years that the regulated unit(s) received waste but it may be longer where additional time is needed to complete corrective action that was ongoing at the time that the normal compliance period ends. In setting the compliance period, the basic objective is to have the owner or operator ready to conduct corrective action during the time that the most significant portion of the leachate plume is emerging from the regulated unit.

There could be two potential reasons for the appearance of contamination in ground water: (1) the regulated unit liner has failed and is allowing leachate to pass through it; or (2) the unit did not have a liner and liquids present in the unit are simply seeping into the ground unobstructed by any barriers. In either case the liquids available for migration to ground water should be sharply curtailed by the placement of the final cover on the unit at closure. In fact, a well-designed and carefully maintained cover should reduce the rate of migration of leachate to ground water to insignificant levels. Thus, the active life of the unit, the period during which the cover is not present, is the time period during which the release of leachate to the subsurface environment is likely to be greatest.

Projecting that same analysis into the ground water, it is logical to assume that once contamination appears in ground water the most substantial release to ground water will occur during a period that is equal to the active life (including the closure period) of the unit. Based on this technical analysis, EPA has concluded that the compliance period for the compliance monitoring program must extend for a time period that is at least equal to the active life of the unit.

EPA recognizes, however, that several technical factors may cause the plume caused by a "no liner" or "failed liner" scenario to continue to appear after a compliance period that is based on the unit's active life. First, the placement of a cover at closure does not immediately shut off the exfiltration of liquid from the unit. Particularly at a landfill there is likely to be a deliquifying period during which liquid in the waste passes down through the waste and into the ground. In addition, various contaminants may move at different speeds through the unsaturated zone below the facility. Thus, the detection of hazardous constituents in ground water may reflect the appearance of the fastest-moving constituents. The slower moving constituents may begin to appear later and continue to appear for a period that is longer than the compliance period (i.e., the period equal to the active life of the unit) as measured from the first appearance of the fastest-moving constituent.

The regulations account for this phenomenon, if it occurs, with a variance. If a corrective action program is under way when the normal compliance period ends, the compliance period will be extended until the ground-water protection standard is achieved. This will ensure that the time period for the compliance monitoring and corrective action programs is linked to the purpose of the program—the removal of the hazardous component of any plume from the unit.

EPA also recognizes that some technical factors could cause the period during which significant amounts of leachate enter the subsoil to be much less than the active life of the regulated unit. The major situation where this would occur is where a liner in the unit provides an effective barrier for some period of time, and the liner does not fail until late in the active life of the unit. At this time, EPA does not know how to account for this possibility in defining what the appropriate compliance period should be because it is not possible to know precisely when the liner actually fails. Accordingly, the regulations provide that the compliance period must extend for a period at least as long as the active life of the unit, based on the assumption that an improperly installed liner may begin to leak as soon as waste disposal begins.

The second major time period used in the regulations concerns post-closure responsibilities. The owner or operator must know how long after closure he must continue to maintain the liquids management measures, such as the cover, and continue to monitor to determine whether hazardous constituents are leaking into ground water. This is a difficult time frame to define because it implies some assessment of how long owners and operators should be held responsible for a unit at which there has been no evidence of ground-water contamination.

The existing hazardous waste regulations have established a post-closure care period that extends for 30 years after closure at a land disposal facility but allows for variances to increase and, in some cases, decrease that time period. EPA promulgated regulations establishing that post-closure care period on May 19, 1980 (45 FR 33066) and received comment on that approach. This time period represents what EPA thinks is a reasonable burden to place on the owner or operator to maintain a presence at the facility. While some commenters have recommended shorter or longer time periods, others have indicated that the existing post-closure care period represents a reasonable burden for the facility owner or operator.

Given the current state of knowledge about hazardous waste disposal and given the record developed in

rulemaking on these regulations, EPA has concluded that this time period is a reasonable way to define the owner or operator's responsibility after closure to continue liquids management measures and to monitor ground water where no contamination has appeared. The Regional Administrator may modify this time period under the regulations where necessary to protect human health and the environment. Such a variance is necessarily open-ended because it can potentially be based on a variety of site-specific factors.

EPA is not entirely satisfied with the way today's regulations address the issue of time in protecting ground water. EPA intends to analyze further the question of whether there is an optimal time frame to be used in a ground-water protection strategy for land disposal facilities. Specifically EPA intends to study each of the following approaches to setting an optimal time frame.

First, EPA will consider whether there is a technical basis for setting a proper time frame. EPA is interested in determining whether the time period can be linked to the likelihood of significant attenuation of constituents in the unsaturated zone. Thus, EPA would explore the circumstances under which, if contamination did not appear in ground water for a certain number of years, it could be concluded that sufficient attenuation had occurred to reduce to insignificant levels the potential hazard of any plume that could reach ground water.

Second, EPA will consider whether there is an optimal time period that balances the need for protection at individual facilities against the need for environmentally-acceptable capacity for land disposal of hazardous waste. At some point, the imposition of long-term responsibilities on owners and operators of land disposal facilities could become so expensive that new facilities would not be developed and that existing facilities would close, thereby reducing the available capacity for hazardous waste that may have to be placed in land disposal facilities. Such a situation would not be desirable as a matter of national environmental policy because it tends to create pressure for the worst forms of uncontrolled hazardous waste disposal.

Third, EPA will consider whether there is an optimal time frame for ground-water protection that balances the cost of additional protection against the benefits derived from increasing the time frame for protection.

B. Surface Water

EPA is also concerned with the impact of hazardous waste land disposal on surface waters. As part of its general liquids management strategy for waste management units, EPA has imposed requirements that should minimize the impact on surface waters. For example, run-off controls at landfills, land treatment units, and piles, and the overtopping requirement at surface impoundments, will avoid the migration of hazardous constituents over the land surface to surface water. In addition, units located in 100-year floodplains must generally be designed to prevent washout, a measure that is primarily concerned with surface water protection.

The general strategy for the protection of ground water in today's regulations should also serve the purpose of surface water protection. Most aquifers are hydraulically connected to surface water. To the extent that today's standards assure protection of ground water upgradient from a surface water body, EPA is also providing protection of that surface water. In fact, as will be discussed later, EPA has built a concern for surface water into the monitoring and response program as well as the design and operating requirements being promulgated today.

In addition, it should be recognized that the surface water effects from hazardous waste land disposal are controlled under other EPA programs besides the RCRA hazardous waste program. Specifically, the discharge of pollutants into navigable waters from a point source is subject to regulation under the Clean Water Act (CWA). Such a discharge must receive a permit under the National Pollutant Discharge Elimination System (NPDES), as provided for in Section 402 of the CWA. Where a hazardous waste land disposal facility has a point source discharge, the appropriate requirements of the CWA must be met for that discharge.

C. Air

For several reasons, EPA has found it very difficult to address the effects of land disposal units on air quality in these regulations. First, EPA has less information and experience with air pollution at these units than with other types of environmental problems (e.g., ground-water contamination.) As a result, less is known about the extent of the problem and about the available control technologies for remedying the problem. This makes it difficult to assess the need for particular requirements to deal with air pollution. Second, based on the information that is available to EPA, it appears that the question of whether a unit has an air pollution problem, particularly where volatile emissions are at issue, is heavily dependent on the nature of the particular waste being placed in the unit. Several of the experts attending EPA's technical symposium on land disposal, for example, indicated that some surface impoundments could have significant air emissions but that the extent of the problem was primarily dependent on the volume of volatile hazardous constituents placed in the impoundment.

Given the limited information on air emissions from hazardous waste land disposal units and the fact that the problem appears to be highly waste-specific, EPA has not attempted to establish extensive control measures for such problems as volatile emissions in these regulations. EPA considered establishing a narrative standard for air emissions that would be analogous to that contained in § 267.10(c) of the temporary standards for new hazardous waste land disposal facilities. EPA decided, however, that it needed more information before it would know how to translate such a broad standard into specific control requirements that could become permit conditions.

EPA has required a few operating measures aimed at avoiding adverse effects from air emissions. Specifically, EPA requires wind dispersion controls to minimize emissions of particulate matter at waste piles, land treatment units, and landfills.

EPA has begun a detailed study of potential air emission problems and will focus first on defining the extent of the problem and the circumstances under which emissions threaten human health and the environment. This work is being done in conjunction with EPA's broader degree of hazard studies and regulatory impact analyses. As a result of that work, EPA may propose banning certain wastes in certain types of units or placing restrictive design and operating standards on units handling significant quantities of volatile wastes in those circumstances where it has clearly identified air pollution problems.

VII. Detailed Analysis of the Rules—Parts 260, 264, 265, and 122

This section of the preamble discusses the specific provisions in today's regulations. Before beginning the discussion, however, it is important to clarify the meaning of various terms used to describe what areas are being regulated at a disposal facility. When using the term "facility," EPA is referring to the broadest extent of EPA's area jurisdiction under Section 3004 of RCRA. In many cases, particularly for off-site facilities, this means the entire site that is under the control of the

owner or operator engaged in hazardous waste management. Within the facility there will be an area where hazardous waste treatment, storage, and disposal activities occur. This is the waste management area.

The waste management area is made up of one or more waste management units. The provisions in the Part 264 and 265 regulations (principally the technical standards in Subparts K–N) establish requirements that are to be implemented on a unit by unit basis. A waste management unit is a contiguous area of land on or in which waste is placed. A waste management unit is the largest area in which there is a significant likelihood of mixing of waste constituents in the same area. Usually this is due to the fact that each waste management unit is subject to a uniform set of management practices (e.g., one liner and leachate collection and removal system).

Today's regulations establish specific requirements for surface impoundments, waste piles, land treatment units, and landfills. Generally, each of these four terms is synonymous with the concept of a waste management unit. For example, a surface impoundment is typically a single depression in the ground in which wastes are allowed to mix. Landfills may, however, present an exception to this general rule. Some landfills are designed as a series of adjacent trenches that are separately lined. In this situation, the term "landfill" can refer to the entire set of trenches. Yet, each individual trench is a separate waste management unit under today's regulations. (The principal practical implication of this distinction arises in determining what area of the facility is subject to the monitoring and response program in Subpart F. This will be discussed in more detail in Section VII.D. of this preamble.)

EPA's hazardous waste management regulations have also used the term "process" to describe a part of the facility. "Process" refers to general classes of waste management activities (e.g., surface impoundments, piles) and thus embodies a set of units that may be present at a facility. For example, a facility may contain three separate surface impoundments, two waste piles, and a single landfill. Such a facility contains six waste management units and three waste management processes (e.g., surface impoundment, waste pile, and landfill.)

In some parts of today's regulations and in this preamble, the term "facility permit" is used in describing a permit issued under Section 3005. While the broad term "facility" is used, this is not intended to mean that a permit can only be issued for all units at a facility. EPA may issue a permit for some set of units at a facility. (Under these circumstances, the interim status standards of Part 265 continue to apply to units that are not covered by the individual permit and have not been formally denied an individual permit.)

Today's regulations also refer to waste management "portions." This is the smallest area typically referred to in these regulations. This simply means some area within the confines of a waste management unit.

Finally, today's regulations have clarified somewhat the terminology used to describe areas used for land treatment. In the past, EPA has used the term "land treatment facility" to describe the plot of ground on or in which land treatment occurs. This area is esentially the waste management unit as just described. Therefore, EPA intends to use the term "land treatment unit" when describing these areas. This shift in terminology is designed to make the language used in the regulations more precise. It does not reflect a substantive change in the scope of the land treatment requirements. Thus, the term "land treatment unit" in today's regulations is synonymous with the term "land treatment facility" used in previously-issued regulations.

A. Definitions (Part 260)

In today's regulations, EPA is adding several definitions to 40 CFR Part 260 that are used in the land disposal regulations. In addition, EPA is replacing one definition and clarifying the meaning of another.

1. *Aquifer.* The term "aquifer" is defined in Part 260 (promulgated on May 19, 1980) as a geologic formation, group of formations or part of a formation capable of yeilding a significant amount of ground water to wells or springs. Public comments have suggested that "significant amount" is an imprecise term which may leave owners and operators in doubt as to which formations constitute aquifers. Commenters correctly pointed out that the concept of a "significant amount" was actually site-specific, depending upon the demand for ground water. Furthermore, commenters stated, the potential yield (amount) of ground water from one well could be dramatically lower than the yield from a cluster or field of wells at the same location. In water-scarce areas, it is not uncommon to install several wells into the same formation to collect sufficient ground water to feed into a public water supply system. The lower the yield to one well, the greater the number of wells necessary to serve the users of a given water supply system.

In the preamble to the December 18, 1978 proposal, the Agency had suggested 600 gallons per day as the minimum yield which would constitute a "usable quantity," based upon the needs of a family of four persons. The Agency used the design specification of 125 gallons per person per day in arriving at this minimum yield. Commenters pointed out, however, that this design specification is only applicable to municipal public water supply streams and includes allowances for washing of automobiles, lawn watering, central sewerage, minimal fire protection, etc. Commenters suggested that, if the agency wished to base the minimum yield specification on the needs of a family of four in a rural area (a typical situation where a single, private, ground-water supply well would be used) an individual demand of between 5 and 50 gallons per person per day, to satisfy health and personal hygiene needs, would be appropriate.

Commenters also stated that many land disposal facilities are sited in areas where saturated upper clay layers are available to serve as a natural barrier to the migration of leachate into the ground water in the actual uppermost aquifer. Since any saturated soil material can yield quantities of ground water to wells, even at an extremely low rate, one interpretation of the definition of aquifer could require the saturated clay landfill liner to be monitored in accordance with the ground-water monitoring requirements.

It was never the Agency's intent to consider saturated clay landfill liners to be subject to ground-water monitoring as an aquifer. However, no acceptable criterion was suggested, nor has the Agency been able to produce a universally acceptable interpretation of "significant amount" which is appropriate in all of the various circumstances that may be encountered.

The Agency wishes to define the term "aquifer" more precisely in a manner that is consistent with both the RCRA program and the Safe Drinking Water Act program, and that reflects the ground-water policy that EPA is currently developing to coordinate its ground-water protection programs. EPA is working on this issue, and will announce its result when the work is completed.

2. *Certification.* The terms "certification", "certify", and "certified" are used throughout the regulations, including those promulgated today, to refer to the rendering of a professional opinion concerning compliance with a

requirement of the regulations by a qualified professional in the field. Commenters have suggested that courts sometimes interpret these terms to imply that certification is equivalent to a guarantee or warranty, thus relieving other parties (e.g., owners and operators) of their responsibilities under regulations as a result of such certifications. This was not intended by the Agency in the various RCRA certification requirements. By requiring a certification, the Agency is seeking an opinion from a professional qualified in the field but does not intend to relieve owners and operators from their responsibilities under the regulations. The definition does not address the potential liabilities of the certifying party. This is a matter to be resolved between the certifying party and the owner or operator in accordance with applicable law. Since EPA still believes the terms "certification" and "certify" accurately denote the Agency's intention, EPA is choosing to define the terms to eliminate possible legal misinterpretation.

3. *Constituent, Hazardous Waste Constituent.* Both the term "constituent" and the term "hazardous waste constituent" are defined in 40 CFR § 260.10 to mean "a constituent which caused the Administrator to list the hazardous waste in Part 261, Subpart D, of this Chapter, or a constituent listed in Table 1 of § 261.24 of this Chapter". However, the first of these terms, "constituent", has been used throughout the RCRA regulations in its common sense (i.e., an element or component of a whole) rather than in reference to constituents listed in Table 1 of Appendix VII of Part 261. To reflect the actual use of this term in the regulations, the term "constituent" has been dropped from the definitions in § 260.10. Therefore, as with other undefined terms, it is to read in its common, everyday sense.

The definition of "hazardous waste constituent" remains unchanged. This term refers to a constituent of a waste which caused the Administrator to list the waste as a hazardous waste or a Table 1 constituent.

4. *Existing portion.* A new term, "existing portion," has been added to § 260.10 to describe the portion of a waste management unit that is exempt from those requirements in Subparts K, L, and N of Part 264 which would involve impractical retrofitting for existing operations. The Agency believes that lateral expansions of existing waste management units (i.e., the placement of wastes on additional land surfaces) after permit issuance should incorporate all of the design standards in Subparts K, L, and N of Part 264 because the construction of features like a liner for such expansions would not require impractical retrofitting. Therefore, today's regulations do not exempt all existing waste management units from liner requirements but do exempt the land surface included in the original Part A permit application on which wastes have been placed prior to permit issuance. This term is used in Subparts K, L, and N of Part 264.

5. *Treatment Zone.* Today's regulations also define "treatment zone", a term used in the Subpart M requirements for land treatment units. This term describes the area within a land treatment unit in which all degradation, transformation, or immobilization of hazardous constituents must occur. For a complete explanation of this term, see the preamble discussion of Subpart M.

6. *Uppermost Aquifer.* The term "uppermost aquifer" is generally understood to mean the first geologic formation beneath the natural ground surface which meets the definition of an aquifer. The uppermost aquifer will be the first aquifer affected by leakage from a facility. In rare situations, however, lower aquifers are hydraulically interconnected with the uppermost aquifer within the facility property boundary. In these situations, hazardous constituents could migrate, via the uppermost aquifer, to lower aquifers. Therefore, when monitoring ground water quality for the purpose of determining compliance with the ground-water protection standard, the entire system of aquifers, rather than just the uppermost aquifer, may be of concern. To avoid the repeated use of the phrase "uppermost aquifer and hydraulically interconnected lower aquifers" throughout Subpart F of Part 264, the term "uppermost aquifer" has been defined in § 260.10 to include the entire system of aquifers which are hydraulically interconnected with the uppermost aquifer within the facility property boundary.

B. Conforming Changes (Part 264, Subparts B, E, G, H)

Because of the promulgation of today's new Subparts and Sections, a number of minor conforming changes are being made in several sections of Part 264. These changes merely add references to the new Subparts and Sections to several existing reference lists in Subparts B, E, G, and H. Specifically, minor conforming changes are being made in § 264.15 (general inspection requirements), § 264.73 (operating record), § 264.77 (additional reports), § 264.112 (closure plan) § 264.117 (post-closure care and use of property), § 264.118 (post-closure plan), § 264.142 (cost estimate for facility closure), and § 264.144 (cost estimate for post-closure monitoring and maintenance).

C. Location Standards (Part 264, Subpart B)

1. *Applicability (§ 264.10).* Section 264.10(b) lists those facilities to which the floodplain standard under § 264.18(b) applies. Storage surface impoundments and storage piles subject to regulation under Subparts K and L, respectively, were made subject to the floodplain requirements of § 264.18(b) when EPA promulgated regulations applicable to these facilities on January 12, 1981. Part 264 standards applicable to other types of surface impoundments and waste piles are being promulgated for the first time in today's rules; § 264.10(b) has been amended to include them as well.

Part 264 standards applicable to hazardous waste land treatment units and landfills are also being promulgated for the first time today and they have been made subject to § 264.18(b), by an amendment to § 264.10(b).

The Agency has concluded that all types of surface impoundments and waste piles, as well as land treatment units and landfills, should be subject to the floodplain standards. In all of these types of waste management units, hazardous wastes could be washed out by floodwaters unless adequate controls are imposed. Consequently, § 264.10(b) is being modified by adding waste management units subject to regulation under Subparts M and N to the list of facilities to which the floodplain standard applies. Sections 264.11 through 264.18(a) remain unchanged by today's rule, except for minor conforming changes to § 264.15, as noted above, It should be understood, however, that § 264.18(a), seismic considerations, applies only to new land disposal facilities.

2. *Floodplains (§ 264.18(b)).* The Agency has concluded that hazardous waste surface impoundments, waste piles, land treatment units, and landfills preferably should not be located in a 100-year floodplain. Facilities so located must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood. However, in accordance with §264.18(b)(1)(i), if the owner or operator demonstrates to the Regional Administrator that, in the event of a flood, the waste would be removed to a

safe area before flood waters reached the facility, special design and operating features to prevent washout are not required. The Agency realizes that this option may not be viable for many existing surface impoundments, waste piles, land treatment units, and landfills. Accordingly, the Agency is promulgating a second exemption, defining narrow circumstances in which existing facilities, not designed and operated to prevent washout, may be located in a 100-year flood plain without the owner or operator's making the demonstration contained in § 264.18(b)(1)(i). These circumstances are where the owner or operator demonstrates that a washout would cause no adverse effects on human health or the environment. Section 264.18(b)(ii) lists the factors that must be considered in making this demonstration. These factors are the following: the volume and characteristics of the waste in the facility; the concentration of hazardous constituents that could result in affected surface waters; current and potential uses of and water quality standards established for affected surface waters; and the impact of hazardous constituents on the sediments of affected surface water bodies or the soils of the 100-year floodplain.

These factors address the principal adverse health and environmental effects that potentially can result from flood washout of hazardous waste land disposal facilities. They are intended to cover the effects that might occur during the flooding washout (*e.g.*, the contamination of river sediments and floodplain soils caused by sedimentation of washed-out hazardous constituents as and after the floodwaters recede). The Agency is unable to provide more definitive criteria because of the wide variations in facility locations, flooding character of adjacent water bodies, types of wastes stored or disposed of in facilities, and other site-specific conditions. The Agency solicits public comment on these factors.

The general floodplain requirements are consistent with the other requirements in Subparts K through N, which are designed to prevent the escape of hazardous waste or hazardous constituents into surface water and hydraulically connected ground waters in order to prevent potential adverse effects on surface water quality. (See also Section VII. E–I of this preamble and the preamble to §264.18(b), 46 FR 2813–2815, January 12, 1981.)

The Agency recognizes, however, that existing hazardous waste surface impoundments, waste piles, land treatment units, and landfills located in 100-year floodplains were placed there before § 264.18(b) applied to them. Consequently, because the preferred option of avoiding location in a 100-year floodplain is not practicably available for those waste management units, they may have to take advantage of one of the two exemptions from this requirement.

With the exception of small impoundments and waste piles, it may be impossible to remove hazardous waste from waste management units before flood waters can reach them. Also, it may be difficult to construct new walls or dikes or elevate existing walls or dikes around these units to prevent washout from a 100-year flood. Retrofitting may not be feasible or practicable for reasons such as: inadequate landspace on which to build new or expanded dikes; inadequate structural capacity of existing walls or dikes to accommodate expansions; and unwarranted disruption of the operation of the existing unit (principally surface impoundments) and, in some cases, associated manufacturing operations, when building or expanding dikes.

The 100-year flood plain rule may seem inconsistent with the requirement that surface impoundments, landfills, land treatment units and waste piles have run-off control systems designed to withstand the effects of a 25-year storm. The two criteria are not inconsistent, however. Although the Agency is concerned about the effects of run-off, these effects are not likely to be as serious as those that would result from a flood. A flood would carry hazardous materials much farther from the facility than would run-off that exceeded the run-off control system, and a flood probably would carry away a greater quantity of hazardous materials. Thus, the environmental consequences of a flood are very great, and waste management facilities generally should not be located where a flood may occur.

D. Ground-water Protection (Part 264 Subpart F)

Subpart F contains the requirements for the monitoring and response program that will serve as a backup to the other ground-water protection measures in today's regulations. The requirements of this subpart define a general set of responsibilities that the owner or operator must meet but allow considerable flexibility in how the monitoring and response programs may be designed.

EPA intends to examine closely the monitoring programs and the monitoring data developed to meet these requirements and to use this information to refine the regulations over time. As in today's regulations, EPA's objective will be to develop a cost-effective monitoring program that will provide reliable information about the effects of land disposal units on ground water in order to ensure protection of human health and the environment.

1. *Applicability (§ 264.90).* a. *Regulated units*—The requirements of this subpart apply to new and existing surface impoundments, landfills, waste piles, and land treatment units that manage hazardous waste. In defining the scope of this subpart, however, it is necessary to define rather precisely the particular waste managment components that are subject to the ground-water monitoring and response program. This subpart uses the term "regulated unit" in defining the portion of the facility that is subject to the requirements of this subpart. A regulated unit is any waste management unit of the above types that receives hazardous waste after the effective date of today's regulations.

A waste management unit can be a regulated unit even though it contains predominantly non-hazardous waste or hazardous waste which was disposed prior to the effective date of these regulations or prior to November 19, 1980, the effective date of the regulations defining what is a hazardous waste (40 CFR part 261) and establishing the permitting requirements (40 CFR 122–125) for hazardous waste management facilities.

Many existing waste management units may contain waste that was placed there before the effective date of these regulations or before November 19, 1980. Some commenters have raised questions about EPA's legal authority to regulate such waste and about the reasonableness of regulating them under a RCRA permit as a policy matter.

EPA believes that it has legal authority under Subtitle C of RCRA to regulate any activity, emission, or release from a facility that is receiving hazardous waste. Section 3004 of RCRA provides that EPA has authority to issue regulations covering owners or operators of treatment, storage, and disposal *facilities* as may be necessary to protect human health and the environment. This section does not limit EPA's authority to those portions of the facility that receive hazardous waste after a specific date.

Section 3005 of RCRA, which provides for issuance of permits to treatment, storage, and disposal facilities, indicates that after the effective date of any Section 3005 regulations any treatment, storage, and disposal of hazardous

waste without a permit is prohibited. EPA does not believe that the prospective nature of this provision operates to limit EPA's standard-setting authority under Section 3004. The prospective nature of Section 3005 reflects the permitting scheme of RCRA. Owners or operators seek permits for a particular future activity (*i.e.*, treatment, storage, and disposal of hazardous waste) at the facility. The owner or operator does not generally seek a permit for actions he has already taken (*i.e.*, previous treatment, storage and disposal activities.) EPA's authority to deny permission to conduct future waste management activities is one of the principal sanctions under the permit program.

As a condition for allowing future waste management activities, however, RCRA provides that the owner or operator must meet the requirements of Section 3004. Under Section 3004, EPA must define the responsibilities of an owner or operator that are necessary to protect human health and the environment. In order to accomplish that objective, EPA may need to impose duties that are designed to remedy the present adverse effects of past activity. Likewise, EPA may require the owner or operator to continue certain activities that are designed to protect human health and the environment after the owner or operator has ceased placing waste into the ground. (Such future responsibilities are the correlative duty that must accompany the current right to dispose of hazardous waste. EPA thinks that those duties can be most effectively implemented through permits.) Under RCRA, an owner or operator who wishes to initiate or continue storage, treatment, or disposal activities at a facility must take on all of these responsibilities. EPA has concluded that these responsibilities must include reasonable measures to address current ground-water pollution attributable to waste placed before the date of permit issuance under these regulations.

EPA has decided that there are sound policy reasons for subjecting regulated units to the ground-water monitoring and response program of Subpart F. First, once wastes are placed in the same unit there is a strong possibility that the constituents in the waste will react with each other to form new compounds or to alter the physical or chemical state of the waste constituents. Some of the interactions may cause the resulting leachate to become more toxic or more mobile in the subsurface environment. At the time that leachate emerges from a unit it is extremely difficult, particularly at units that handle many types of waste, to determine what characteristics of the leachate are attributable to particular wastes. It is therefore appropriate to focus regulatory concern on the leachate as it is and not to speculate on what incremental effect particular wastes have had on the leachate's quality and characteristics.

Another reason for subjecting all waste in a regulated unit to the monitoring and response program is that the management problem posed by a unit is not substantially affected by the timing of when hazardous constituents were placed in the unit. If the unit's liner fails, the leachate can be expected to contain constituents from wastes placed before and after the effective date of these regulations. Likewise, corrective action measures (e.g., counterpumping) do not selectively remove constituents from wastes placed at different times but rather control the entire plume. Thus, once wastes are in the same unit, the nature of corrective action would not be substantially altered by attempts to distinguish between wastes placed in the same unit at different times.

In defining what is a "regulated" unit, however, EPA has sought to address the concern in the regulated community that a permit under Subtitle C may not be the appropriate mechanism for requiring cleanup of contamination from all previous waste management activity at a facility. EPA has defined a regulated unit as one which receives hazardous waste after the effective date of today's regulations.

EPA believes this has several advantages. First, it gives reasonable notice to the regulated community about what the regulations will require and will allow them to adjust their management practices accordingly. It avoids the prospect that the owner or operator would face responsibilities under a permit for units that were operated and fully closed before any of the Section 3004 standards were established. (Any adverse effects on ground water from such units may be addressed under other EPA authorities, including Section 7003 of RCRA.) This approach is certainly consistent with Section 3010 of RCRA which provides that regulations under Subtitle C are to become effective six months after they are promulgated. The legislative history of this provision indicates that the purpose of the provision was to give the regulated community a reasonable time period in which to prepare for new requirements.

Second, this approach ensures that there will be an early incentive to institute the proper design and operating measures to reduce the potential for significant ground-water contamination from regulated units. With the issuance of today's regulations, the regulated community will have the benefit of reviewing EPA's conclusions on what a sound liquids management strategy for a land disposal unit should be. EPA thinks that today's regulations should create incentives to institute reasonable design and operating measures before a permit application is called in for an existing unit and final action is taken on the permit. (EPA acknowledges that it will take several years to complete this process for all existing land disposal units.) By indicating that all units receiving waste after the effective date of today's regulations will ultimately be subject to the monitoring and response program of Subpart F, EPA has created the incentive for owners and operators to take reasonable steps today to reduce the likelihood that they will face long-term responsibilities for corrective action.

There will be situations where it will be difficult to tell whether a plume of contamination comes from a regulated unit. This is most likely to occur when several regulated units are adjacent to other storage or disposal units. As will be described later, the compliance point where there are several regulated units is an imaginary boundary circumscribing all of these units. In such a situation, it may be difficult to determine whether regulated units are causing a leachate plume that appears at the compliance point.

The regulations provide that any waste constituent that migrates beyond the compliance point is presumed to come from a regulated unit. The owner or operator may, however, overcome this presumption if he demonstrates, with monitoring data or other information, that the constituents are coming from another source.

b. Exclusions—There are limited exclusions from the Subpart F requirements. First, any of the general exclusions in § 264.1 remove certain facilities from Subpart F as well. Second, double-lined surface impoundments, piles, and landfills (described in § 264.222, § 264.252, and § 264.302, respectively) are excluded, as are piles complying with § 264.250(c) and § 264.253. The specific elements of these types of units are described in detail in later sections. The reason that most of these provisions provide a basis for an exclusion from Subpart F is that they involve some ongoing method for detecting whether the unit's liner has failed. As long as it is clear that the liner has not failed, EPA and the public can be confident that hazardous constituents

from such regulated units will not enter ground water. The exclusion for a pile designed to satisfy § 264.250(c) is based on the premise that the specified conditions reduce the possibility of leachate generation to such a degree that ground-water contamination is not likely to occur.

Third, the owner or operator of a land treatment unit may suspend compliance with Subpart F requirements if he can demonstrate to the Regional Administrator under § 264.280(d) that the hazardous constituents in the waste have been effectively treated. The requirements for such a demonstration are described in the discussion of land treatment in Section VII. H.8. of this preamble. It should be recognized, however, that this exclusion relieves the owner or operator from Subpart F responsibilities only during the post-closure care period.

Fourth, the owner or operator of a regulated unit may be excluded from Subpart F if the Regional Administrator finds that there is no potential for hazardous constituents to migrate from the regulated unit to the uppermost aquifer during the active life of the unit (including the closure period) and the post-closure care period specified under § 264.117. This exclusion is designed for units located in hydrogeologic settings that prevent leachate migration to ground water for very long periods. In such a setting, hazardous waste leachate would simply not be able to reach ground water during the active life of the unit and the post-closure care period. Where there is a high degree of confidence that such a hydrogeologic setting is present, EPA decided that it would be of little value to require the permittee to implement a detection monitoring program. (Such a program would simply not detect contamination during the active life of the regulated unit plus the post-closure care period.)

Moreover, EPA believes it may be productive to exclude such locations from ground-water monitoring. Such locations are relatively desirable for waste disposal because soils which provide long delays in the arrival of leachate in ground water may also have characteristics that attenuate hazardous constituents. Excluding ground-water monitoring requirements at such locations could encourage the use of such environmentally desirable locations.

This exclusion is based on the premise that it may be unnecessary to require detection monitoring in some favorable hydrogeologic settings. Therefore, it is appropriate that the time frame should be the same as that of the detection monitoring program—the active life of the regulated unit plus the post-closure care period.

This exclusion involves substituting predictions of likely migration to ground water for actual ground-water monitoring. EPA believes that it is extremely difficult to make accurate predictions about the migration of liquids through the unsaturated zone. Several of the experts attending EPA's technical symposium on land disposal held in May of 1981 indicated that they did not have a high degree of confidence in predictions of leachate fate and transport in the subsurface environment. The prinicpal reason for this low confidence in such predictions is that appropriate values for the several variables that need to be considered are often extremely difficult to determine.

Since this exclusion involves substituting inherently uncertain predictions for ground-water monitoring, EPA believes that a safety factor should be built into the exclusion. Thus, today's regulations provide that owners or operators must base any predictions made to qualify for this exclusion on assumptions that tend to maximize the estimated rate of leachate migration. While these assumptions are not specified in the regulations, the following is a list of the types of assumptions that EPA will use in determining whether an exclusion is warranted. Geologists and geotechnical engineers should be familiar with most of these assumptions.

First, the thickness or depth of soil underlying the regulated unit should be determined. This factor can be determined directly by soil core borings. If soil depth estimates are used in the prediction, however, the minimum value in the range of depth estimates should be selected. Second, the calculation of travel time should be based only on natural soil properties, ignoring the effects of synthetic or recompacted natural soil liners placed beneath the waste. Third, the prediction should be based on the travel time of the most dense and/or least viscous fluid in the regulated unit (i.e., the fluid with the lowest kinematic viscosity). For example, some solvents are less viscous than water and thus are likely to move faster than water. Fourth, since the depth of liquids or leachate in a unit can vary, the prediction should assume that the unit is full of liquids (i.e., the maximum possible hydraulic head).

Fifth, the owner or operator should assume that the soil is saturated because fluids will pass through such soils more quickly than unsaturated soils. Sixth, the owner or operator should account for the effective porosity of the soil when making a prediction. Estimations of effective porosity are difficult to make. For this reason, EPA believes that 10 percent effective porosity, a low value, should be used to avoid the uncertainty involved in estimating effective porosity and to ensure relatively short travel time predictions for the soil beneath the regulated unit. Seventh, soil attenuation mechanisms should be ignored in travel time predictions. Eighth, since a regulated unit may have been in operation well before the prediction of travel time is made, an owner or operator should assume that migration of fluids through the soil began when the unit commenced operation.

As another measure to increase confidence in a prediction made to qualify for this exclusion, EPA has required that the owner or operator's demonstration must be certified by a qualified geologist or geotechnical engineer.

Lastly, EPA considered establishing an exemption from Subpart F requirements for a regulated unit located over an uppermost aquifer which is so dirty that it would never be used for any purpose and which, regardless of any future level of contamination, is not capable of significantly contaminating another usable aquifer or surface water that is hydraulically connected. EPA believes that this would be an extremely rare situation, if indeed such a location exists, and has, therefore, chosen not to establish such an exemption at this time. However, EPA requests comments on the existence of such locations and the appropriateness of such an exemption from Subpart F.

2. *Establishment of Programs (§ 264.91).* Under Subpart F the Regional Administrator will be establishing in a facility permit the elements of a monitoring and response program. The purpose of § 264.91 is to make clear that the owner or operator of each regulated unit subject to this subpart must institute some kind of monitoring and response program and that the content of the program will be specified in the facility permit. The other sections of Subpart F provide further elaboration of the content of the various programs.

The owner or operator must institute at least one of the three types of programs set forth in Subpart F—a detection monitoring program, a compliance monitoring program, or a corrective action program. The permit may, however, contain all three and specify the conditions under which each will be used. EPA expects that in many situations it may be appropriate to specify more than one program in a facility permit. For example, it is logical

to have a compliance monitoring program and a corrective action program in the same permit. Then the permittee will be able to shift back and forth between the compliance monitoring mode and the corrective action mode of operation as the levels of hazardous constituents in ground water fluctuate above and below the concentration limits for the constituents.

There may be some incentive to combine programs in the same permit because the establishment of such a program would be a major modification if it occurred after the issuance of the initial permit. A proceeding to modify a permit would be conducted in compliance with EPA permitting procedures and could be time-consuming. Once a program is established in a facility permit, the owner or operator must continue to implement the program unless the permit specifies when certain obligations may terminate or unless the owner or operator obtains a permit modification. It is, therefore, wise for the owner or operator to anticipate when he believes a permit modification will be needed and to assemble the information necessary for such a modification.

Ultimately, the Regional Administrator has the authority to include more than one program in a facility permit even though the owner or operator did not specifically ask for multiple programs. While the owner or operator can only be operating under one program at a time, there will be situations where it is necessary for an owner or operator to take prompt action under his permit when monitoring data indicate that another type of program is appropriate.

The Regional Administrator must have the flexibility to establish in the permit a program that is conditioned on the occurrence of some event (e.g., appearance of contamination) in order to adequately protect human health and the environment. For example, a regulated unit may be located above fast-moving ground water and near an important drinking-water source. In such a situation, the time needed to modify the facility permit to replace a detection monitoring program with a corrective action program could allow substantial damage to occur. In such a situation it might be appropriate to have an approved corrective action program in the permit that would be triggered by the detection of contamination in the ground water. Thus, today's regulations specifically provide that the Regional Administrator may incorporate one or more monitoring and response programs into the facility permit as may be necessary to protect human health or the environment.

Besides being combined with each other, monitoring and response programs may also be linked to other provisions of a facility permit. There are certain design and operating measures that allow owners or operators to forego Subpart F monitoring the response programs. These exclusions, however, terminate if such design and operating measures fail to meet their objectives. Therefore, permittees may want to have a monitoring and response program (*e.g.*, a detection monitoring program) included in the permit even though they employ one of the designs that qualify them for an exclusion. The permit would specify that the Subpart F program need not begin until the design failed. For example, the owner or operator of a double-lined surface impoundment may choose to initiate a monitoring and response program, in lieu of repairing the facility liner, if the liner fails during the active life of the impoundment. Initiation of a Subpart F program is the only appropriate action to take if the owner or operator intends to use a double-liner design to provide protection during the post-closure care period.

While an owner or operator may have more than one monitoring and response program in the facility permit, there are certain minimum requirements specified in § 264.91. If hazardous constituents from a regulated unit have not entered the ground water, the owner or operator must at least have a detection monitoring program. This is to ensure that any leakage from the facility is detected. Once hazardous constituents appear in ground water, the owner or operator must, at a minimum, have a compliance monitoring program that can determine whether the ground-water performance standard is exceeded.

If that standard is exceeded, the owner or operator must have a corrective action program. Compliance monitoring programs and/or corrective action programs will continue through the compliance period under § 264.96. Section 264.91 also indicates that a corrective action program is needed when hazardous constituents under § 264.93 exceed concentration limits under § 264.94 in the ground water between the compliance point and the downgradient facility property boundary. (The rationale for this provision is discussed in Section VII.D.13.d. of this preamble.) It is possible that the compliance period may be shorter than the normal post-closure care period for the facility depending on when contamination first appeared, the length of the regulated unit's active life and the success of the corrective action program.

When the compliance period ends before the close of the post-closure care period, today's regulations provide that the owner or operator must reinstate a detection monitoring program for the remainder of the post-closure care period. In § 264.90(c)(2), the regulations make clear that detection monitoring programs, once instituted, continue through the post-closure care period. (the permitting regulations under 40 CFR § 122.15 provide that the Regional Administrator may initiate a permit modification to establish a detection monitoring program if the compliance period ends before the end of the post-closure care period specified in the permit.)

EPA believes this is reasonable for two reasons. First, since the owner or operator will be present at the facility through the post-closure period under the permit, it is appropriate for him to take all reasonable steps to assure ground-water protection. Since detection monitoring involves a relatively light monitoring burden, it should be relatively easy for the owner or operator to perform. Second, the completion of a successful corrective action program (i.e., a showing that the ground-water protection standard in the permit has not been exceeded for a period of three years) or the completion of the compliance monitoring program does not provide absolute assurance that a plume of significant contamination will never appear below a regulated unit. Since hazardous constituents move at different speeds through soil and since they may be released from the regulated unit at different times, it is possible that a plume of contamination could appear several years after an initial plume from the unit had been detected and cleaned up. Therefore, a detection monitoring program is needed to determine whether such a delayed plume appears.

The nature of the program established in the initial permit will depend on the information available at the time of permitting. The key question is whether a regulated unit has begun to leak. For new units this is not an issue, but it may be somewhat problematic for existing units. Since the owners or operators of most existing units will be conducting monitoring in accord with the Part 265 interim status requirements, there should be a reliable base of information that can be used to determine whether hazardous constituents have entered the ground water.

The issue of whether a regulated unit qulifies for one of the exclusions in § 264.90 will also be addressed in the

initial permitting process. An applicant who believes he qualifies for such an exclusion will submit information to demonstrate that fact in his permit application. He may also wish to submit the information necessary to establish a Subpart F monitoring and response program as well in case EPA determines that he does not qualify for the exclusion.

3. *Ground-water Protection Standard (§ 264.92).* The ground-water protection standard in § 264.92 indicates when corrective action is necessary to control plumes of contamination that have emerged from a regulated unit. The ground-water protection standard essentially tells the owner or operator when corrective action must begin and when it may be terminated. In this way, the ground-water protection standard provides protection for human health and the environment.

There are four principal elements of the ground-water protection standard: (1) The hazardous constituents to be monitored and removed if necessary; (2) the concentration limits for each hazardous constituent that trigger corrective action; (3) the point of compliance for measuring concentration limits; and (4) the compliance period. Each of these elements of the standard is described in a separate section of Subpart F.

The ground-water protection standard will be established when hazardous constituents from a regulated unit appear in ground water. As will be discussed later, a waste constituent must be in the ground water before it can be part of the ground-water protection standard. There may be situations where an owner or operator will want to anticipate events and establish elements of the ground-water protection standard before hazardous constituents actually appear in ground water. For example, if he expects that a particular constituent that is prevalent in his waste will eventually migrate to ground water and be selected as a hazardous constituent, he may want to establish an alternative concentration limit for that constituent under § 264.94. While today's regulations do not preclude the establishment of elements of the ground-water protection standard before leachate from a regulated unit appears in ground water, EPA does not intend to give first priority to such requests. EPA must use its available resources to give prompt consideration to the establishment of ground-water protection standards at facilities that are contributing leachate to ground water.

Where it establishes concentration limits before contaminants arrive in ground water, EPA is essentially establishing a partial compliance monitoring program for a regulated unit that is conditional on appearance of contaminants in the ground water. Once contamination actually appears in ground water and a permit modification proceeding is triggered, the Regional Administrator may reassess the justification for the alternate concentration limit in light of the information available at the time that the ground-water protection standard is actually established.

Finally, it should be recognized that the ground-water protection standard is not a general performance standard that applies directly to owners or operators. Under a permit an owner or operator is responsible for conducting the monitoring and corrective action measures that are designed to achieve the ground-water protection standard. If monitoring indicates that the ground-water protection standard is exceeded, the owner or operator is responsible for taking certain actions specified in the permit. If he fails to take these actions, he is subject to enforcement action; if the actions specified are inadequate to bring the facility back into compliance with the ground-water protection standard, the permit must be modified. Section 122.15(a)(7) has been amended to provide that a permit may be modified when the corrective action program has not brought the regulated unit back into compliance with the ground-water protection standard within a reasonable period of time.

4. *Hazardous Constituents (§ 264.93).* In keeping with the regulatory philosophy described earlier in this preamble, the objective of the Subpart F monitoring and response program is to remove the hazardous portion of any leachate plume that has reached ground water from a regulated unit. Thus, in establishing the ground-water protection standard for the facility, the Regional Administrator must define the hazardous portion of the plume.

This is accomplished by identifying hazardous constituents. Under today's regulations, the Regional Administrator makes three findings when identifying a constituent as a hazardous constituent under § 264.93. First, the constituent must be listed in Appendix VIII of 40 CFR Part 261. Second, the constituent must have been detected in the ground water below a regulated unit. Third, the constituent must be reasonably expected to be in or derived from the waste contained in the regulated unit.

a. *Alternatives Examined*—EPA considered several options for identifying hazardous constituents. One option was to focus on the list of Appendix VII constituents identified in Part 261. When EPA lists a hazardous waste under Part 261, it often lists the particular waste constituents that caused EPA to identify it as a hazardous waste. These constituents are identified in Appendix VII.

EPA concluded that Appendix VII was not an appropriate list to use in identifying hazardous constituents. In identifying Appendix VII constituents, EPA did not attempt to conduct an exhaustive analysis of all constituents in the waste that could have caused the waste to be hazardous. For purposes of identifying a waste as a hazardous, it was sufficient to identify a few constituents that could pose a substantial present or potential hazard to human health or the environment if the waste was improperly managed. Therefore, limiting hazardous constituents to those in Appendix VII would preclude EPA from addressing other hazardous constituents known to be in the wastes.

In addition, Appendix VII only applies to listed waste. It does not address hazardous constituents that may be present in wastes deemed hazardous because they exhibit one of the characteristics in Part 261. Moreover, Appendix VII is not designed to address the hazardous constituents that may be formed when various wastes are mixed in a regulated unit, or react with constituents in the soil.

A second option considered was a narrative standard that would establish general criteria for what constituted a hazardous constituent. The Regional Administrator would use these criteria to identify individual hazardous constituents and would specify them in the permit. EPA rejected this option for two reasons. First, it did not serve the general goal of providing certainty to the regulated community or the public. Permit applicants could not predict the potential scope of their responsibilities, and the public would be uncertain whether most of the potentially dangerous constituents would be covered. Second, narrative criteria could prove difficult to implement as a practical matter in the permitting process. Under Subpart F, hazardous constituents are to be identified when the Regional Administrator establishes a compliance monitoring or corrective action program for the facility. Before that decision can be made, however, the applicant must know what universe of potential hazardous constituents to monitor in order to provide the data base from which the Regional Administrator would select hazardous constituents. A narrative standard is not

very helpful in this situation because it would force the applicant to guess at what might be present or to monitor for absolutely everything. EPA believes that it is a waste of resources to monitor for everything because there will be constituents (*e.g.*, chlorides) that do not present any real danger. At the same time, EPA does not believe it is sound regulatory policy to leave to the applicant the decision of what waste constituents might be hazardous constituents. Therefore, EPA rejected the option of establishing a purely narrative definition of hazardous constituent, concluding that some specific list of constituents was necessary.

EPA concluded that hazardous constituents should be based on the list of constituents in Appendix VIII of Part 261. Appendix VIII is a list of 387 hazardous constituents and classes of constituents that have been shown to have toxic, carcinogenic, mutagenic or teratogenic effects on humans or other life forms. It includes many of the constituents identified under Section 307(a) of the Clean Water Act, Section 311 of the Clean Water Act, Section 112 of the Clean Air Act, and Section 1412 of the Safe Drinking Water Act. Further, it covers genetically active constituents that EPA's Cancer Assessment Group has evaluated and determined to sufficiently threaten human health and the environment to warrant regulation under EPA's programs. Finally, it includes the most acutely toxic substances listed in the NIOSH Registry or regulated by the Department of Transportation as a transportation hazard.

EPA has used this list of constituents in the hazardous waste listing process. EPA has also used Appendix VIII in its regulations for incinerators. For each constituent listed in Appendix VIII, EPA has prepared a Health and Environmental Effects Background Document. Each document describes and evaluates the constituent's adverse effects on humans and other life forms and substantiates the fact that the constituents may pose a substantial hazard to human health or the environment.

EPA believes that Appendix VIII has several advantages as a basis for defining hazardous constituents. First, Appendix VIII is a relatively comprehensive list of constituents that may cause significant harm to human health and the environment, as indicated in the description of its origin, and should assure the public that the monitoring and response program provides adequate protection. Second, Appendix VIII provides certainty to the regulated community. It clearly defines their environmental responsibilities and thus should assist in the management of land disposal units.

b. *Public Comments on Use of Appendix VIII*—Several commenters have raised objections to the use of Appendix VIII in these regulations. Some have argued that Appendix VIII has not been subject to rulemaking or scientific peer review. This is not correct. Appendix VIII has been subject to public comment on several occasions. Appendix VIII accompanied the interim final hazardous waste rules of May 19, 1980 (45 FR 33132). Reflecting public comments received on those rules, EPA modified Appendix VIII on November 12, 1980 (45 FR 27477), November 25, 1980 (45 FR 78544), May 20, 1981 (46 FR 27477), and June 3, 1981 (46 FR 29708). In addition, commenters on the outline of today's regulations, that was discussed in the public meeting of December 21, 1981, had an opportunity to comment on the use of Appendix VIII. These opportunities for public review have also provided the scientific community an opportunity to comment on the list.

Some commenters have claimed that there is a lack of reliable analytical methods for constituents on Appendix VIII. Of the 387 constituents listed in Appendix VIII, the Agency has described analytical methods for all but nine constituents which are unstable in water and thus would not be expected to be found in ground water samples.

Some commenters have argued that Appendix VIII places an unreasonable monitoring burden on the regulated community. The monitoring burden associated with the use of Appendix VIII depends in the first instance on the nature of the wastes placed in a regulated unit. EPA does not believe that it is unreasonable to place a more extensive monitoring burden on owners and operators who handle wastes that contain many potentially dangerous constituents. As will be discussed later in this preamble, the owner or operator will be allowed to demonstrate that some Appendix VIII constituents cannot be in a regulated unit because of the nature of the waste. Ultimately, the reasonableness of the monitoring burden depends on the health and environmental rationale underlying the inclusion of a constituent on Appendix VIII. EPA believes that the constituents on Appendix VIII are those which may pose a substantial hazard to human health or the environment. If an owner or operator disagrees with that conclusion and has data to challenge that conclusion, he may petition the Agency under § 260.20 to remove constituents from the list.

As part of its ongoing refinement of the regulations, EPA will consider adding constituents to Appendix VIII. If members of the public believe that additional constituents should be on Appendix VIII, they can also petition the Agency to expand the list.

c. *Selecting Hazardous Constituents from Appendix VIII*—Besides being on Appendix VIII, a constituent must meet two other criteria before it may be identified as a hazardous constituent. First, it must be in the ground water. The ground-water protection standard is only concerned with waste constituents that reach ground water. Second, a waste constituent must reasonably be expected to be in or derived from waste contained in a regulated unit. A constituent derived from waste may be a by-product of reaction of waste or waste leachate with other waste or materials in a regulated unit or with soil underlying the unit. As a general matter, EPA will consider the presence of the constituent in the ground water at the compliance point as a sufficient initial indication that the constituent is derived from waste in a regulated unit.

EPA recognizes, however, that it is possible that a constituent appearing at the compliance point may not originate from a regulated unit. Today's regulations, therefore, allow the permit applicant two grounds for arguing that a constituent did not derive from the waste in a regulated unit. Only one of those arguments, however, may be considered in the establishment of hazardous constituents. The owner or operator may be handling a waste with relatively uniform chemical characteristics, and he may be able to show that it is impossible for certain constituents to ever appear in the leachate emerging from his regulated unit. In that situation, the Regional Administrator may conclude that some Appendix VIII constituents found in ground water should not be identified as hazardous constituents for that regulated unit.

The second line of argument that the applicant may want to pursue is that, while a particular constituent could appear in the leachate from his regulated unit, the applicant believes that the constituent found in ground water is coming from a source other than the regulated unit. Before accepting such a showing, however, EPA believes it is important to have sufficient monitoring data to allow for statistical comparisons of background values for a constituent to the level of that constituent at the compliance point.

Therefore, today's regulations provide the owner or operator an opportunity to make such a showing in the context of his detection or compliance monitoring programs. EPA does not believe, however, that such an analysis should be the basis for deleting Appendix VIII constituents from the list of hazardous constituents in the ground-water protection standard.

EPA has provided a limited variance in § 264.93 that would allow an applicant to ask the Regional Administrator to eliminate some constituents found in ground water from the list of hazardous constituents specified in the facility permit. The burden that must be met here, however, is a heavy one. Basically the owner or operator must be able to demonstrate that the constituent is not capable of posing a substantial threat to human health or the environment at any time under any circumstances that might reasonably occur, barring war or acts of God.

The variance specifically does not, however, allow the owner or operator to argue that adverse effects on human health or the environment will simply be delayed for some period of time. Thus, the owner or operator could not receive a variance under § 264.93(b) by arguing that a plume of contamination would not reach potential users (e.g., not migrate beyond the facility property boundary) for some period of time.

The variance provided in § 264.93(b) is designed to address relatively limited situations. For example, the applicant may be able to demonstrate that, regardless of the concentration that the hazardous constituent might reach in ground water underlying a regulated unit, because of its half-life and the slow rate of ground-water flow, it can never pose a hazard to human health or the environment.

Today's regulations specify a set of factors that the Regional Administrator will consider when considering a variance under § 264.93(b). The factors used in the Regional Administrator's analysis are similar to those identified in § 267.10, the general performance standard applied to new hazardous waste land disposal facilities in the Part 267 temporary standards. The factors have been modified slightly to explicitly indicate that the Regional Administrator will examine the ground-water and surface-water uses in the area around the facility. (The § 267.10 standard also addressed air protection and subsurface migration, which are not part of the analysis in this variance.) Basically, the factors are designed to assure that the following topics are examined: (1) The potential for leachate migration from a regulated unit: (2) the quality of the leachate as it migrates; (3) the current and future uses of ground water and surface water in the area; and (4) the health and environmental effects associated with exposure to different levels of hazardous constituents.

Under the Underground Injection Control (UIC) program of the Safe Drinking Water Act, the States will be identifying underground sources of drinking water (USDW) and exempted aquifers. (See 40 CFR § 122.35) The UIC program is aimed at protecting USDW's. Exempted aquifers are aquifers that have many of the same characteristics as underground sources of drinking water but that are unlikely to be used for public drinking water supply due to a variety of technical and economic factors. Under the UIC program, a State must seek approval from EPA for any decision to exempt an aquifer. In making decisions about the use of an aquifer under the variance in this section, EPA believes it is important to build on the decisions already made by the States and EPA under the UIC program. This will insure consistency in EPA's overall approach to ground-water protection.

Today's regulations provide, therefore, that the Regional Administrator will consider any decisions made under § 122.35, the provision that allows for identification of USDW's and exempted aquifers, in any decisions about ground-water use for purposes of this variance. The Regional Administrator will rely on that decision, however, only to the extent that it is consistent with the ground-water protection strategy in today's regulations. For example, if an aquifer is exempted for a fixed period of time (e.g., in some mining situations), then the Regional Administrator may consider what the likely use of that ground water will be after the fixed time period in deciding whether a variance under this section is appropriate.

5. *Concentration Limits (§ 264.94).* As indicated earlier, the ground-water protection standard indicates when corrective action is needed at the facility. In order to serve that purpose, the ground-water protection standard must establish an action level for each constituent that will trigger initiation of a corrective action program. In § 264.94, the regulations set forth the criteria that the Regional Administrator will use in establishing such concentration limits for each hazardous constituent.

a. *Alternatives Examined*—EPA considered several options for defining concentration limits. One approach is to set limits based on the detectability of the constituent in ground water. A second approach is to establish numerical limits for each constituent that are based on a health or environmental rationale. A third option is to establish narrative criteria based on protection of human health and the environment in the regulations and to allow the Regional Administrator to set specific contamination limits in the permit after considering a variety of site-specific factors. The fourth option is to ensure that a hazardous constituent does not exceed the background concentration of that constituent in the ground water.

EPA decided not to use the first option, which would trigger corrective action whenever there is a detectable level of the constituent at the compliance point. Detectable levels of hazardous constituents may appear at the compliance point through no fault of the owner or operator. Natural background levels of chemical constituents or other sources of contaimination could cause such detectable values. EPA believes it is unfair to the owner or operator to cause him to clean up contamination that cannot be reasonably linked to leachate from a regulated unit.

Today's regulations embody a mix of the other three options. Each has advantages but no single approach is appropriate in all situations. The second option, which involves the establishment in the regulations of numerical limits for each constituent, is based on health and environmental factors. This is a desirable option because it assures that the action level is directly related to the protection of human health or the environment. Unfortunately, such an approach is not fully adequate at this time because EPA has not established such contamination limits for most of the hazardous constituents listed on Appendix VIII. Therefore, EPA has used health-based contamination limits where such limits exist. Specifically, the maximum contaminant limits established for the constituents in the National Interim Primary Drinking Water Regulations (NIPDWR) under the Safe Drinking Water Act will be used in the ground-water protection standard. Those constituents and associated concentration limits are specifically identified in Table 1 under § 264.94.

There may also be situations where the third option, which involves the site-specific establishment of concentration limits based on a narrative standard, will be feasible. EPA decided not to rely solely on this approach, however, for several reasons.

It may require data that are not readily available. Moreover, the data

collection and analysis needed for such an approach may be extremely time-consuming and resource-intensive. EPA is concerned that such an approach could lead to a cumbersome administrative process that would delay the initiation of needed measures to control plumes of contamination. In addition, the result of the analysis under such a standard could be subject to considerable scientific uncertainty and might not serve to assure the public that adequate measures were being taken. Finally, this approach could divert the owner's or operator's resources from expenditures on proven control measures that will provide significant environmental protection to expenditures on complex analysis and predictions about the fate and transport of hazardous constituents.

Therefore EPA has decided to provide for this option through a variance. Today's regulations allow the owner or operator an opportunity to request an alternate concentration limit based on a demonstration that the concentration will not adversely affect human health and the environment. If the data on which the demonstration is based is subject to considerable uncertainty, EPA will not establish the requested concentration limit. To avoid unreasonable delay in the commencement of corrective action, today's regulations provide specific deadlines for the submission of information necessary to establish the ground-water protection standard. An owner or operator who wants to justify a concentration limit based on the narrative criteria in the regulations must do so within the general time frames applicable to the establishment of other types of concentration limits.

In those situations where there is no concentration limit specified in the regulations (i.e. the NIPDWR maximum contaminant levels in Table 1) and where the owner or operator fails to justify an alternate concentration limit under the variance, today's regulations will be based on the fourth option, which would require that the level of a hazardous constituent not exceed the background concentration of that constituent in the ground water.

This approach has several advantages. First, it assures that the standard will not be violated unless hazardous constituents have entered the ground water from a regulated unit. (This assumes that normal fluctuations in background are accounted for in the analysis of whether background has been exceeded. This concern will be discussed in Section VII. D.9. of this preamble.)

Second this approach provides assurance to the public that the ground water quality will not be made any worse by the advent of hazardous waste disposal in the area. As discussed earlier in the preamble, this approach assures that the current and future uses of ground water in the area will be preserved. EPA concluded that this approach was the best of available alternatives for those hazardous constituents not addressed by the NIPDWR, for which an alternate concentration limit cannot be established, because it properly balances the need to fully protect human health and the environment and the need to develop fair, workable requirements for the regulated community.

While the numerical limits identified in Table 1 for the NIPDWR constituents are generally appropriate concentration limits for those constituents, there is one situation where the "no increase over background" standard will be used for those constituents. It is possible that in some situations the level of the constituent in background ground water exceeds the NIPDWR limit for that constituent. Unless the "no increase over background" standard is applied in that situation, the regulations would force the owner or operator to initiate corrective action measures even though no contamination had entered the ground water from regulated units at the facility. Such a result is inconsistent with the basic purpose of the monitoring and response program.

b. *Use of Alternate Concentration Limits*—Under § 264.94, the owner or operator may ask for a concentration limit other than a NIPDWR contaminant limit or a "no increase over background" limit. The basic test that the Regional Administrator will use in evaluating such a demonstration is whether the constituent would pose a substantial present or potential hazard to human health or the environment at any future time, barring war or acts of God.

The alternate limit may be sought at any time but EPA will not allow the consideration of such a demonstration to unreasonably delay the establishment of the ground-water protection standard for a facility. Once the ground-water protection standard has been established in the permit, the owner must seek alternate concentration limits through permit modifications under the procedures in 40 CFR Part 124. Such modifications are always major modifications and the burden of proof is on the applicant to justify the variance.

The factors that the Regional Administrator will use in considering this variance are identical to the factors to be considered for the variance in § 264.93, which allows the Regional Administrator to exclude some Appendix VIII constituents found in ground water from the list of hazardous waste constituents in the ground-water protection standard. The distinction is that the variance in § 264.93 does not limit the concentration of the constituent in the ground water underlying the facility; this variance does.

A few examples may help to explain how this variance may work. These examples are not to be interpreted as scenarios that will necessarily qualify for alternative concentration limits nor are they the only possible scenarios. An owner or operator may have a regulated unit located close to a river that is downgradient from the unit. The owner or operator may also be able to show that the ground water between the unit and the river will never by used. He may also be able to show that as long as contaminant levels are maintained below certain thresholds the assimilative capacity of the river will not be exceeded. This situation may be a good candidate for an alternate concentration limit.

A second scenario is one in which the owner or operator is able to demonstrate that there is a high concentration threshold for a contaminant based on available health and environmental data. By keeping the concentration of the contaminant in the ground water at the compliance point below that level, he can assure that there will be no adverse effects downstream on human health or the environment. A third scenario might be based on attenuation in the saturated zone. The owner or operator may be able to show that as long as the concentration of a hazardous constituent does not exceed certain levels at the compliance point, the concentration of that constituent at a downgradient point of use will be non-detectable or within commonly accepted health standards. (It should be noted that EPA believes it extremely difficult to make this latter demonstration.)

As with the variance in § 264.93, the owner or operator may not receive an alternate concentration limit by showing that the adverse effects on human health and the environment will be delayed. In addition, EPA intends to rely on designations of underground sources of drinking water and exempted aquifers under the UIC program when considering what the uses of ground water are likely to be in the area. In addition, it should be understood that the variance in this section will not be

used to reconsider the health basis of the National Interim Primary Drinking Water Regulations. The Regional Administrator may establish alternative concentration limits for the constituents in Table 1, but these alternative limits must be based on factors (*e.g.*, likely attenuation during migration) that do not call into question the basis for the MCL's.

6. *Compliance Point (§ 264.95).* The ground-water protection standard must also define the point in the ground water at which the standard must be met. The Agency considered several options and concluded that the compliance point should be the edge of the waste management area.

a. *Alternatives Examined*—The first option considered was some point directly below the waste. EPA rejected that option for several reasons. It is not generally practical to attempt to monitor ground water directly underneath a land disposal unit. Drilling wells through a regulated unit itself is unwise because such wells can only undermine the integrity of the unit design, creating a conduit for the passage of hazardous constituents to ground water. It is conceivable that wells could be drilled at an angle underneath a regulated unit so that there would not be a need to penetrate the liner in the regulated unit. EPA does not think that this type of monitoring system has been shown to operate effectively at a sufficient number of hazardous waste disposal units to justify its use as the general requirement in today's regulations. Moreover, there will not typically be a substantial delay in detecting hazardous constituents if the compliance point is at the edge of the waste management area as opposed to some point below a regulated unit.

A second option considered was the property boundary. EPA considered this approach carefully but decided that it did not provide sufficient time to take corrective action once noncompliance occurred. Moreover, this approach could allow contamination of large quantities of ground water within the property boundary, water that would eventually move off site.

A third option considered was to establish a buffer distance outside of the waste management area. EPA decided not to take this approach. There was no rationale for a fixed buffer distance that would apply to all facilities. EPA did actively consider the use of a buffer zone that was based on assuring at least 5 years of flow time within the property boundary. EPA eventually decided against this approach because it was difficult to justify the 5-year time frame and because this approach could still allow significant ground-water contamination before corrective action would begin.

The fourth option considered was the edge of the waste management area. EPA ultimately decided that this was the best of the available options for several reasons. EPA believes this approach will provide the greatest assurance to the public. Given the fact that there is a degree of uncertainty about how successful corrective action measures will be, EPA does not think that it makes sense to allow contamination of large quantities of ground water when selecting a compliance point. Moreover, since the owner or operator is not expected to be present at the facility forever, it is reasonable to require him to keep the ground water under his control as clean as possible while he is present at the facility. This is consistent with the general philosophy of these regulations to require reasonable steps to provide long-term environmental protection.

In addition, EPA believes that corrective action is likely to be most cost-effective when conducted at the edge of the waste management area. The plume of contamination is likely to be most concentrated at that point, meaning that less water will need to be removed and managed if it is removed there instead of some other downgradient point. In addition to being cost-effective, a strategy that reduces the need to remove large quantities of ground water is a sound water conservation policy. By using the edge of the waste management area as the point of compliance, EPA has reduced the likelihood that corrective action measures would deplete the aquifer and thereby impair use of ground water in the area.

b. *Use of Compliance Point*—While "compliance point" is the term of art used to define the location where the ground water protection standard is measured the "compliance point" is, in fact, a surface (or a set of points.) Specifically, the compliance point 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. 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. This area will be specified in the facility permit. Where there is more than one regulated unit at the facility, the waste management area is described by an imaginary line circumscribing the several regulated units.

The edge of the waste management area is not the outer limit of the waste itself. The limit includes any horizontal space taken up by liners, dikes, or other barriers designed to contain waste in a regulated unit. The purpose of this provision is to avoid the implication that monitoring and corrective action wells should be drilled through the structures which are designed to control the waste, clearly a counterproductive result.

In defining the compliance point for the ground-water protection standard, EPA considered the implications of the selected approach for existing plumes that have appeared at existing facilities. At the time that it initiates permitting for existing facilities, EPA may find that hazardous constituents have already migrated beyond the compliance point at some units. Under the regulatory system in today's regulations, however, portions of plumes that have migrated beyond the compliance point will be addressed under the permit. EPA will require the cleanup of the portion of these plumes up to the property boundary as a condition of continued operation after the effective date of these rules. (This issue is discussed in Section VIII.D.13.d. of this preamble.) Portions of plumes that have migrated beyond the facility property boundary are not subject to the monitoring and response program of Subpart F.

EPA believes that today's regulations reflect a reasonable approach, as a matter of law and policy, on the appropriate scope of the Subtitle C program. Plumes that have already migrated beyond the property boundary may be addressed by other EPA programs. If such a plume presents an imminent and substantial endangerment to health or the environment, EPA may take enforcement action under Section 7003 to correct the situation. Such plumes may also qualify for remedial action measures under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

EPA will actively consider the use of these other authorities to address plumes of contamination that have migrated beyond the property boundary at the time of initial permitting. EPA must operate within the constraints of those laws and thus cannot guarantee that actions under these other authorities will also be appropriate. EPA does intend, however, to take a close look at plumes of contamination that have migrated beyond the property boundary at the time of initial permitting to determine whether action under other authorities is justified.

7. *Compliance Period (§ 264.96).* In setting the ground-water protection standard, the Regional Administrator

must define the time period over which it will apply. In § 264.96, the regulations indicate that the compliance period to be set in the permit 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.)

As described in Section VI.A. of the preamble, the compliance period is to be based on the active life of a regulated unit, the time period during which the most significant release of liquids to the ground is likely to occur. Where more than one unit is contained within the waste management area of the facility, liquids may enter the ground for the period beginning when waste is first placed in any unit within the waste management area and continuing until the last unit within the waste management area is properly closed. Accordingly, the appropriate time frame for this compliance period is the period equal to the active life of the waste management area.

EPA recognizes that there may be situations where particular plumes or portions of plumes can be linked to particular units, depending on the configuration of the waste management area. For example, where the waste management area is made up of a series of adjacent landfill trenches and ground-water flow is parallel to those trenches, it may theoretically be possible to distinguish which trench created a plume that may appear at the compliance point. Today's regulations, however, do not allow for the establishment of individual compliance periods for each regulated unit within the waste management area. EPA is considering whether to provide for such an option and seeks further comment on this issue. In particular, EPA asks commenters to address the need for such a provision, the practical feasibility of distinguishing plumes from different units within the same waste management area, and the technical criteria that might be used in determining when this option might be appropriate.

In calculating the compliance period, the Regional Administrator will include the time that any regulated unit was operating prior to permitting. The basis for the compliance period is the time period during which leachate could have entered the ground due to the absence of a liner or the failure of the liner. The fact that some of that time period occurred before permit issuance and some after should not influence the length of the time period.

The compliance period begins to run when the owner or operator initiates a compliance monitoring program under § 264.99 following detection of hazardous constituents in ground water. This assumes that detection of hazardous constituents in ground water indicates that the front of the plume is entering ground water.

It is theoretically possible, however, that the actual front of the plume is relatively dilute and that the detection monitoring program would not indicate the presence of hazardous constituents in the ground water until some later, more contaminated, portion of the plume appears. In such a case, the theory of plume migration described in Section VI.A. of this preamble would suggest that the compliance period should be shorter than the length of the regulated unit's active life. (Under that theory, the compliance period is linked to the time period during which the most significant portion of the plume is expected to appear.)

EPA knows of no way to account for this scenario in setting the compliance period because it depends on knowledge about the quality of leachate that is entering the ground water, a fact that will not be known at the time the ground-water protection standard is established. Therefore, the compliance period will be linked to the full active life of the regulated unit (or the waste management area if there is more than one unit), based on the assumption that the detection monitoring program will detect the initial front of a plume of contamination emerging from the regulated unit.

The compliance period may extend beyond the number of years equal to the active life of the waste management area if corrective action has been initiated but not completed. EPA believes that corrective action measures should be completed once begun. The capital expenditures will have already been made, so the permittee will only bear the additional costs of operating the corrective action equipment. The fact that the ground-water protection standard is still exceeded at the end of the normal compliance period indicates that an environmental problem is still present. This may be caused by the fact that some constituents in the plume may have proceeded through the soil more slowly than those that were at the front of the plume. In keeping with the general philosophy that the owner or operator should seek to remove environmentally significant levels of hazardous waste leachate from the environment, EPA believes that it is reasonable for the compliance period to be extended where necessary to complete corrective action.

It is necessary, then, to define what is meant by completing corrective action. Today's regulations indicate that the owner or operator can demonstrate the success of corrective action by showing, with monitoring data, that the ground-water protection standard has not been exceeded for a period of three consecutive years. This time period should provide a reasonable margin of safety in determining whether a plume of contamination has been removed.

Depending on when corrective action begins and its success in removing or treating contamination, it is possible that the compliance period will extend beyond the post-closure care period for the unit. The regulations do not provide that the post-closure period would be automatically extended for the same duration as the compliance period. It may not always be necessary for the compliance period and the post-closure care period to continue for the same amount of time because the activities involved may have differing objectives. Cover maintenance, for example, may not be directly related to the task of cleaning up a plume caused by leachate that entered the ground during the unit's active life. The Regional Administrator may, however, modify the permit to extend the post-closure care period under § 264.117 of the existing regulations. Under the general criteria established in § 264.117, it may be entirely appropriate to extend the post-closure care period to be coterminus with the compliance period.

8. *General Ground-water Monitoring Requirements (§ 264.97).* In § 264.97, EPA has set forth a series of general requirements that address such topics as well design and placement, sampling and analysis procedures, analytical methods, sampling of water elevations, determination of background, and statistical procedures.

It is most efficient to describe these requirements as they come up in later sections of this preamble that discuss the specific ground-water monitoring programs. Two of these general requirements, however, deserve special discussions. They are described in the following two sections.

9. *Determination of Background (§ 264.97(g)).* In many situations, the concentration limit for a particular hazardous constituent will require no increase over the background concentration of the constituent. In addition, the detection monitoring program relies on increases over background levels of parameters or constituents to define when a regulated unit is leaking. Today's regulations are designed to ensure that the calculation of background ground-water quality will be based on accurate data.

The level of chemical constituents in ground water may fluctuate substantially over time. One of the major sources of variation is seasonal fluctuation. During different times of the year the recharge rates to ground water will vary, reflecting the differences in climate, rainfall, and other factors. When recharge rates are high, there may be more dilution and the background concentrations of constituents tend to fall. When the recharge rate is low, the concentration of constituents in background ground water may increase.

EPA believes that such variation in background concentrations should be accounted for if this can be done without compromising other regulatory objectives. For detection monitoring, today's regulations provide that background concentrations will be determined by the mean of values measured at least quarterly for one year. Quarterly sampling is required to roughly accord with the seasons.

EPA does not believe that this general approach can be used in the compliance monitoring program because of the environmental situation at the time that such a program is required. If hazardous constituents are moving downgradient, they may present a considerable risk of causing adverse effects on human health and the environment. EPA does not believe it is generally appropriate to allow such a plume to continue to migrate while the owner or operator collects background data for one year. Therefore, EPA will, whenever possible, rely on whatever reliable background data is available to establish background values for the compliance monitoring program.

Today's rules require that a request for a permit modification to incorporate a compliance monitoring program be submitted by the owner or operator within 90 days of determining that there has been a statistically significant increase in the concentration of a detection monitoring parameter. During this 90 day period multiple ground-water samples can be obtained from the monitoring wells, and analyzed for the presence and concentration of hazardous constituents. Potential seasonal variations in concentrations cannot be established during this period. Depending on the length of the permit process, the owner or operator may have enough time to develop one year of background data for each constituent.

The Regional Administrator will exercise discretion in processing a permit modification application to incorporate compliance monitoring when available data (including data collected during the 90 days after finding a statistically significant increase in a detection monitoring parameter) suggest that additional measurements of background concentrations are necessary to adequately account for anticipated seasonal variations. This situation could occur when Appendix VIII constituents in ground water at the compliance point are present in concentrations which are not greater by a statistically significant amount than the concentrations of these constituents in samples from upgradient wells. If, in such a situation, the owner or operator has evidence that the concentrations of the constituents in ground water vary over time, then additional sampling and analysis over time to account for such variation in background concentrations may be prudent.

Occasionally, additional sampling and analysis over time may be appropriate even where compliance point concentrations exceed upgradient concentrations, at a given point in time, if the Regional Administrator believes it reasonably possible that this difference is due to seasonal or spatial variation in ground-water quality. In this case, however, the Regional Administrator would consider whether the rate of ground-water flow (and any plume of contamination) was sufficiently slow that additional time for collection of ground-water quality data would jeopardize the potential for successful corrective action if it is determined to be necessary. The Regional Administrator would not, however, consider allowing time for additional data gathering in cases where the initial difference in compliance point and upgradient constituent concentration is well above potential seasonal variation.

The owner or operator who wants to account for seasonal variations in the background values has at least two additional options. He can anticipate the need for such data by collecting upgradient data on Appendix VIII constituents likely to be in leachate before detection monitoring program indicates that leakage has occurred. He may also continue to collect background data after the compliance monitoring program permit is issued. He may use that data in making a demonstration under § 264.99(j) that an apparent increase over concentration limits in the ground-water protection standard is caused by contamination from other sources. He may also use the data in seeking a permit modification to change the background values contained in the compliance monitoring program.

Another issue in the establishment of background for a constituent is the question of what wells should be used in the data base. One option is to establish background at downgradient wells and then to determine whether ground-water quality at each well increases significantly over time. The principal disadvantage of this approach is that is can lead to major miscalculations at an existing regulated unit. Such a unit could be leaking quite heavily. If the plume of contamination is included in the data base used to determine background, the plume could continue to flow and the analysis of ground-water quality at the downgradient wells would not show a statistically significant increase.

Another option is to base background on data from both upgradient and downgradient wells. This approach suffers from the same general problem described above. A plume of real contamination could become part of the data base for determining background and lead to a failure to detect a significant plume.

A third option, which EPA believes is preferable in most situations, is to base background data on upgradient wells. Assuming these wells are properly placed, they should produce data that are not biased by contamination from the facility.

There is, however, a conceptual difficulty with the use of upgradient wells as the basis for determining background. In a theoretical sense, an "increase over background" test at the compliance point attempts to compare the sampled ground-water quality at the compliance point to what that ground-water would have been at the compliance point in the absence of the facility.

In the option just described, the upgradient wells are being used to indicate what the ground-water quality at the compliance point would have been in the absence of the facility. The problem here is that there may be some lag time between upgradient and downgradient wells due to the slow movement of ground water. Thus, upgradient ground-water quality may not always be exactly the same as background ground-water quality at the compliance point. While this factor may be a source of error, EPA knows of no reliable way to correct for it. Given the alternatives, EPA still believes that this approach is superior because it at least does not present the possibility of including leachate from a regulated unit in the data base for calculating background values.

There may be situations, however, where the data used to calculate background values may be taken from wells other than the upgradient wells. In some situations, it may not be possible to determine what wells are upgradient. For example, if a land disposal unit sits

on a hilltop, the entire perimeter of a regulated unit is, in a sense, downgradient. In such a situation, it may be more useful to establish background by drawing samples from a nearby background plot that is representative of general ground-water quality in the area.

In other situations, the possibility that wells other than upgradient wells may be affected by contamination from a regulated unit may not be a serious risk. For example, at a new facility that has not yet received waste, it might be quite acceptable to use downgradient wells in the determination of background ground-water quality.

To account for situations such as these, EPA has provided a variance from the general requirement that background ground-water quality be based on upgradient wells. Such a variance is appropriate where hydrogeologic conditions do not allow the owner or operator to determine what wells are upgradient or where sampling at other wells will provide an indication of background ground-water quality that is as representative or more representative than that provided by upgradient wells.

Today's regulations do not specify how many wells must be installed to provide the data base for determining background ground-water quality. In § 264.97(g), however, the regulations indicate that certain minimum numbers of samples must be taken. The owner or operator must take at least one sample from each well used in the calculation of background (*i.e.*, one from each upgradient well in the normal case). This will ensure that broadly-based data are used, and that the owner or operator cannot selectively use various data points.

The regulations also require a minimum of four samples from the entire system in the determination of background. This means that if there is only one upgradient well, then the owner or operator would take four replicates at that well; if there are two wells, the owner or operator would take two from each well.

10. *Statistical Procedures (§ 264.97(h)).* In the detection monitoring program, the owner or operator must determine whether background values of monitoring parameters or constituents are exceeded at the compliance point. In the compliance monitoring program, the owner or operator must determine whether concentration limits (which may include background values) for hazardous constituents are exceeded at the compliance point. In order to be sure that the ground-water quality measured at the compliance point reflects an accurate indication of whether a background value or concentration limit is exceeded, today's regulations require that the owner or operator determine whether a "statistically significant" increase (or decrease in the case of pH) over background values or concentration limits occurs at the compliance point.

The regulations set forth the general standards that must be met by the statistical procedures used at the facility. In referring to "statistical procedures" in § 264.97(h), EPA means to emphasize that the concept of "statistical significance" must be reflected in a number of aspects of the monitoring program. This involves not just the choice of a level of significance, but also the choice of a statistical test, and the requirements of the number of samples and the number of replicate measurements run on each sample. Since all of these interact to determine the ability of the procedure to detect contamination, the statistical procedures must be evaluated in their entirety and not evaluated by individual component.

EPA's basic concern in establishing standards for statistical procedures is to achieve a proper balance between the risk that the procedures will falsely indicate that a regulated unit is causing background values or concentration limits to be exceeded (false positives) and the risk that the procedures will fail to indicate that background values or concentration limits are being exceeded when that is, in fact, the situation (false negatives). Today's regulations are designed to address that concern directly.

*a. *Basic Statistical Procedure*—EPA has not been able to specify one set or several sets of statistical procedures that will provide a high level of confidence in the results for all situations. Many different situations exist and no one procedure is appropriate for all circumstances.

EPA also found it difficult to try to reduce the regulations to a set of specific numerical performance standards that would achieve the proper blance between false positives and false negatives. A major reason for EPA's inability to establish such performance standards at this time is that the probability of correctly deciding that a regulated unit is contaminating (often expressed as the "power" of a statistical test) cannot be easily summarized by a single number because the power of a test is related to the magnitude of the difference between two populations. Today's regulations do not attempt to express the idea of "exceeding background values or concentration limits" in terms of any minimum magnitude; any increase is a cause for concern under today's regulations. The implication of this for the statistical procedures is that a performance standard related to the power of a statistical test would have to be specified for every possible minimum magnitude that might be of concern. This is not feasible at this time given the state of knowledge about ground-water contamination.

An alternative would be for EPA to decide what magnitude of increase it was concerned about and to specify how powerful the test would be for that magnitude of difference. However, the Agency is unable, at this time, to determine an amount of contamination that is acceptable and thus is not able to set such a magnitude. Also, the problem would remain of having to specify how powerful the test should be for values above that minimum difference of concern. EPA invites comment on this issue.

Consistent with its general strategy, however, EPA has tried to bring certainty to these regulations wherever possible.

Therefore, the Agency is establishing a specific sampling requirement, statistical test, and significance level for those situations for which the Agency believes the test is appropriate. This specific approach will then serve as a benchmark against which other statistical procedures may be compared. The comparison should be based on their theoretical properties combined with available data from the specific site. It will generally be easier to make a relative comparison of one procedure against another than to determine the best possible test at a given site.

The regulations establish a standard statistical procedure for use in the detection phase when the background data is approximately normally distributed. The procedure requires background sampling data, sampling data from the compliance point, and a specific statistical test protocol. For any parameter or constituent from a specific well, the protocol is as follows: Compare the mean contaminant level of the compliance point data with the mean contaminant level of the background data using Cochran's Approximation to the Behrens-Fisher Student's t-test. If the comparison is found to be significant at the 0.05 level of significance, a new sample is drawn from that specific well and the comparison of the mean of the new monitoring data with the background data is made. If this (retest) comparison is significant at the 0.05 level of significance, the site is judged to produce a statistically significant difference in contaminant level. If the

comparison is non-significant on either the initial test or the retest, the site is judged not to produce a significant difference in contaminant level.

Today's regulations define the situations in which the distribution is likely to be normal by a coefficient of variation. The coefficient of variation for distribution is the standard deviation divided by the mean. Today's regulations assume that a sample with a coefficient of variation less than 1.00 is likely to have a normal distribution. This assumption is based on the following analysis.

For a normal distribution, approximately 95% of all possible data lie within plus or minus two standard deviations of the mean. Since ground-water constituent levels cannot have negative values, zero is the lower bound to the distribution of sampling data and hence such data should have a coefficient of variation (standard deviation divided by the mean) of approximately 0.5 or less. When sample standard deviation and sample mean are used to estimate the coefficient of variation rather than the true (population) standard deviation and mean, the probabilistic nature of this sample coefficient of variation must be considered. If the data is from a normal distribution, then less than 10% of all sample coefficients of variation will exceed 1.00 by random chance. If the data is non-normal (such as either skewed to the left or right), then the sample standard deviation will be large relative to the sample mean and, therefore, make the probability of a sample coefficient of variation exceeding 1.00 quite large. Accordingly 1.00 is being used to distinguish between situations that are and are not likely to have normal distributions.

In specifying 1.00 instead of 0.5 as the coefficient of variation the Agency believes that it will reduce the burden, on both the owner or operator and the Agency, of establishing a site-specific data comparison procedure. More facilities will, therefore, utilize the specified Student's t-test than if the coefficient of variation were specified as 0.5. For those facilities where the sample coefficient of variation is less than 1.00 but at which the ground-water quality is not quite normally distributed, the specified t-test should remain valid due to the "robustness" of the t-test.

While EPA has decided that a coefficient of variation of 1.00 provides a reasonable criterion for determining whether monitoring data are likely to be normally distributed, EPA specifically seeks further comment on this issue. EPA also urges commenters to provide suggestions about other statistical criteria that might be used to predict whether monitoring data are likely to be normally distributed.

As described in the previous section of this preamble, detection monitoring background values are based on quarterly sampling with at least four replicate measurements on samples taken per quarter. Should there be only one background well, the four measurements per quarter are obtained by splitting a sample from the one well into four aliquots and conducting separate analyses of each aliquot. If there is more than one well, the regulations require there to be at least four measurements per quarter from the background wells as a group with a minimum of one measurement per well.

This number of background measurements is judged by the Agency to be the minimum requirement to adequately establish background concentrations. Using fewer background measurements could decrease the confidence in the background estimate and reduce the ability of a given statistical procedure to detect contamination of a given amount.

The Agency is requiring that monitoring wells be sampled at least semi-annually and that when a well is sampled, the sample is divided into at least four aliquots on which separate analyses and measurements are then conducted. The reason for requiring four aliquots to be separately analyzed is to obtain information on measurement error. It has been EPA's experience that measurement error cannot be reliably estimated with less than four readings.

The standard statistical test being required is the Cochran's Approximation to the Behrens-Fisher Student's t-test. The t-test is appropriate in most situations because concentrations measured above the limit of quantification (defined as the value below which numerical estimates of concentration are unreliable) tend to be approximately normally distributed. The test is believed to be reasonably insensitive to moderate deviation from normality in the distribution of the data.

The version of the t-test required for the comparison of mean level of background data with the mean level of compliance point data is not the one most commonly encountered when comparing two data sets. A key assumption (aside from that of normality) for the usual test is that the underlying variances of the two data sets are equal. With ground-water monitoring data, the background data has variability due to measurement error and seasonal variation, but the compliance point monitoring data has variability only due to measurement error. Therefore, the appropriate test for comparing the two data sets is the Behrens-Fisher Student's t-test, which requires special tables. A good approximation to the relatively complex Behrens-Fisher Student's t-test is supplied by the Cochran's approximation to the Behrens-Fisher Student's t-test, which uses standard tables. These tables are commonly available and it takes no special statistical skills to interpret the results of the test.

EPA is fixing the level of significance for the Student's t-test at 0.05 for each parameter at each well. When the Agency proposed this significance level for interim status ground-water monitoring, it received some criticism that this would produce too many notifications of contamination where none had actually occurred.

EPA recognizes that this could be a problem, particularly when there are many comparisons being made for different parameters and for different wells. However, EPA is concerned that a lower significance level would unduly compromise the ability to detect contamination when it did, in fact, occur.

Instead EPA believes that, given the number of parameters likely to be selected in a detection monitoring program, the problems created by a significance level of 0.05 are adequately controlled by the provision for an automatic retest procedure. The regulations for use of the Student's t-test specify that, for each specific well, one must retest those parameters that tested as a significant difference the first time. They also specify that the observed difference of the first sample is not considered to be statistically significant for purposes of this regulation unless the retest also shows a significant difference.

It may be demonstrated that, without the retest provision, the "compounding" effect of multiple comparisons creates an overall significance level that EPA believes to be too high. For example, if there were twelve comparisons (4 parameters at each of three downgradient wells), each to be made at a significance level of 0.05, then the overall significance level for the twelve comparisons as an entire group is 0.46, too high for practical use. If the retest procedure is used in the same situation, the overall significance level for the entire group is 0.03, a more acceptable value.

EPA certainly seeks to avoid a situation where non-contaminating sites are falsely identified as contaminating due to repeated use of a univariate

statistical test procedure. EPA does not believe, however, that this problem should be addressed by reducing the significance level applied to individual tests and thereby undermining the ability to detect real contamination. Comments are invited on how to construct a statistical test procedure that has an acceptably low probability of falsely identifying a non-contaminating regulated unit, yet provides an acceptably high probability of identifying a truly contaminating regulated unit.

EPA recognizes that even where the distribution of background data is expected to be normally distributed (i.e., the coefficient of variation is less than 1.00), there may be situations where the owner or operator can devise statistical procedures that are more cost-effective to him and which will provide reliable results. Therefore, today's regulations allow the Regional Administrator to approve such procedures if he finds that the procedures balance the risk of false positives and false negatives in a manner comparable to that provided by the Student's t-test protocol specified in the regulations. In examining the comparability of the suggested procedure, the Regional Administrator will not focus on a single aspect of the procedure, such as the significance level of the test, but rather will look to the overall ability of the procedure to provide a reasonable balance between the risk of false positives and false negatives. The Regional Administrator will specify in the permit such things as the sampling frequency and the sample size for the alternative statistical procedure.

b. *General Alternative to Basic Procedure.*—EPA recognizes that there will be situations where the t-test specified for the detection monitoring program will not be useable in that program or in the compliance monitoring program. In such situations, it is necessary to develop procedures that are tailored to the specific situation at the facility. EPA has established a general narrative standard for such situations. The standard indicates that EPA has two principal concerns in the development of such procedures: (1) That the procedure be appropriate for the distribution of the data used to establish background values or concentration limits; and (2) that the procedure provides a reasonable balance between the risk of false positives and false negatives.

EPA has not specifically required that the procedure be comparable to the t-test protocol described above. The regulations indicate, instead, that the procedure must provide reasonable confidence that the migration of hazardous constituents from a regulated unit into and through the aquifer will be indicated. (The reference to hazardous constituents does not mean that this option only applies to compliance monitoring; the test also applies to monitoring parameters and constituents in the detection monitoring program since they are surrogates indicating the presence of hazardous constituents.)

The t-test protocol will, however, be used as a general benchmark for defining "reasonable confidence" in the proposed procedure. If the owner or operator shows that his suggested test is comparable to the Student's t-test in its results, then it is likely to be acceptable under the "reasonable confidence" test. There may be situations, however, where it will be difficult to directly compare the performance of an alternative test to the t-test protocol. In such cases, the alternative test will have to be evaluated on its own merits.

EPA would like to give further specificity to these general criteria for evaluating statistical procedures. The Agency will be analyzing this issue further to see whether more specific criteria can be developed. The Agency hopes to at least provide further guidance about the kinds of statistical procedures that could be adequate under the general criteria in the regulations. EPA encourages public comment on this issue.

c. *Statistical Procedures for Compliance Monitoring*—The basic t-test protocol specified in the regulations was not applied to the compliance monitoring program. The reason for this is that EPA believes a compliance monitoring program is more likely to be subject to a high "experiment error rate" than is the detection monitoring program. An experiment error rate depends on the number of individual comparisons being made for a facility. Each individual comparison of a constituent at a compliance point to the concentration limit for that constituent is subject to an error rate (i.e., probability of a false positive) that is determined by the significance level used with the test. When many individual comparisons are made, this error rate is compounded such that the probability that at least one comparison will falsely indicate statistical significance will greatly increase.

EPA expects that the list of constituents to be monitored in the compliance monitoring program will be greater than that in the detection monitoring program. The experiment error rate in such a situation could be too high. Therefore, the statistical procedures used in the compliance monitoring program have been generally subjected to the "reasonable confidence" standard. Where the number of hazardous constituents identified in the compliance monitoring program is not too large, it may be quite reasonable to use the t-test protocol in the compliance monitoring program and such an approach would be encouraged.

d. *Other Situations*—There will be other situations where the general standard rather than the t-test protocol should be used to evaluate the owner or operator's statistical procedures. One such situation occurs when the coefficient of variation for the background data is greater than 1.0. In such a situation it is quite possible that the data is not normally distributed. In that situation the general narrative test will be used. It is particularly important in such a situation to ensure that any statistical procedure used is appropriate for the distribution of the data.

A second situation that will probably require the crafting of a specialized procedure is one in which the background level of a constituent is below the detectability limit of the analytical methods used or is recorded as a trace level of the constituent. EPA believes that appropriate statistical procedures can be developed in such cases.

Another situation which may be confronted, in the compliance monitoring mode, involves point in time comparisons between upgradient and downgradient ground-water sample analyses, in contrast to comparisons against previously established background values. In situations where there is a high temporal correlation of upgradient and downgradient ground-water quality, that is upgradient and downgradient quality varies uniformly over time, then well to well comparisons may be judged appropriate by the Regional Administrator. An appropriate statistical comparison procedure will need to be established in permits which incorporate such point in time comparisons.

The statistical procedures developed under the general standard need not always be more complex than those used in the basic t-test protocol. For example, where an alternative concentration limit is a fixed health-based number which has no variance, a simpler version of the t-test than the Cochran's Approximation of the Behrens-Fisher Solution may be used.

11. *Detection Monitoring Program (§ 264.98).* The last three sections of Subpart F (*i.e.*, §§ 264.98, 264.99, and 264.100) set forth the specific elements of each type of ground-water monitoring

and response program. In doing so, these sections define the specific responsibilities that an owner or operator must meet under Subpart F, incorporating the appropriate elements of the other sections of Subpart F.

If hazardous constituents from a regulated unit have not reached ground water at the time of permit consideration, the owner or operator may receive a detection monitoring program permit. The following is a description of what such a program will contain.

a. *Parameters to be monitored*—The purpose of a detection monitoring program is to determine whether a regulated unit is leaking. The Regional Administrator will specify in the facility permit the constituents or parameters that must be monitored in order to make that determination.

The list of parameters to be monitored may include indicator parameters, such as pH, specific conductance, total organic carbon, or total organic halogen. These four parameters are the specific monitoring parameters used in the Part 265 ground-water monitoring regulations. The list of parameters may also include the results of gas chromatography procedures using specific detectors, such as GC/ECD or GC/FID. Where indicator parameters are not capable of detecting all known waste constituents or reaction products in ground water, the Regional Administrator may include specific waste constituents or reaction products in the list of detection monitoring parameters.

The basic test that the Regional Administrator will apply is that the parameters used must provide a reliable indication of the presence of hazardous constituents in ground water. In making that determination, the Regional Administrator will address four major factors. First and foremost, the Regional Administrator will consider the types and quantities of hazardous wastes that are managed at a regulated unit, and the concentrations of constituents within those wastes. The Regional Administrator will consider whether those wastes are inorganic, organic, or both. The Regional Administrator may also consider, for example, whether an organic hazardous waste is a chlorinated compound, the quantity of this waste managed at the regulated unit, and the concentration of constituents within the waste.

Second, the Regional Administrator will consider the quality of the leachate as it passes through soil beneath the waste management area prior to entering ground water. Because an accurate prediction of leachate quality, mobility, stability, and persistence in the unsaturated zone is very difficult, this consideration will often not be critical in selecting detection monitoring parameters. However, there may be situations where approximations of these leachate characteristics will lead to rejection of certain indicator parameters or may assist in selecting others to account for products of leachate reactions with soil. For example, the Regional Administrator could choose an inorganic indicator parameter to detect soil constituents that may be leached from the soil into ground water as a result of leakage from a surface impoundment containing highly corrosive wastes. Third the Regional Administrator will consider the detectability of the potential monitoring parameters or constituents. Routine analytical procedures must yield accurate concentrations or values for monitoring parameters if they are to be usable in detection monitoring programs. Parameters which are extremely difficult to measure in ground-water samples will seldom be specified by the Regional Administrator regardless of how representative they are of the waste managed in a regulated unit.

Fourth, the Regional Administrator will consider the variability of the concentration or value of a monitoring parameter in background ground water that is unaffected by a regulated unit. Today's rules include the use of the coefficient of variation in selecting detection monitoring parameters. The coefficient of variation is derived by dividing the standard deviation of a parameter in background ground water by the average concentration or value. As discussed previously in this preamble, the coefficient of variation has been included in these rules to account for the occasionally wide variation in background ground-water quality over time. In general, ground-water quality tends to vary seasonally, principally due to recharge events, such as heavy spring rain. By comparing the average concentration or value during a given year, the Regional Administrator will draw conclusions about the potential effectiveness of a detection monitoring parameter. Monitoring parameters with large coefficients of variation will be avoided whenever possible because it becomes increasingly difficult to determine statistically significant changes in ground-water quality as the coefficient of variation for a parameter increases.

b. *Detection monitoring system*—The owner or operator must install a ground-water monitoring system at the compliance point that complies with certain basic performance standards. The monitoring system must include a sufficient number of wells, installed at appropriate locations and depths, to yield ground-water samples that indicate the quality of ground water passing through the point of compliance. This general standard is similar to the Part 265 requirement concerning well placement in that it places the burden on the applicant to develop a system that yields representative samples. Unlike the Part 265 regulations, however, today's regulations do not require a minimum number of downgradient wells. Such a requirement is not as necessary in today's regulations because EPA will be evaluating the adequacy of the system during the permit process. EPA expects that at least three wells, the minimum number of wells specified in the Part 265 rules, will be needed at most facilities. There may be situations, however, where an adequate job may be done with fewer wells. The Agency intends to issue guidance on ground-water monitoring that will assist the applicant on this issue.

EPA anticipates that ground-water monitoring systems installed at most interim status facilities will be sufficient for detection monitoring in today's rules. Systems developed for assessment monitoring under the interim status regulations may not, however, be adequate. For example, such systems may not have been installed at the compliance point. The information provided by sampling at such wells may, however, be useful in the permitting context. The applicant may use data from interim status assessment monitoring to justify an alternate concentration limit for particular hazardous constituents.

As in the Part 265 regulations, today's rules provide that monitoring wells may be placed at the limit of the waste management area when the facility includes more than one regulated unit.

An adequate monitoring system must also comply with requirements concerning well installation. The wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. The casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of ground-water samples. The annular space above the sample depth must be sealed to prevent contamination of samples and the ground water. These represent standard practices that are designed to prevent contamination of ground-water samples and to avoid the possibility that a ground-water monitoring well could

become a conduit allowing contamination into ground water. The Part 265 regulations contain a similar requirement.

c. *Establishment of background values*—Under the detection monitoring program, the owner or operator determines whether contaminants from a regulated unit have entered ground water by comparing the levels of constituents at the compliance point to background values for those constituents. The first step in the process, then, is to establish a background value for each monitoring parameter or constituent in the facility permit. In most cases, the background value itself will be in the permit. The Regional Administrator may, however, specify in the permit the procedure to be used in calculating background and indicate that whatever value results from that calculation shall automatically become part of the permit. For example, the owner or operator may have only assembled 6 months of background data at the time the permit is ready to be issued. Rather than wait another 6 months until the rest of the one year of background data has been assembled, the Regional Administrator may simply specify how the additional background data will be used to calculate the background value.

The monitoring system used to establish background ground-water quality must meet the same general requirements that the monitoring system at the compliance point must meet, with one modification. The well placement scheme must be designed to yield samples that represent the quality of background ground water that has not been affected by leakage from a regulated unit. As with the monitoring system at the compliance point, today's regulations do not specify a minimum number of wells.

Background calculations must be based on data drawn from the appropriate wells. The general guidelines for what wells should be used in the determination of background values are in § 264.97(g). The owner or operator should use those guidelines in establishing background values (Section VIII.D.9. of this preamble explains those provisions.)

The background values in the detection monitoring program must be calculated in a form that is necessary for the determination of statistically significant increases under § 264.97(h). Thus, in the case of the Student's t-test, the owner or operator would need to calculate the mean and variance of the background data.

d. *Duty to Monitor at Compliance Point*—Once the detection monitoring system has been established, the owner or operator must sample ground water at least semi-annually at the compliance point during the active life of a regulated unit (including the closure period) and the post-closure care period. The duration of the monitoring program is based on the general ground-water protection strategy discussed earlier in this preamble. The frequency of sampling will be specified in the permit. As in the interim status regulations, today's rules require that sampling must occur at least semi-annually.

e. *Ground Water Flow and Direction*—Each time the ground water is sampled at the compliance point, the owner or operator must determine the ground-water flow rate and direction in the uppermost aquifer. Determining the gradient in the aquifer will enable the owner or operator to ensure that upgradient wells continue to be upgradient and downgradient wells continue to be downgradient. Information on ground water flow rates can be useful in deciding what the frequency of monitoring should be and in devising a corrective action program.

f. *Sampling and Analysis Procedures*—The detection monitoring program must include procedures for sampling and analysis that comply with the general performance standards in § 264.97(d) and §264.97(e). The owner or operator must develop sampling and analysis procedures that involve relatively standardized measures for insuring that samples taken from monitoring wells are properly handled to avoid inadvertent contamination from other sources. Ultimately, the objective here is to provide reasonable confidence that the samples taken will reflect true ground water quality. The procedures must address: (1) The procedures for obtaining samples from ground water monitoring wells; (2) procedures for preserving the samples for shipment to the laboratory; (3) the analytical procedures to be followed in analyzing samples; and (4) the "chain of custody" procedures to be used to prevent loss or mislabeling of samples during shipment and analysis. EPA intends to issue guidance on these topics.

The detection monitoring program will also indicate what analytical methods will be used in analyzing ground water samples. The general standard in § 264.97(e) requires that the methods be appropriate for ground water sampling and provide an accurate estimate of the presence of hazardous constituents in ground water samples. Some commenters have asked EPA to indicate what the analytical methods should be. To assist owners or operators, EPA is revising *Test Methods for Evaluating Solid Waste* (SW-846) to include guidance on acceptable analytical methods and procedures for ground-water sample analyses. This guidance should assist in the development of appropriate analytical methods for both the Part 265 and Part 264 monitoring requirements.

g. *Determining Statistical Significance*—Each time the owner or operator takes samples at the compliance point he must determine whether the level of the monitoring parameters and constituents is above (or below in the case of pH) the background values for those parameters and constituents by an amount that is statistically significant. The appropriate statistical procedures to be used are specified in § 264.97(h) and will depend on the pattern of the background data. The permit will specifically detail the statistical test that will be used. (See Section VIII.D.10 of this preamble for a description of the statistical procedures.)

The owner or operator must complete the statistical analysis within a reasonable period of time. EPA has not specified a minimum period of time because it recognizes that the reasonableness of such a time period will depend on several factors. Therefore, the regulations provide that the Regional Administrator will specify a time period within which the statistical analysis must be completed after considering the two key factors that could influence the time needed—the complexity of the statistical test and the availability of laboratory facilities to perform the analysis of ground water samples.

h. *Response to Finding Statistical Significance*—If the comparison between data at the compliance point and background values shows that a statistically significant increase (or decrease in the case of pH) has occurred, there is a presumption that a regulated unit is leaking. The owner or operator must pursue one of two options in responding to that finding.

The first option is to seek a permit modification to establish a compliance monitoring program (and perhaps a corrective action program) at the facility. Such a permit modification would be justified by the "new information" cause for modification under § 122.15(a)(2). The owner or operator must take several steps as part of this option. First, he must notify the Regional Administrator in writing within seven days that he has detected a statistically significant increase at the compliance point. The notification must indicate what parameters or

constituents have shown an increase. Second, he must sample the ground water at all monitoring wells for all constituents identified in Appendix VIII of Part 261. This will identify all potential hazardous constituents in the ground water.

Third, the owner or operator must begin to take additional samples to determine background values for all constituents detected at the compliance point. The owner or operator may be seeking to establish an alternative concentration limit (ACL) for some of the hazardous constituents. He must, however, collect some background data on such constituents to be ready in the event that the ACL cannot be justified and that "no increase over background" will become the concentration limit. The owner or operator must comply with the other general performance standards for ground water monitoring systems, for determination of background, and for preparing data in a form necessary for statistical analysis when developing this data.

Fourth, the owner or operator must submit a permit application for a compliance monitoring program within 90 days. That application should indicate what hazardous constituents have been found in ground water. For each such constituent found, the owner or operator must indicate what type of concentration limit (background value, NIPDWS level, or alternate concentration limit) should be established. The owner or operator must also describe any appropriate changes to be made to the ground water monitoring system, the monitoring frequency, sampling and analysis procedures or methods, or statistical procedures. In most cases, the permit applicant will at least be modifying the constituents to be monitored, and therefore, the analytical methods to be used. Monitoring frequency is also likely to be increased. Changes to the statistical procedures may also be needed, depending, for example, on the variance found in background data. In most cases, the applicant will not need to make substantial changes to the ground-water monitoring system.

Given that the modifications to the ground water monitoring program will primarily be ones involving changes in operating procedures, EPA believes that the applicant should be able to submit the application within 90 days.

If the owner or operator wants the Regional Administrator to establish alternative concentration limits, the information needed for the application will be more extensive. As indicated earlier in this preamble, EPA does not believe that permit issuance should be unreasonably delayed to allow an applicant to begin to collect data necessary for an ACL showing. Applicants who anticipate that they will want to pursue an ACL demonstration should do some advance planning to allow them to make the demonstration quickly.

In recognition of the fact that an application requesting an ACL will necessarily contain more information and analysis than an application based on the other types of concentration limits, however, today's regulations allow owners and operators additional time to submit the information necessary to justify an ACL. Within 90 days after detecting a statistically significant increase in the concentration of detection parameters or constituents at the compliance point, the owner or operator must indicate whether he intends to seek an ACL variance for each of the Appendix VIII constituents that have been found in the ground water at the compliance point. He indicates his choice by either proposing a concentration limit (background value or NIPDWR limit) or giving notice of his intent to seek an ACL. The owner or operator has an additional 90 days to submit the actual information necessary to support each of the ACL's sought.

Timely ACL demonstrations will be evaluated in the context of the permitting process on the compliance monitoring program. EPA will indicate its decision on the merits of the ACL demonstration when it issues the compliance monitoring permit. The permit will either contain a background value or NIPDWR limit (if EPA rejects the ACL demonstration) or it will contain an ACL (which may be equal to or less than the one proposed by the applicant).

Fifth, the owner or operator must submit within 180 days an engineering feasibility plan for a corrective action program. Once the monitoring indicates that a regulated unit is leaking and that hazardous constituents are present in the ground water, EPA believes that it is reasonable to assume that corrective action is likely to be necessary. In many cases, the Regional Administrator will be specifying a corrective action program in conjunction with a compliance monitoring program. Therefore, EPA believes that the owner or operator should submit a preliminary proposal for corrective action at the facility in conjunction with an application for a compliance monitoring program.

This plan does not need to detail every aspect of the program but rather should be an engineering feasibility plan showing what general corrective action measures can be taken. The plan should be sufficiently specific to allow EPA to determine that the corrective action program proposed could work at the facility. Recognizing that this plan could take some time to prepare, EPA has given the applicant 180 days to submit it.

The regulations also indicate that there are two situations where such a feasibility plan will not be necessary. First, if the only hazardous constituents are those listed in Table 1, and if the concentrations of those constituents at the compliance point are below the contaminant limits specified in Table 1, the likelihood that corrective action will be needed is less clear. Therefore, there is no automatic requirement for a corrective action feasibility plan in those cases. Second, if the owner or operator has requested an ACL for every Apendix VIII constituent significantly above background, or above appropriate NIPDWS levels found in ground water at the compliance point, then he is not required to submit the engineering feasibility study. If an ACL were granted for all of these constituents, it would not necessarily follow that a corrective action program would have to be established. Therefore, where such a comprehensive request for ACL's has been made, the Regional Administrator will make a decision on the ACL demonstration before requiring the submission of information necessary for a corrective action program.

The owner or operator has another option for responding to evidence that there is a statistically significant increase (or decrease in the case of pH) at the compliance point. The owner or operator may submit a report to the Regional Administrator indicating why he believes that the perceived increase was caused by a source other than a regulated unit or was the result of error in sampling, analysis, or evaluation. This report should be accompanied by additional monitoring data which indicates that the values used in the initial analysis of statistical significance are incorrect. Since this report is an action that may substitute for the submission of a permit modification application as described above, it must be submitted within 90 days.

The owner or operator may submit the report just described and a permit modification application. The owner or operator may also choose to file the report in lieu of the permit modification application. If he does so, however, he is subjecting himself to a risk. Such a report can only operate to exempt him from the general duty to file a permit modification application if it clearly indicates that the contamination is from

another source or is due to error. If the report fails to demonstrate such facts and the owner or operator has not filed an application for a permit modification, he is in violation of his permit. EPA could, therefore, take enforcement action if it finds such a report to be inadequate. Therefore, where the owner or operator knows that the data on which he bases his report is somewhat questionable, it may be prudent to also file a permit modification application.

i. *Duty to Modify Program*—The owner or operator has an ongoing responsibility to make sure that the detection monitoring program continues to comply with the requirements of this section. If he determines that it does not meet the general standards contained in this section, he should initiate a permit modification proceeding to make appropriate changes. For example, if his monitoring of ground-water elevation indicates that the gradient of the uppermost aquifer has shifted, he should apply for a permit modification to make appropriate changes to the ground-water monitoring system.

j. *Duty to Ensure Compliance with the Ground-Water Protection Standard*—The monitoring and response program of Subpart F provides for a graduated response over time to the problem of ground-water contamination as the evidence of such contamination increases. Since there is a significant likelihood that ground-water contamination problems will appear some time into the active life of a regulated unit or the post-closure care period, EPA wants to make sure that owners or operators engaged in current waste disposal will remain at the facility to manage any plume of contamination that emerges from a regulated unit. For example, EPA wants to avoid a situation which would allow an owner or operator who has not detected hazardous constituents in ground water to continue to operate while he faces the relatively light burdens of the detection monitoring program and to walk away once significant problems appear in ground water. To clarify a permittee's responsibilities, EPA is amending § 122.21(d) which sets forth the scope of the RCRA permit requirement. The amendment clarifies that owners and operators of hazardous waste management facilities must have permits during any post-closure care period for the facility and during any compliance period for the facility as well as during the active life of the facility. EPA is making a conforming change to § 122.10(b) to clarify that closure activities and post-closure care both must be undertaken pursuant to a permit.

One way of avoiding the possibility that the owner or operator would choose not to operate under a permit once contamination appeared is to provide a specific condition in the initial permit for the facility which obligates the owner or operator to monitor for and clean up hazardous constituents in the future as may be necessary to achieve the ground water protection standard. EPA believes that such a permit condition constitutes sound regulatory policy. EPA believes that the right to dispose of hazardous waste carries with it a correlative duty to insure that future contamination does not cause environmental problems. Thus, a future responsibility should be condition of a present authorization to operate.

Today's regulations indicate that a detection monitoring program will include a general permit condition requiring the owner or operator to take monitoring and corrective action measures that are necessary to assure compliance with the ground water protection standard. The exact nature of that commitment will be fleshed out in later permit proceedings if there is a need to take additional monitoring and corrective action measures.

12. *Compliance Monitoring Program (§ 264.99).* Once the owner or operator determines that there are hazardous constituents from a regulated unit, in ground water, he must establish a compliance monitoring program at the facility. Many of the requirements of this program are analogous to those required for the detection monitoring programs. The discussion here will only elaborate on those elements of the compliance program that differ from the detection program.

a. *Ground Water Protection Standard*—The ground-water protection standard for a facility will be established in the compliance monitoring program permit. The Regional Administrator will specify in such a permit the four elements of the ground-water protection standard: (1) The hazardous constitutents (§ 264.93); (2) the concentration limits for those constituents (§ 264.94); (3) the compliance point (§ 264.95); and (4) the complliance period (§ 264.96). The criteria used to establish these permit conditions are discussed in other sections of this preamble.

b. *Compliance Monitoring System*—The owner or operator must establish a monitoring system at the compliance point that will be used to determine whether the ground water protection standard is exceeded. The ground water monitoring system must satisfy the same general performance standards on well placement and installation (e.g., casing) that apply to detection monitoring systems installed at the compliance point.

c. *Concentration Limits*—The levels of hazardous constituents found at the compliance point must be compared to the concentration limits established in the ground water protection standard. The concentration limit for a constituent will be specified in the permit either in relationship to the background concentration of the constituent or as a specific concentration for the constituent. In both cases, statistical comparison procedures will be utilized.

In the first case, the concentration limit will be specified to allow for a determination of a statistically significant increase in the concentration of a constituent at the compliance point over the concentration of that constituent in ground water unaffected by a regulated unit. In most situations, the background concentration of a constituent will be specified in the permit as a result of pooling upgradient sample analyses over time, principally to account for seasonal variations in the naturally occurring ground water quality.

Where there is a high temporal correlation between ground water quality at the upgradient and downgradient monitoring wells, it may not be necessary to require the pooling of samples over time to account for seasonal variations. In such a situation, it would be acceptable to compare upgradient and downgradient ground-water quality each time the ground water is sampled. Accordingly, today's regulations provide that the Regional Administrator may allow for such a "single-point-in-time" comparison of upgradient and downgradient samples as an alternative to making comparisons of downgradient sampling results against a set background level that was based on a pooling of samples over time. Where this option is used, the Regional Administrator will specify in the permit a procedure for how background values will be calculated each time sampling occurs rather than specific background values.

The Agency has very limited information regarding the prevalence of temporal uniformity in ground water quality for hazardous constituents. The Agency invites comments regarding this phenomena where concentrations of constitutents in ground water vary over time but where the amount of variation at two different monitoring wells in the aquifer is virtually the same. Based on

such further information, the Agency may expand the use of the method just described for determining whether statistically significant increases occur in these regulations.

In the other case, the concentration limits specified in the permit will be either an MCL, for those constituents listed in Table 1 under § 264.94, or an ACL (alternate concentration limit) established under § 264.94(b).

When the concentration limit is one of the maximum concentration limits (MCL's) in Table 1, a problem arises when the MCL is quite close to the background value of the constituent. The MCL may be within the normal range of fluctuating background quality. Thus, when the monitoring system picks up a value that exceeds the MCL, it is not possible to tell whether the increase was due to leachate from a regulated unit or from normal fluctuations in background.

To account for this possibility, today's regulations provide that, when an MCL is within the normal range of background fluctuations of a constituent, the background value will be used as the concentration limit. This approach will provide reasonable confidence that corrective action will be triggered by an increase over an MCL only when the increase was not caused by normal background fluctuations.

The test used to determine whether the MCL or the background value will be used relies on a statistical concept. If analysis indicates that the MCL does not exceed the background value of a Table 1 constituent by a statistically significant amount, then the concentration limit will be based on the background value of the constituent. In addition, if the background value for a constituent is greater than the MCL, the background value will be used.

The system used for the collection of background data must meet the general performance standards applied to such systems. The data must be drawn from the proper wells as outlined under § 264.97(g) and must be expressed in a form necessary for the determination of statistically significant increases under § 264.97(h).

d. *Compliance Point Monitoring*—Under a compliance monitoring program, the owner or operator must sample ground water at the compliance point throughout the compliance period to determine whether a concentration limit is exceeded. Since a compliance monitoring program is used when hazardous constituents are in the ground water, EPA believes that sampling must be more frequent than it is in the detection monitoring program. EPA has, therefore, required that sampling should occur at least quarterly. The data collected must be expressed in a form necessary for the determination of statistically significant increases.

e. *Ground Water Flow and Direction*—The owner or operator must determine ground water flow rate and direction in the uppermost aquifer each time samples are taken at the compliance point. The rationale for this requirement is explained in the preamble to the detection monitoring program.

f. *Duty to Search for Additional Hazardous Constituents*—Since the hazardous constituents in a regulated unit will leak into ground water at different rates, it can be expected that the quality of leachate entering the ground water will change over time. Therefore, an assessment of leachate quality at the time that the leading front of the plume reaches the compliance point will not necessarily reflect the range of hazardous constituents that will appear at the compliance point during the compliance period.

To account for this fact, owners or operators are required to sample and analyze the ground water to determine whether additional hazardous constituents besides those identified in the permit are appearing at the compliance point. In order to make this determination, the owner or operator must analyze the ground water samples for Appendix VIII constituents at least annually. If this analysis reveals constituents that had not been found in the sampling used in the initial determination of the list of hazardous constituents, then the owner or operator must report his findings to the Regional Administrator. It will then be up to the Regional Administrator to reopen the permit to add hazardous constituents and appropriate concentration limits to the facility permit. The cause for this permit modification would be the new information that the permittee has found additional constituents in the ground water. See § 122.15(a)(2).

g. *Sampling and Analaysis Procedures*—As in the detection monitoring program, the owner or operator must develop sampling and analysis procedures and methods that satisfy general performance standards set forth in the regulations. As described in the preamble discussion of the detection monitoring program, those standards are designed to assure that the program develops accurate and reliable information on ground-water quality at the facility.

h. *Determining Statistical Significance*—Each time samples are taken at the compliance point, the owner or operator must determine whether there is a statistically significant increase at the compliance point over the concentration limit for each constituent. The procedures to be used must meet the requirements in § 264.97(h). As the preamble discussion of that section indicates, different criteria apply to statistical procedures used in the compliance monitoring program than apply in the detection monitoring program. The statistical analysis must be performed within a reasonable period of time, as discussed in the preamble to the detection monitoring program.

i. *Response to Finding of Statistical Significance*—If the analysis indicates a statistically significant increase over a concentration limit, the owner or operator must respond in a manner that is analogous to what is required in the detection monitoring program when a statistically significant increase is found. The owner or operator must notify the Regional Administrator in writing within seven days about what constituents have exceeded their concentration limits. He must also begin to prepare an application for a permit modification to establish a corrective action program for the facility, unless one has already been established in the permit. Where the monitoring data developed during the course of the compliance monitoring program provide the basis for knowing that concentration limits are exceeded, the cause for this permit modification would be the new information of the increase over a concentration limit. See § 122.15(a)(2).

The owner or operator has 90 days to submit an application for a corrective action program. EPA believes this is a reasonable time frame, particularly in light of the fact that in the normal course of permitting he will have aleady submitted an engineering feasibility study for corrective action as part of the deliberations over his compliance monitoring program.

The owner or operator will not have submitted an engineering feasibility study previously, however, if he had attempted to make ACL demonstrations for all Appendix VIII constituents found at the compliance point or if the only constituents found were NIPDWR constituents which were not above levels found in Table 1 under § 264.94. (These two situations are discussed in Section VII.D.11.h. of this preamble.) Where these two situations arise, the regulations allow the owner or operator 180 days, rather than 90 days, to submit the application for a corrective action program.

The application for the corrective action program must provide sufficient

information to allow the Regional Administrator to make two findings. First, the Regional Administrator must be able to determine that the corrective action proposed by the applicant will be able to bring the facility back into compliance with the ground-water protection standard for the facility. This will require a detailed description of how the applicant intends to remove or treat the ground water. This information should also describe any treatment processes that the owner or operator intends to use on ground water that is removed from the aquifer. EPA is particularly concerned that units used to treat these waters meet any applicable requirements of the hazardous waste regulations.

Second, the application must describe a ground-water monitoring program that will be used to demonstrate the effectiveness of the corrective action. In many cases, this program will be essentially the same as the compliance monitoring program, because that program was the one used to determine that the ground-water protection standard was exceeded. Some modifications to the compliance monitoring program may be appropriate, however, to demonstrate the effectiveness of corrective action. For example, it may be necessary to increase the frequency of monitoring or to increase the number of wells at or near the compliance point in those areas where the plume appears to be concentrated. In order to fully evaluate the effectiveness of the corrective action program, owners or operators may wish to install additional monitoring wells beyond the compliance point.

As in the detection monitoring program, the owner or operator may file a report along with, or in lieu of, the permit modification application that explains why the statistically significant increase was caused by a source other than a regulated unit or was the result of error in sampling, analysis, or evaluation. As in the detection monitoring program, the owner or operator takes the risk that he will ultimately be in violation of his permit if he files the report in lieu of a permit application and the report fails to demonstrate that the statistically significant increase was not caused by leachate from a regulated unit.

j. *Duty to Modify Program*—As in the detection monitoring program, the owner or operator has an ongoing responsibility to make sure that the compliance monitoring program continues to comply with the requirements of this section and to seek permit modifications when needed. This provisions is explained in more detail in the preamble for the detection monitoring program.

k. *Duty to Ensure Compliance with the Ground-water Protection Standards*—As described in the preamble for the detection monitoring program, EPA believes that the current right to dispose of waste carriers with it a correlative duty to control adverse effects from that activity that appear in the future. Therefore, today's regulations indicate that the facility permit will include a general condition obligating the owner or operator to conduct future monitoring and corrective action measures as may be necessary to achieve the ground-water protection standard.

13. *Corrective Action Program (§ 264.100).* If hazardous constituents from a regulated unit exceed the ground-water protection standard established for a regulated unit, the owner or operator must have a corrective action program designed to bring the unit back into compliance with the standard. A corrective action program may stand on its own in the permit or may be specified in conjunction with a compliance monitoring program. The following describes the general elements of a corrective action program.

a. *Ground-water Protection Standard*—The goal of the corrective action program is to bring the regulated unit into compliance with the ground-water protection standard. Accordingly, the elements of the ground-water protection standard will be specified in the permit including the list of hazardous constituents, the concentration limits for each constituent, the compliance point, and the compliance period.

b. *Objective of Corrective Action*—While the general goal of the corrective action program is to achieve compliance with the ground-water protection standard, today's regulations indicate that this goal must be achieved by removing the hazardous constituents or treating them in place. This is consistent with the general ground-water protection strategy described earlier in this preamble. EPA believes that the appropriate way to protect ground water is to prevent generation of hazardous waste leachate, where feasible, and to remove such leachate from the subsurface environment when it appears. EPA believes that in situ treatment of hazardous constituents is analogous to removal because it also provides long/term protection of human health or the environment. While the Agency recognizes that in situ treatment is an emerging technology, with chemical and biological techniques applied in only limited circumstances to date, in situ treatment may be an effective corrective action strategy.

EPA does not believe that measures which only prevent migration of hazardous constituents in the ground water for some period of time provide an adequate level of protection. Such approaches simply defer adverse ground-water effects until some later time. Therefore, EPA does not believe that measures which only modify the gradient in the aquifer or create barriers (*e.g.*, slurry walls) provide a fully adequate solution under the Subtitle C program. Such measures can, however, be combined with other measures, such as counterpumping, to constitute an adequate corrective action program.

The regulations do not describe in great detail the specific measures that must be taken for corrective action. Corrective action measures are highly dependent on site-specific factors. Moreover, the state of the art of ground-water cleanup will probably improve substantially in the next few years. EPA does not want to establish rigid guidelines for corrrective action that stifle innovation in this area. Therefore, EPA will rely on the broad performance standards established in § 264.100 to evaluate specific corrective action measures.

c. *Timing of Corrective Action*—EPA recognizes that is will take time to install corrective action measures and that the time needed will depend on site-specific factors. Therefore, today's regulations do not attempt to establish a minimum time period for installing corrective action measures. Instead, the regulations simply provide that corrective action must begin within a reasonable period of time to be specified in the permit by the Regional Administrator.

Some permits may combine the elements of the compliance monitoring program with the corrective action program. In such a situation, the appropriate response to the discovery of a statistically significant increase is the initiation of the approved corrective action program rather than submission of a permit modification application. In § 264.100(c), today's regulations make this point clear.

Corrective action must extend as long as is neoessary to achieve the ground-water protection standard. EPA has not specified a minimum time limit within which the standard must be achieved. EPA believes that any such limit should be based on site-specific factors. EPA anticipates that the owner or operator may be switching back and forth

between the compliance monitoring and corrective action mode during the course of the compliance period as ground-water quality fluctuates above and below the concentration limits specified in the permit. EPA should be able to specify in the permit the conditions under which these shifts in the mode of the monitoring and response program take place such that permit modifications will not be necessary.

Corrective action must continue through the compliance period to the extent necessary to meet the ground-water protection standard. If corrective action is still needed at the end of the compliance period, the owner or operator must continue the corrective action until it has achieved the standard. In defining what it means to "achieve" the standard, EPA must indicate how long the owner or operator must demonstrate through monitoring data that the ground-water protection standard has not been exceeded. In order to provide an adequate margin of safety, EPA has provided that the ground-water protection standard must not be exceeded for a period of three consecutive years before the corrective action program can be terminated.

d. *Duty to Clean Up Contamination Past the Compliance Point*—At the time that EPA considers a regulated unit at an existing facility for permitting, it is possible that a plume of contamination will have migrated beyond the compliance point. Clearly, such a plume of contamination can present a risk of adverse effects on human health and the environment. Corrective action measures designed to remove the plume of contamination at the compliance point will be at least partially successful in controlling contamination beyond the compliance point, but there is no guarantee that such a plume will be completely removed.

Some or all of the plume may be within the facility property boundary and thus within the areal jurisdiction of Section 3004. Therefore, it is within EPA's authority to require cleanup of this contamination under the permit.

EPA has decided that it is reasonable to require the owner or operator to take corrective action measures to clean up a plume (or portion of a plume) of contamination that has migrated beyond the compliance point but not beyond the property boundary as a condition for receiving a permit under today's regulations. EPA's decision is based on several considerations. First, the existence of such a plume may constitute a very real and present danger to human health and the environment. In fact, the proximity of such a plume to the facility property boundary indicates that it may present a threat that is even more imminent than that presented by the portion of the plume that is just arriving at the compliance point at the time of permit consideration.

The fact that the plume can be linked to wastes placed before these regulations were issued does not negate the fact that the existence of the plume is a present condition that may cause present and future harm to human health and the environment if the plume is allowed to continue to migrate. In requiring the corrective action program to address the plume beyond the compliance point, EPA is not imposing new requirements directly on past practices, but rather is requiring the owner or operator to address a current ground-water contamination problem that may cause present and future damage.

Second, this approach, in conjunction with the decision about what constitutes a regulated unit, provides fair notice to the owner or operator about what his responsibilities will be. The ground-water protection standard in today's regulations only applies to plumes of contamination from regulated units (i.e., units that receive waste after the effective date of today's regulations). If the owner or operator can show that a particular plume does not originate from a regulated unit, the permit would not require him to clean up such a plume. (EPA could, of course, seek cleanup of such plumes under other authorities, including Section 7003 of RCRA.) Thus, the regulations provide the owner or operator with a reasonable time period (i.e., the time between the issuance of today's regulations and their effective date) to define the units (and thus the potential plumes) that will be subject to the requirements of this Section.

Third, this approach links the scope of the owner or operator's responsibility to the scope of his control. The property boundary defines the area within which the owner or operator can feasibly conduct corrective action measures such as counter-pumping. In some situations, it might also be possible for him to obtain permission to enter neighboring property to conduct corrective action to reach a plume that has migrated off-site. EPA has not required, however, that the owner or operator attempt to clean up the portion of a plume from a regulated unit that has migrated beyond the facility property boundary because there is no guarantee that the owner or operator could obtain such permission. It is inappropriate, therefore, to impose this as a general requirement for all facilities. Plumes migrating beyond the property boundary could, however, be addressed under other authorities such as CERCLA.

Accordingly, today's regulations require that the owner or operator take corrective action to clean up significant plumes (or portions of plumes) of contamination from regulated units that are in the ground water between the compliance point and the facility property boundary at the time of permit consideration. The regulations require (in § 264.91(a)) that a corrective action program is necessary if hazardous constituents under § 264.93 exceed concentration limits under § 264.94 in the ground water between the compliance point and the downgradient facility property boundary. The nature of that corrective action program is defined in § 264.100(c).

The Regional Administrator will determine whether there is a need to clean up a plume beyond the compliance point using some of the same general criteria used to determine whether the groundwater protection standard is exceeded. Thus, corrective action is triggered if hazardous constituents under § 264.93 from the regulated unit exceed concentration limits under § 264.94. These same general criteria will be used to define when the corrective action is complete. Corrective action measure may be terminated when hazardous constituents no longer exceed their respective concentration limits.

The corrective action program to clean up a plume beyond the compliance point must be initiated and completed within a reasonable period of time, considering the extent of contamination. The permit will specify the measures that the owner or operator will take to satisfy this provision and will set forth a schedule for when these activities must be completed. These measures may be carried out in conjunction with other corrective action measures designed to achieve compliance with the ground-water protection standard. In § 264.100(d), today's regulations also indicate that the monitoring program needed to determine whether the ground-water protection standard is being achieved should also be capable of determining whether § 264.100(e) is being met where there is a plume from a regulated unit beyond the compliance point.

Today's regulations do not specify that the facility property boundary, for purposes of this provision, is the boundary in existence at any particular point in time. While EPA expects that, in most cases, a facility's property boundary will not change substantially between the effective date of these regulations and the date of permit

issuance, it is possible that an owner or operator may sell a piece of the property during that interim period. EPA is concerned that today's regulations should not create an incentive for an owner or operator to sell pieces of the facility property in order to avoid the responsibility of cleaning up plumes (or portions of plumes) of contamination under this provision.

Accordingly, EPA seeks public comment on how it can better define the concept of the facility property boundary to avoid such undesirable results. Specifically, EPA requests comment on whether the regulations should require corrective action at permitting for any plume (or portion of a plume) that is within the facility property boundary as it existed on the effective date of these regulations, the date that the permit application was submitted, the date of permit issuance, or some other point in time.

e. *Corrective Action Monitoring*—The corrective action program must include a monitoring program that is capable of demonstrating that the corrective action measures have been successful. The monitoring program should be based on the compliance monitoring program of § 264.99, since this is the program that is designed to determine compliance with the ground-water protection standard. Where a compliance monitoring program is established in the same permit as the corrective action program, or has been established in an earlier permit, such a program should be sufficient for the corrective action monitoring. In some cases, however, it may be necessary to have more frequent monitoring or to have a different configuration of wells during the corrective action stage than during the compliance monitoring stage. The Regional Administrator will specify in the facility permit the monitoring program to be used. It must be at least as effective as the compliance monitoring program in determining whether the ground-water protection standard is exceeded.

f. *Reporting*—Today's regulations provide that the owner or operator must report in writing semi-annually on the effectiveness of the corrective action program. EPA believes this requirement is reasonable in light of the fact that the permit may not specify when corrective action must be completed. EPA believes that an ongoing reporting requirement is needed under these circumstances to ensure that the owner or operator does not simply continue to implement measures that are not achieving the ground-water protection standard.

E. Design and Operating Standards: General Discussion (Part 264, Subparts K,L,M,N)

1. *Introduction.* The Part 264 regulations promulgated today for surface impoundments, piles, landfills, and land treatment units used to treat, store, or dispose of hazardous wastes include a set of design and operating standards in Subparts K–N in addition to the ground-water protection requirements in Subpart F. The design and operating standards are of two types. First is a set of standards that are analogous and, in some cases, identical to the interim statutes standards that have already been established for these units in 40 CFR Part 265. These standards generally require sound operating practices. Second is a set of new and generally more rigorous standards that emphasize environmentally protective design and construction features as well as complementary operating and maintenance practices. This preamble discussion will focus on the latter set of standards.

In developing the design and operating standards, EPA has considered all of its previous rulemaking activities (see the discussion in section II of this preamble) and the public comments received as part of the rulemaking process. While the comments submitted to EPA were by no means uniform, the following general guidelines appear to reflect a broad consensus and, in EPA's opinion, a sound approach to writing the design and operating standards (as well as the Subpart F ground-water standards).

(1) The standards should reflect clearly articulated regulatory goals.

(2) The standards should be understandable by the regulated community and the general public and capable of being administered efficiently by permit-issuing authorities.

(3) The standards should require different units to achieve consistent environmental results, while providing ample flexibility for site-specific factors to be considered during the permitting process.

(4) The standards should be specific enough to provide as much certainty as possible, but, again, should be flexible enough to allow environmental results to be achieved in the manner that is most cost-effective for a specific combination of wastes, unit, and location and that does not stifle innovation.

Accordingly, the major feature of the Subparts K–N regulations promulgated today is a set of design performance standards. The standards clearly set forth the environmental results to be achieved (e.g., there must be no migration of wastes from a landfill during its active life) in terms of generalized design requirements (e.g., a landfill must have a liner to prevent the migration of wastes from the landfill during its active life).

The design performance requirement sets forth general performance goals (e.g., a liner must have appropriate chemical properties and sufficient strength and thickness to prevent failure). However, EPA recognizes that there are many ways to achieve such goals. Therefore, detailed specifications are not set forth in these rules but, rather, are left to be determined during the permitting process. EPA has developed in the past and will continue to develop technical manuals and guidance documents to assist permit applicants and permitting authorities in evaluating the appropriateness of various equipment, materials, and designs in the context of specific units, wastes and locations (see the discussion in Section VII. E.8. below.)

The design and operating standards generally apply to all surface impoundments, waste piles, land treatment units, and landfills, including both new and existing units. However, portions of units on which wastes have been placed prior to permit issuance are exempt from certain design requirements which would require burdensome and possibly hazardous retrofitting of the units. (See Section VII E.6. below.) Furthermore, the regulations provide a waiver from some design and operating standards if the permit applicant demonstrates that there will never be any ground water or surface water contamination if the waiver is granted.

2. *Major Features of the Design and Operating Standards.* The regulatory goal adopted in the design and operating standards is to minimize the formation and migration of leachate to the adjacent subsurface soil or ground water or surface water. Thus, while the ground water protection requirements are intended to result in detection, evaluation and, if necessary, correction of ground water contamination, the design and operating standards are intended to minimize the possibility of such contamination. Thus, these two sets of standards are complementary. One set is preventive; the other offers a cure for situations in which the preventive measures have not sufficed to eliminate threats to human health and the environment.

The regulatory goal of minimizing the formation and migration of leachate is

achieved differently with respect to different units. For land treatment units, the design and operating standards require that hazardous constituents be degraded, transformed, or immobilized within the treatment zone. Due to the unique features of land treatment units, these units are discussed separately below in Section VII.H. of this preamble.

For surface impoundments, piles, and landfills, any treatment that occurs is usually not instantaneous and is often incomplete. (An exception is neutralization surface impoundments in which treatment may be very quick and complete. See the discussion above in Section IV.B.2. of this preamble.) Therefore, EPA has assumed in writing the standards that some hazardous constituents will be capable of migrating from these units to adjacent subsurface soil or ground water or surface water. For these units, therefore, EPA has developed regulations to minimize the rate and volume of waste and leachate migration. The regulations have the following key features:

(1) Each impoundment, pile, or landfill (except existing portions) must have a liner that is designed and installed to prevent any migration of wastes out of the unit to the adjacent subsurface soil or ground water or surface water throughout the active life of the unit.

(2) To minimize the potential for release of hazardous constituents both during the unit's active life and after the unit is closed:

a. Piles and landfills must have leachate collection and removal systems (during their active lives and, after closure, until leacate is no longer detected), as well as measures to prevent run-on of liquids into the unit.

b. Surface impoundments must have all wastes and waste residues either removed or solidified at closure. Piles must have all wastes and waste residues removed at closure.

(3) To further minimize post-closure leaching of hazardous constituents, any unit in which hazardous constituents are not entirely removed or decontaminated at closure must have a final cover (cap) placed on top to minimize the percolation of liquids into the unit. The cap must be maintained until the end of the post-closure period.

3. *Rationale Underlying the Design and Operating Standards.* In developing standards for land disposal units, EPA considered and rejected the option of promulgating ground water standards in conjunction with only those operating requirements already in the Part 265 interim status standards. EPA expects that today's Part 264 ground water protection standards in Subpart F will, in most cases, adequately protect human health and the environment from ground water contamination. They also address surface water contamination threats to some degree, since land disposal units that contaminate surface water often do so by leaching waste constituents to ground water, which then serves as a conduit to adjacent surface water. However, EPA concludes that sound policy as well as the law support an approach that supplements those standards, where appropriate, with design and operating standards that minimize contamination threats by controlling the source of contamination, i.e., the unit itself.

First, at present, the technologies for detecting and remedying ground-water contamination, while fairly advanced, remain subject to error. To detect ground-water contamination, one must carefully study the hydrogeologic setting to properly place monitoring wells. Because each setting is unique and often is heterogeneous, occasional errors in well placement are inevitable despite the best efforts of owners and operators to comply with Subpart F. Furthermore, the technology of performing corrective action is new. The Agency's and the regulated community's experience in conducting remediation activities (beyond the feasibility study stage) is fairly limited to date. Thus, while ground-water monitoring and remediation techniques are important activities and thus are appropriately required in Subpart F, design and operating standards will significantly increase confidence by reducing the potential for ground-water contamination.

Second, corrective action can be expensive. It may involve pumping and treating large volumes of contaminated ground water for many years. In some cases, the owner or operator may lack the financial resources to perform the required corrective action. Elsewhere in this preamble (Section IV.B.1.) EPA discusses and invites public comment on options for financial responsibility requirements to address this problem. Any such requirements that might be promulgated are likely to reduce, but cannot eliminate entirely, the possibility that owners or operators of land disposal units will lack the finances needed to perform necessary corrective action. Furthermore, if ground-water contamination occurs after the owner or operator has completed all required post-closure maintenance and monitoring activities required in his permit, substantial sums of money may need to be drawn from the Fund established in CERCLA or otherwise expended by the public. Design and operating practices can reduce this problem by minimizing the amount and rate of leachate migration to the subsurface soil and ground water.

For the above reasons, EPA believes that design and operating standards are necessary to protect human health and the environment. EPA emphasizes, however, that despite the promulgation of design and operating standards, the Subpart F standards are also necessary to fully protect human health and the environment. Design and operating features, like the ground-water monitoring and response program, are effective but not fail-safe. Most land disposal units, however well designed, will eventually leak after closure to some extent. Furthermore, many existing units lack adequate liners and may already be leaking. When leaking occurs, EPA expects that compliance with the Subpart F requirements will, in most cases, result in detection of contamination that may threaten human health and the environment and in remediation of the threats. In addition, EPA anticipates that the technologies needed to implement Subpart F will continue to advance, just as they have rapidly improved in recent years. Thus, the standards promulgated today provide a two-part "prevention and cure" system, each part adding to confidence in the system as a whole.

This combined approach, including both design and operating standards and monitoring and corrective action requirements, comports with the language and intent of Section 3004 of RCRA. This Section requires EPA to promulgate regulations establishing such performance standards as may be necessary to protect human health and the environment, and direct that these standards include requirements respecting:

(1) Operating methods, techniques and practices as may be satisfactory to the EPA Administrator;

(2) Reporting, monitoring, and inspection;

(3) Location, design, and construction of facilities; and

(4) Contingency plans for effective action to minimize unanticipated damage from hazardous waste treatment, storage, or disposal.

EPA believes that the two-pronged approach promulgated today successfully addresses the various factors listed by Section 3004. We further believe that the regulatory approach will help a concerned public gain confidence that land disposal units permitted pursuant to the standards promulgated today will protect human health and the environment.

4. *Rationale for Requiring Liners that Prevent Migration of Wastes During the Active Life of the Unit.*

During our development of the requirement that each impoundment, pile, and landfill have a liner designed to "prevent" migration of wastes out of the unit during the active life of the unit, EPA considered requiring instead that the liner merely "minimize" migration. This distinction has significant practical consequences with respect to the types of materials that may be used for liners. For example, while a clay liner minimizes migrations, it does not completely prevent migration, since liquids will slowly enter the pores of the clay, move through it, and ultimately flow out of it.

EPA decided to require a design to prevent migration during the unit's active life. This standard, together with requirements to minimize post-closure migration, represent the best available technology to achieve the goal of minimizing the rate and volume of leachate migration for all time. Merely designing to minimize migration during the unit's active life would result in an increased risk of ground-water contamination both during the unit's active life and after closure.

When a synthetic membrane liner, for example, is installed in a landfill, the leachate collection and removal system installed above the liner (as required by today's regulations for landfills and piles) can achieve virtually a 100% removal efficiency. In contrast, if a clay liner is used, some leachate will seep into the liner rather than be removed through the drainage layer. This leachate will remain in the soil after closure and will likely migrate to the ground water at some future time.

Prevention, rather than minimization, of leachate migration similarly produces better environmental results in the case of surface impoundments used to dispose of hazardous wastes. As discussed in Section VII.F. of this preamble, an impoundment is not required to have a leachate collection system, and thus no leachate is removed during its active life. One of the regulatory options for closing a surface impoundment is to solidify remaining wastes and cover the impoundment with a low permeability cap (i.e., to close the unit in the same manner as a landfill). These measures will likely nearly eliminate further migration of hazardous constituents from the impoundment for the near term and will minimize migration into the distant future. If the liner has prevented migration throughout the active life of the impoundment, then all wastes and leachate will still be above the liner at closure where they can be dealt with relatively easily. But if the leachate has migrated into a soil-based (e.g., clay) liner prior to closure, future migration of these wastes is more likely. A liner that prevents rather than minimizes leachate migration provides added assurance that environmental contamination will not occur.

The above rationale does not apply fully to a pile or to a surface impoundment from which all wastes and waste residues will be removed at closure (i.e., "storage" piles or surface impoundments; some of these may treat the wastes as well as store them). Since all contaminated liners will be removed or decontaminated at closure, it is environmentally acceptable for leachate to enter into such liners during the pile's or impoundment's active life. For example, suppose that a five-foot clay liner (but not the underlying soils) received some leachate during the active life, after which the entire contaminated liner system is removed. In that case, the standard of preventing migration out of the unit during its active life would have been met, and the environmental goal of long-term minimization of leachate migration would also have been achieved.

In accordance with the rationale explained above, the regulation requires that landfills, surface impoundments, and piles have liners designed to prevent migration to the adjacent subsurface soil or ground or surface water during their active lives. First, it further provides that in the case of a storage unit (i.e., a pile or a surface impoundment from which wastes and waste residues will be removed or decontaminated at closure), the liner may be constructed of materials that may allow wastes to migrate into the liner (but not into the adjacent subsurface soil or ground water or surface water) during the active life of the unit, provided that the liner is removed at closure. Thus, in appropriate situations, clay or admixed materials may be acceptable liner materials. Second, in the cases of landfills and of surface impoundments used to dispose of hazardous waste, the regulations provide that the liner must be constructed of materials that prevent wastes from passing into the liner. Synthetic liners are the only commonly-used materials of which EPA is aware that would meet this standard.

EPA recognizes that even a thin, 30-mil synthetic liner can sorb a *de minimis* quantity of wastes into its structure and allow some vapor to pass through. EPA of course, does not interpret such *de minimis* sorption or passage to violate the requirement that disposal units not allow wastes to pass into the liner. However, clay liners, even if relatively "tight," would violate this requirement.

It should be noted that the standard of designing to prevent migration is a design performance standard. It requires that liners be "designed constructed and installed" to prevent migration during the unit's active life. If the permittee complies with this requirement and the liner fails subsequent to installation despite such compliance, the permittee will not be in violation of the permit as it relates to this standard.

EPA is not requiring that liners prevent migration of wastes after the unit is closed rather, the regulations require that post-closure migration of liquids be "minimized". Absolute prevention of migration forever or for very long times is beyond the current technical state of the art. Thus, at some time some migration will probably occur. Thus, instead of relying on bottom liners to provide post-closure protection of ground water, EPA is relying principally on final cover (caps), as discussed below.

5. *Closure of Land Disposal Units.* A cap is a top liner, placed on the unit at closure. Caps, like bottom liners cannot be expected to last forever. However, a properly designed and maintained cap can prevent the entry of liquids into the closed unit, and thus the formation and migration of leachate, for many years and can minimize it thereafter in the absence of damage. Therefore, EPA requires that the cap be designed and constructed to provide long-term minimization of the movement of liquids into the closed unit. Because clays will generally last longer than synthetic materials, clay caps rather than synthetic caps should usually be the materials chosen to provide long-term minimization.

To avoid the build-up of liquids in the closed landfill or impoundment (the "bathtub effect") EPA requires that the cap be as impermeable as the bottom liner. This will require the installation of a synthetic membrane cap whenever the bottom liner is synthetic. Thus, many units will be required to have two-layer caps consisting of a synthetic layer to avoid the bathtub effect and provide short-term prevention of infiltration, and a clay layer to provide long-term minimization of precipitation infiltration and leachate generation. EPA believes that this will provide maximum short-term and long-term protection of human health and the environment.

EPA recognizes the need for certainty and uniformity in implementing the regulatory concept of "long-term minimization" of liquids migration.

Therefore, EPA is currently developing numerical limits for liquid migration. The technical approach being used is discussed in EPA's Guidance Document for Landfill Design—Liner Systems and Final Cover (see Section 9 of this preamble discussion below). EPA hopes to propose these numerical limits within six months.

6. *Existing Portions.* The design and operating standards contain a limited exemption for "existing portions" (defined today in § 260.10). An existing portion is any area on which waste has been or is being placed at the time of permit issuance. This may be one cell or trench of a landfill, an impoundment, or a section of a pile. Existing portions are exempt from the requirements to install liners and leachate collection systems. However, they remain subject to the remainder of the design and operating requirements (*e.g.*, placing a cover over wastes remaining at closure) as well as the ground-water protection requirements of Subpart F.

Installing liners and leachate collection systems at existing portions would create severe difficulties for many facilities. Owner or operators would have to remove wastes before installing liners and leachate collection systems. This presents several types of problems.

Some facilities may lack space in which to store the wastes temporarily while retrofitting. Even worse, in some cases, the ongoing waste disposal operation is integral to production operations. For example, some facilities use large volumes of water as part of their manufacturing processes and use surface impoundments to treat wastewater or to store or dispose of sludge. Unless additional space is available to construct a new impoundment to receive the wastes being removed from the existing impoundment, it may be impossible to retrofit the old impoundment without shutting down production facilities.

A second problem is safety. Exhuming wastes from a landfill, for example, may create significant hazards for workers and others who are nearby and may be exposed to the wastes.

The Congress recognized the problem of retrofitting existing units when it amended Section 3004 of RCRA in 1980 to add the following provision:

> In establishing such standards the Administrator shall, where appropriate, distinguish in such standards between requirements appropriate for new facilities and for facilities in existence on the date of promulgation of such regulations.

This provision does not absolutely require EPA to have separate standards for new and existing units but does indicate that EPA must consider whether distinctions should be drawn. The legislative history of this provision specifically indicates that the Congress was concerned about burdensome retrofitting problems that existing units might have in complying with location and design requirements that EPA might appropriately specify for new portions. H.R. Rep. No. 96-1444 (1980).

The limited exemption for existing portions in these rules implements the legislative intent. The exemption applies only to those requirements which would require dangerous or impracticable retrofitting at existing units (i.e., bottom liners and leachate collection and removal systems). Moreover, it applies only to existing portions of existing units. New portions of existing units (e.g., lateral extensions of existing landfills such as new cells or trenches) are not entitled to the exemption since they would not experience the retrofitting problems pertaining to existing portions.

EPA is concerned that this exemption may be too broad in some situations and too narrow in others. It may be that there are some situations where waste can be removed with minimal risk and at a reasonable cost even at existing portions, so that the policy concern behind the exemption is inapplicable. For example, it may be quite simple to remove a small waste pile or a small or partially filled landfill trench and place a liner underneath it. Similarly, it may be feasible to retrofit an existing surface impoundment that is used infrequently (e.g., to hold overflows) or that is not essential to daily production needs. Also, EPA realizes that there may be little environmental gain in requiring owners and operators of units very near the end of their operating life to comply with the liner requirements. For example, if 95 percent of the capacity of a landfill is consumed at the time of permitting, there may be little benefit to requiring a liner system under the remaining 5 percent. EPA does not currently have enough information to distinguish among various types and sizes of existing portions to fashion a narrower exemption. EPA requests public comment about the scope of the exemption and welcomes suggestions about how this exemption can be better crafted to address those situations where substantial retrofitting would not be necessary or could be accomplished without causing environmental harm or excessive burdens or, alternately, where upgrading practices at existing facilities may provide *de minimis* additional protection.

7. *Waiver from the Liner and the Leachate Collection and Removal Requirements.* If an owner or operator of an impoundment, pile, or landfill can demonstrate to the Regional Administrator that the use of alternate design and operating practices, in combination with location and waste characteristics, will prevent the migration of any hazardous constituents into the ground water or surface water forever, then he may obtain an exemption from the liner and the leachate collection and removal requirements. The basis for the exemption is that such requirements become superfluous if no potential threat to ground water or surface water will occur at any time.

An example of a situation for which this exemption may be appropriate is one where: (1) A large unsaturated zone below the unit is composed of materials that are capable of attenuating any hazardous constituents in the leachate before it reaches ground water or surface water (e.g., attenuating hazardous constituents through ion exchange); (2) the unit is located in an arid area in which precipitation does not recharge ground water; and (3) the unit handles only a small quantity of wastes. Given an appropriate combination of such factors, together with proper design and operating practices, (e.g., the use of a thick liner possessing substantial attenuative capacity), it may well be that the owner or operator could demonstrate that no hazardous constituents could ever migrate as far as the ground water or surface water.

Although the requirements for liners and leachate collection and removal systems apply only during the life of the unit, the waiver of these requirements is based on a demonstration that migration to ground or surface water will not occur at any future time. These requirements, while operative during the unit's active life, are designed to ensure that the post-closure migration of liquids is minimized to the extent that ground- or surface-water contamination will never occur. Therefore, a waiver of these requirements must logically be based on a showing that the equivalent environmental result will be achieved, i.e., that ground- or surface-water contamination will never occur.

EPA also considered granting a waiver from the closure provisions in situations as described above, where it is demonstrated that hazardous constituents cannot reach the ground water. However, the closure provisions have other benefits in addition to ground-water protection, including: (a) Prevention of the "bathtub" effect (i.e.,

filling with leachate and overflowing); (b) protection of surface water from run-off; and (c) discouragement of direct access to the wastes. The Agency has, therefore, decided not to waive the closure requirements where ground-water contamination is not possible.

Another waiver from the design and operating requirements considered by the Agency involved facilities located over aquifers which are not underground sources of drinking water (exempted aquifers under the Safe Drinking Water Act—see 40 CFR 122.35 and Section VII.D.5.c. of this preamble. The argument can be made that if an aquifer or a portion of an aquifer is, for some reason, not usable as a drinking water supply, then there is little reason to install devices (e.g., liners) to protect it. The Agency is concerned, however, that exempted aquifers or portions of aquifers under the Safe Drinking Water Act may be only temporarily exempted in some cases, and that they may flow into nonexempted portions, into surface water bodies, or into nonexempted interconnected aquifers (e.g., underlying aquifers). The Agency has not had time, however, to fully evaluate to what extent, if any, such an exemption may be protective and has, therefore, not included it in this promulgation. Existing facilities over exempted aquifers or exempted portions of aquifers will, however, be considered low priority for permitting pending review of this issue.

The Agency solicits comments on these and other waivers from the design and operating requirements which might provide adequate protection.

8. *Special Provisions for Double-lined Units: Exemption from the Ground Water Protection Requirements of Subpart F.* The design and operating standards contain special sets of standards for surface impoundments, piles, and landfills with double liners and leak detection systems. Compliance with these standards is not mandatory. However, if an owner or operator voluntarily applies for and is issued a permit to comply with these special standards (in addition to the other standards generally applicable to these units), then he is not subject to the ground water protection regulations contained in Subpart F (except under special circumstances discussed below).

These special standards require that there be two liners underlying the unit and a leak detection system between the two liners. The two liners must be designed and constructed in a manner that prevents the migration of liquids into or out of the space between the liners. This can be achieved by lapping or sealing the edges of two synthetic membrane liners at the surface. A leak detection system is any system (e.g., a drain and pump, or appropriate instrumentation) that enables the owner or operator to detect whether any liquid has entered into the space between the liners. If liquids are detected in the leak detection system, it may be concluded that the liquids resulted from a leak in one of the liners. Some water may enter the space between the liners at the time of installation. This would occur only once, at the time of unit start-up. A prudent owner or operator would remove this water at that time, since the presence of water in the leak detection system at a later time will be assumed to indicate that one of the liners is leaking.

If liquid leaks into the leak detection system, indicating a leak in at least one of the two liners, the owner or operator must notify the Regional Administrator within seven days after detecting the leak. He then has two options. One is to repair or replace the liner and obtain a certification from a qualified engineer that the leak has been stopped. This must be done within a period of time specified in the permit. The period of time should be set to ensure expeditious repair or replacement but, since one liner is still intact, can be set reasonably to cause minimal disruption of production processes that are dependent on the unit's continued operation.

For many units, repair or replacement is impractical, just as retrofitting an existing portion to install a liner is impractical, as discussed in the preceding section of this preamble. The second option is to forfeit the exemption from the Subpart F ground-water protection standards and to begin to comply with a detection monitoring program, under § 264.98, to ensure that any migration of leachate to ground water will be detected. However, this option is available only if such a program is already incorporated in the permit. Otherwise, after detection of the leak, ground-water contamination could ensue while proceedings are still being conducted to modify the permit to establish a detection monitoring program.

Ordinarily, a permit written for a double-lined unit seeking an exemption from Subpart F would not contain any detection monitoring requirements. In that case, if an owner or operator discovers a leak in the leak detection system, he will have to repair or replace the leaking liner or else be in violation of the permit. Therefore, EPA recommends that those who anticipate retrofitting problems in attempting to repair or replace leaking liners should request that detection monitoring programs be established in their permits in accordance with the requirements of § 264.98, as contingent requirements. Such requirements would be automatically triggered in the event of a leak, but would not have to be complied with until such a leak occurred. The permit would specify well placement, detection parameters to be monitored, and the frequency of monitoring. If a leak occurred, the permittee would then install the wells and begin monitoring in accordance with a schedule set forth in the permit.

The regulations require that the liners must meet the requirements normally applicable to liners in single liner systems: they must prevent the migration of wastes to subsurface soil or to ground water or surface water during the life of the unit. This is consistent with the policy objectives outlined in Sections VII.E.1. and VII.E.2. above. Furthermore, it should be noted that, as a practical matter, owners or operators seeking to use this exemption from Subpart F will insure that both liners prevent migration. Otherwise, leakage into the leak detection system will occur, resulting in the need to repair or replace the leaking liner or begin groundwater monitoring, as discussed above.

The leachate collection and removal requirements for single-lined piles and landfills also apply to double-lined systems. The leachate collection and removal system must be placed on top of the upper liner, and must be maintained and operated to collect and remove the leachate. This implements the policy objective of reducing the amount of leachate that can leach in the future to the subsurface soil or ground water or surface water.

Finally, to be eligible for the exemption from the Subpart F ground-water protection requirements, a double-lined unit (including the liners and leak detection system) must be placed entirely above the seasonal high water table. Placement of units in the ground water poses special problems associated, among other things, with external pressures applied by the saturated earth. The Agency is concerned that these pressures can cause disruption (collapse or caving in) of the liner system and disruption of the leak detection system to the point that it may not work. While collapse of the liner system can occur when a single liner unit is located in the ground water, the ground-water monitoring system can be expected to function to detect contamination. Since ground-water monitoring is waived for double-lined facilities, it is imperative that the leak detection system function. The Agency

is not confident at this time that it can specify design safeguards that will ensure continued function when the unit is placed in the saturated zone (i.e., in the ground water).

9. *Specification of Design and Operating Requirements in Permits.* The design and operating standards in these rules are written as performance standards. The purpose in using the performance-standard approach is to address the legitimate concern of many commenters that the regulatory standards provide flexibility in meeting the performance goals established by EPA. This allows the use of cost-effective, site-specific designs, equipment, and operating practices, and encourages innovation.

In promulgating performance standards, EPA is relying on the issuance of permits to clearly establish the specific designs and operating requirements which each individual owner or operator must comply with. It is thus the permit-issuing authority's task to translate general standards into specific detailed obligations. The permit writer will do so in accordance with the procedural requirements of 40 CFR Part 124, which provide for the issuance of a draft permit, documentation explaining the basis for the conditions in the draft permit, a public comment period a public hearing if requested, the issuance of a final permit, and a right of administrative appeal.

The regulations for each type of land disposal unit contain a provision that requires that the Regional Administrator will specify in the permit all design and operating practices that are necessary to insure that the general design and operating standards are complied with. For example, the landfill standards require that leachate depth over the liner not exceed one foot. This requirement may be complied with by using a combination of design features (*e.g.,* slope and permeability of the drainage layer above the liner) and operating practices (*e.g.,* the amount of bulk liquids placed in the landfill) based upon assumptions concerning natural conditions (*e.g.,* expected precipitation rates). The permit writer will not only approve the design features but will also specify the operating practices in the permit. The documentation prepared to support the permit issuance (a statement of basis under § 124.7 or a fact sheet under § 124.8) would indicate the assumptions concerning natural conditions that were used in deriving appropriate design and operating conditions. Thus, the design features and operating practices incorporated in the permit will be those used by the owner or operator to demonstrate compliance with the performance standard (*i.e.,* the one-foot depth limit).

10. *Technical Resource Documents and Guidance.* EPA recognizes the need for guidance to assist applicants in understanding what specific designs and operating practices would be considered acceptable to EPA and to assist permit writers in establishing specific permit conditions. Accordingly, EPA has developed two groups of documents.

The first group is a series of eight detailed technical resource documents dealing with various technical issues. These documents discuss (a) facility design and operating technologies, and (b) methods for evaluating the performance of designs, but are not necessarily correlated with the regulations. These documents, in their current draft form (EPA expects to revise them by early 1983), are available from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161. The documents are as follows:

(1) Evaluating Cover Systems for Solid and Hazardous Waste (EPA Publication No. SW–867, NTIS Publication No. PB–81–166–340).

(2) Hydrologic Simulation on Solid Waste Disposal Sites (EPA Publication No. SW–868, NTIS Publication No. PB–81–166–332).

(3) Landfill and Surface Impoundment Performance Evaluation (EPA Publication No. SW–869, NTIS Publication No. PB–81–166–357).

(4) Lining of Waste Impoundment and Diposal Facilities (EPA Publication No. SW–870, NTIS Publication No. PB–81–166–365).

(5) Management of Hazardous Waste Leachate (EPA Publication No. SW–871, NTIS Publication No. PB–81–189–359).

(6) Guide to the Disposal of Chemically Stabilized and Solidified Waste (EPA Publication No. SW–872, NTIS Publication No. PB–81–181–505).

(7) Closure of Hazardous Waste Surface Impoundments (EPA Publication No. SW–873, NTIS Publication No. PB–81–166–894).

(8) Hazardous Waste Land Treatment (EPA Publication No. SW–874, NTIS Publication No. PB–81–182–107).

The second group is a set of four guidance documents correlating to the most important performance requirements (*e.g.,* liners and caps) contained in the design and operating standards promulgated today. These documents contain design specifications which the Agency believes will generally lead to compliance with the performance requirements. The purpose of these documents is to reduce the uncertainty associated with translating the general performance standards into specific and operating requirements for particular units. Thus, if an applicant follows one of the example specifications set forth in the guidance, he will generally receive a draft permit from EPA. (Of course, the final permit may contain different provisions from the draft permit, based upon an evaluation of comments received on the draft permit.)

At present, the draft guidance documents contain only a few design examples. The examples will be expanded over time as EPA gains experience implementing the regulations. The current drafts are available at U.S. Environmental Protection Agency, Central Library, Room 2404, 401 M Street, S.W., Washington, D.C. 20460 and in EPA's Regional office libraries. The documents are:

(1) Surface Impoundments—Liner Systems, Final Cover, and Freeboard Control;

(2) Waste Pile Design—Liner Systems;

(3) Land Treatment Units;

(4) Landfill Design—Liner Systems and Final Cover. These documents will soon be available from the National Technical Information Service. EPA will announce their availability in the Federal Register.

F. Surface Impoundments (Part 264, Subpart K)

Subpart K contains the design and operating standards for surface impoundments used to treat, store or dispose of hazardous waste. The basic requirements are: (1) A liner to prevent migration of wastes out of the impoundment into the subsurface soil and ground water or surface water throughout the impoundment's active life (with an exemption for existing portions); (2) prevention of overtopping the sides of the impoundment; (3) assurance of structural integrity; and (4)(a) removal or decontamination of waste residues and contaminated soils and equipment at closure, or (b) solidification of remaining wastes, capping the wastes and conducting post-closure care. An exemption from the ground-water protection requirements of Subpart F is provided for impoundments that have double liners and leak detection systems. A variance from the liner requirement is provided to any impoundment if the owner or operator demonstrates to the Regional Administrator that hazardous constituents will never migrate from the impoundment into ground water or surface water.

Many of these features of the Subpart K regulations are discussed above in Section VII.E. of this preamble. The remainder are discussed below.

1. *Relationship to Previously Promulgated or Proposed Rules for Permitting Surface Impoundments.* These rules supersede two previous regulations covering surface impoundments. On January 12, 1981, EPA promulgated Subpart K standards applicable only to storage surface impoundments (impoundments that are designed to prevent migration of wastes out of the impoundments during active life and that have all wastes and waste residues removed at closure). These rules required surface impoundments to install double liners and leachate detection, collection, and removal systems and to remove all wastes at closure (40 CFR Part 264 Subpart K, 46 FR 2802). No ground-water monitoring or remediation requirements were established for these impoundments. The regulations did not cover surface impoundments used to dispose of hazardous wastes.

Many members of the regulated community objected to the January 12, 1981 regulations as inappropriate for existing impoundments because extensive retrofitting would be required for many existing sites. They argued that such retrofitting would require costly reconstruction and could in some cases result in shutting down plants, resulting in severe economic disruption. (See the discussion of retrofitting in Section VII.E.6.) On October 20, 1981, EPA proposed to suspend the effective date of these rules, as applied to existing impoundments pending a re-examination of the rules' appropriateness for existing impoundments (46 FR 51407). Pending this reexamination, EPA announced that it would not begin processing permit applications for existing surface impoundments, although EPA announced willingness to process voluntarily submitted applications.

Subpart K, as promulgated on January 12, 1981, is entirely superseded by the new Subpart K promulgated today. Today's regulations have a broader scope; they cover both storage and disposal surface impoundments. Furthermore, the October 20, 1981 proposal is withdrawn. Similarly, the permitting policy announced in the proposal is now withdrawn, and, consistent with its overall permit priorities, EPA will begin requesting the submission of Part B applications from the types of storage surface impoundments described in the January 12, 1981 standards. In addition, on the effective date of today's regulations, EPA will begin calling in Part B permit applications for all types of surface impoundments covered by these standards.

Although the January 12, 1981, regulations have been superseded, many ideas in those regulations are incorporated in the new standards. For example, today's exemption of double-lined impoundments, piles and landfills from the ground-water protection standard is consistent with a similar approach in the January 12 regulations. Similarly, as was true under the January 12 regulations, post-closure care and monitoring are not required if all waste is removed at closure. Some of today's other requirements (e.g., overtopping controls and inspection) are also similar to those contained in the January 12 regulations.

However, today's regulations apply more broadly and are more flexible than the January 12 regulations. They cover disposal impoundments as well as storage impoundments. Even for impoundments used for storage (or storage and treatment only), more control options are now offered. Whereas the January 12 regulations required double liners, the new standards allow a single liner coupled with ground-water monitoring as an alternative option. And whereas the January 12 regulations required that all hazardous wastes and hazardous waste constituents be removed from the impoundment at closure, the new standards allow as additional options, the decontamination or solidification and stabilization or wastes left in place, covering by a cap, and post-closure monitoring and maintenance.

A second set of regulations superseded by today's standards are the Part 267 regulations for new surface impoundments and other land disposal units. See the discussion above in Section II.C. of this preamble.

It should also be noted that the new standards do not incorporate the "seepage facilities" concept for which standards were proposed (but never promulgated) on February 5, 1981 (46 FR 11216). Seepage facilities are lagoons that are designed intentionally to leak. Depending on design, they may also be considered as underground injection units or land treatment units. In any case, EPA has concluded that land disposal facilities should be designed not to leak at all during their active lives, except in rare cases (see § 264.221(b)). Therefore, most new impoundments must be lined in accordance with these standards, and land treatment facilities must prevent release of hazardous constituents by treating them within the treatment zone. Thus, new seepage facilities (other than existing portions that comply with the Subpart F ground-water protection requirements and other applicable requirements) may not be permitted under these regulations. EPA invites public comment on its decision not to authorize seepage facilities.

2. *Absence of Leachate Collection and Removal Requirements for Surface Impoundments.* Unlike piles and landfills, surface impoundments are not required to have leachate collection and removal systems above the liners. Surface impoundments are needed in many industrial facilities to properly treat wastewaters and thereby minimize surface water pollution. These impoundments are often designed to handle large flows, in many cases exceeding one million gallons per day. Often, rather long retention times are required to ensure appropriate treatment of the wastewaters. Since a surface impoundment is intentionally designed to hold liquid wastes, often in extremely large volumes, it makes little sense to require a virtual drain at the bottom. The liquid removed from the drainage layer would itself need to be managed, very likely in a second impoundment. No environmental purpose would be served by such a liquids management program.

The key liquids management goals, for impoundments as well as piles and landfills, are to prevent migration of waste during the unit's operating life and to minimize migration afterwards. The former goal is achieved by the liner. The second goal is best achieved, in the case of a surface impoundment, by dewatering, solidifying, or removing the contents, of the impoundment at closure.

The regulatory approach for surface impoundments achieves environmental results analogous to those achieved for piles and landfills. In most cases, these units must be designed, constructed, and installed so that no migration occurs during the active life of the facility. In the case of piles and landfills, which contain relatively small amounts of liquids, leachate collection and removal is practicable and results in a reduced volume of hazardous constituents available for post-closure migration. In the case of surface impoundments, for which the collection and removal of relatively large amounts of liquids is not practicable, removal or solidification of liquid wastes at closure likewise results in a reduced volume of hazardous constituents available for post-closure migration.

3. *Liner Requirements (Section 264.221(a)).* The regulations for liners in surface impoundments (as well as landfills and piles) include several subsidiary performance standards intended to assure that each liner will meet the performance goal of preventing the migration of wastes to adjacent subsurface soil or ground water or surface water at any time during the impoundment's active life. These standards consist of general common-sense engineering goals, leaving the details to be specified on a case-by-case basis in permits.

First, the liner must be constructed of materials that will resist degradation. Synthetic liners can be degraded by exposure to imcompatible wastes or leachate and in some cases by excessive exposure to sunlight. Clay liners can develop highly increased permeabilities (sometimes by several orders of magnitude) when exposed to certain types of chemicals. The regulation thus requires appropriate materials to be used to avoid such problems. When the permit is issued, the appropriateness of the liner material will be considered in the specific context of the wastes to be placed in the impoundment.

Second, liner materials must be of sufficient strength and thickness to prevent failure due to physical stresses (e.g., earth-moving equipment, dredging equipment, and the weight of large volumes of liquid wastes). While this requirement applies to all liners, it is especially crucial for synthetic liners, which can rupture if they are mishandled or are too thin. Most synthetic liners need to be at least 30 mils (thousandths of an inch) thick to assure that this requirement is complied with.

Third, the foundation underneath the liner must be capable of supporting the liner and resisting pressure gradients. If the support system settles, compresses, or uplifts, the liner may rupture or crack.

Finally, the liner must cover all surrounding earth likely to be in contact with the waste or leachate. This assures that liners will be placed not only underneath the wastes but also on the sides of the wastes. Thus, lateral as well as vertical migration will be prevented.

4. *Control of Overtopping (Section 264.221(c)).* Section 264.221 requires that a surface impoundment be designed, constructed, maintained and operated to prevent overtopping (the flow of liquids over the top and out of the impoundment) resulting from normal or abnormal operations; overfilling, wind and wave action; rainfall; run-on; malfunctions of level controllers, alarms and other equipment; and human error. This language reflects the variety of potential causes of overtopping. Constructing dikes to provide a large amount of freeboard above expected levels in the impoundment is one means of controlling overtopping. Operating practices such as adjusting inflows and outflows to regulate the impoundment level, or using automatic level controllers or alarms, will also help prevent overtopping when potential problems, such as unusually large storms, occur.

The regulatory language differs from that contained in the January 12 regulations, which required 2 feet of freeboard or any alternative amount of freeboard based on documentation acceptable to the Regional Administrator showing that no overtopping will occur. In substance, however, the new standard is similar. It sets forth a general performance standard to prevent overtopping, and leaves to the Regional Administrator the task of specifying the specific design features and operating practices in the permit.

The term "prevent" is absolute and quite stringent, reflecting the Agency's view that outflow of liquid hazardous wastes over the top of an impoundment poses a potentially very serious threat to human health and the environment. Not only is there the very real threat posed by the actual escape of hazardous wastes, but also overtopping can threaten the structural integrity of the dike itself, creating the potential for catastrophic damage. EPA realizes, however, that certain events or combinations of events that can cause overtopping will be so improbable that they must and should be ignored. Some of these might even be considered to border on the absurd, e.g., the possibility that all of the production storage tanks and basins associated with a manufacturing operation will break at once, releasing the contents to a surface impoundment, causing it to overflow. The Agency does not intend that overtopping resulting from highly improbable events be protected against. One common event that will frequently have to be addressed is overtopping potential resulting from drainage of stormwater into the impoundment. In this case EPA believes the impoundment should be designed and operated to prevent overtopping resulting from at least the flow generated by the 24-hour, 100-year storm event. This storm event is recommended since it is the rarest event for which data are readily available.

EPA had deleted a requirement contained in the January 12 regulations that run-on be diverted away from a surface impoundment. We agree with commenters who noted that run-on is acceptable so long as the design and operation of the impoundment are such as to ensure that run-on does not cause overtopping. Therefore, EPA has simply included run-on as a factor to be addressed in preventing overtopping.

5. *Structural Integrity of Dikes (Sections 264.221(d) and 264.226(c)).* Surface impoundments must have dikes that are designed, constructed, and maintained with sufficient structural integrity to prevent massive failure. This requirement is essentially the same as in the January 12 regulations, with one exception.

The January 12 regulations provided that structural integrity of the dikes should be maintained without dependence on any liner system included in the surface impoundment design. This requirement reflected the importance of absolutely preventing any dike failures, which have in the past resulted in sudden release of very large quantities of liquid wastes from impoundments. Even though these regulations require that liner systems not leak during the active life of the unit, some liners will leak due to physical or chemical damage. It is not prudent, therefore, to depend on the integrity of the liner system as a necessary condition for dike stability. Therefore, dikes must be constructed to prevent collapse due to scouring or piping in the event of liner leakage.

However, the January 12 language failed to distinguish between cases where the liner is a part of the dike and cases where it is not. In some cases, on the one hand, several feet of compacted clays may be used as part of the dike in a storage surface impoundment and may contribute to structural stability in ways other than retarding leakage. On the other hand, a synthetic liner would not normally be considered by engineers in the field to provide strength to the dike itself, and even a clay liner may fail to provide additional structural integrity if it is not intentionally designed to achieve that purpose.

In light of the variety of circumstances summarized above, today's regulations simply contain a performance standard requiring structural integrity to prevent massive failure. The extent to which a particular liner should or should not be considered in assuring structural integrity will be determined on a case-by-case basis.

Due to the importance of structural integrity, § 264.223(c) requires that prior to permit issuance, the owner or operator must obtain a certification from a qualified engineer that the dike has structural integrity. Furthermore, a

recertification is required if an impoundment is about to begin operation after it has been out of service for six months or more. The recertification is necessary to assure that no changes to the dike (*e.g.*, erosion during the shut-down period) have impaired its structural integrity. The period of six months is based on EPA's judgment that significant changes may occur during a period of that length.

The certification must cover two aspects of structural integrity: (1) The force exerted on the dike by the contents of the impoundment and (2) the dike's resistance to scouring and piping in the event that the liner leaks. The former ensures that the dike will not collapse or be swept away simply as a result of the pressure exerted against it by its contents. The latter assures that the dike will not collapse or be washed away if liquid begins to seep through it. While seepage through a dike is important from the standpoint of its inherent pollution potential, it also can cause the dike's constituents (usually soil) to become more fluid, to move, and to flush through, creating a hole and massive collapse—a very serious consequence. Although evaluations of structural integrity are not foolproof, the Agency believes that an evaluation and certification provides an important measure of protection.

6. *Monitoring and Inspection (Section 264.226(c)).* Section 264.226 contains several types of inspection requirements, apart from the certification of dike structural integrity already discussed in Section VII.F.5. above. First, liners and caps must be inspected during construction and installation for uniformity, damage and imperfections, and after installation to insure tightness of seams and joints and the absence of tears, punctures, and blisters.

EPA considers the liner inspection to be very important. Properly constructed or installed synthetic liners should prevent any migration of wastes for many years. However, improperly constructed or installed liners can result in migration of wastes almost immediately after startup of the unit.

Section 264.226 also requires inspections, weekly and after storms, of design features and equipment necessary to prevent overtopping; for sudden drops in the level of the impoundment's contents; for the presence of liquids in leak detection systems; and of dikes. These inspections are not very expensive or time consuming; thus weekly inspection of these important features is reasonable. However, EPA does agree with the commenters who argued that the daily inspections required in the January 12, 1981, rules were unnecessarily frequent and burdensome.

7. *Emergency Repairs (Section 264.227).* The January 12 regulations required that whenever there is a "positive indication of a failure of the containment system," the impoundment must be removed from service. "Positive indication" was described as including waste detected in the leachate detection system or a breach (e.g., hole, tear, crack, or separation) in the liner. Commenters argued that the harsh remedy of immediately removing an impoundment from service should only be required to prevent or remedy massive or catastrophic failure and not to deal with relatively small-scale liner breaks. EPA agrees and has modified the regulatory language to deal only with the truly emergency situtations.

Section 264.277(a) requires removal of an impoundment from service when the level of liquids in the impoundment drops suddenly and the drop is not known to be caused by changes in the flows into or out of the impoundment. In such a case, rapid discharge through the liner must be presumed. For example, it may be that the liner is leaking and that channels in the underlying soils are permitting rapid migration of wastes out of the impoundment. EPA does not anticipate that these circumstances will occur in many cases. A second and probably more likely situation requiring removal from service is a leaking dike. This indicates the potential for massive dike failure. Even though dikes are required to be constructed to prevent failure, even in the event of leakage, our ability to predict structural integrity of dikes is not perfect and the potential damage associated with dike collapse is so great that the Agency believes immediate action is necessary in the event active leakage is discovered. Minor deterioration of the dike (e.g., erosion) which can be easily repaired would not require the removal of the impoundment from service.

Removal of the impoundment from service is defined in § 264.227(b) as consisting of several steps: (1) Stopping the addition of wastes to the impoundment; (2) containing surface leakage; (3) stopping future leakage; (4) taking other necessary steps to prevent catastrophic failure; (5) if necessary to stop the leak or prevent catastrophic failure, emptying the impoundment, and (6) notifying the Regional Administrator of the problem. Section 264.277(c) requires that the contingency plan for the impoundment include procedures for complying with these requirements.

If the impoundment is returned to service after removal from service under § 264.277(a), the dike's structural integrity must be recertified. If it has been removed from service due to a sudden drop in liquid level and it has a liner which was installed to comply with § 264.221, the repaired liner must be certified as complying with the applicable conditions.

If an existing impoundment which is exempted from the liner requirements, has experienced a sudden drop in liquid level, then a liner that complies with § 264.221 must be installed prior to its return to service. Due to the extreme failure of the impoundment, installing a liner is absolutely essential to ensure that substantial leakage to ground water will not occur in the future.

If the impoundment is not returned to service, § 264.227(e) requires that it must be closed. This requirement is necessary to assure that the failed impoundment is not left with liquid wastes in it for an unnecessary period of time.

8. *Closure and Post-closure Care (Section 264.228).* Section 264.228 offers owners or operators of surface impoundments two alternatives for closing their facilities. The first alternative is to remove or decontaminate all wastes at closure. The second is to leave the wastes in place, eliminate free liquids, stabilize the wastes, place a cap (final cover) on top of the waste, and conduct post-closure monitoring and maintenance.

If the owner or operator elects the first alternative, he must remove or decontaminate all wastes, waste residues, contaminated system components such as liners, contaminated subsoils and contaminated structures and equipment. This is necessary because under this option, no post-closure care or monitoring is required. The impoundment is a storage unit leaving no hazardous constituents in the ground after closure. All the removed residues, subsoils and equipment must be managed as hazardous wastes unless the provisions of § 261.3(d) are complied with.

If the owner or operator makes all reasonable efforts to comply with his closure plan and to remove or decontaminate all residues and contaminated subsoils (*e.g.*, he removes or decontaminates all waste and waste residues above the liner as well as some contaminated subsoil) and then finds that he cannot comply with his closure plan because he is unable to remove or decontaminate all of the remaining contaminated subsoils, he must close the unit under the second option and perform post-closure care as described below. This situation is likely to occur

often in the case of existing portions that do not have liners or have inadequate liners. In a few cases, liners installed in accordance with the requirements of § 264.221 of these regulations may also fail. In any of these cases, contamination may have migrated a considerable distance from the impoundment and possibly even entered the ground water. This situation necessitates closure under the second alternative to minimize the rate of migration and monitor for potential ground water contamination. In contrast, facilities with good liners that do not fail will be able to avoid post-closure responsibilities.

The second alternative for closing a surface impoundment requires several steps. First, free liquids must be eliminated, by removing liquid wastes and/or solidifying the remaining waste residues. As discussed above in Section VII.F.2, this is an important step in minimizing the rate of leachate migration.

Second, the remaining wastes must be stabilized to a bearing capacity to support final cover (including the top liner and earth materials placed above that liner to protect the liner, allow the growth of shallow-rooted vegetation, and promote drainage). Failure to do so is likely to result in substantial differential settlement of the final cover over time, thereby creating channels through which liquids can enter the impoundment and eventually leach the waste constituents into the ground water.

Third, a final cover must be placed over the closed impoundment. The cover must be designed and constructed to provide long-term minimization of the migration of liquids into the closed impoundment. In addition, the cover must be at least as impermeable as the bottom liner. The purpose of these requirements has been discussed in Section VI. E. 5. of this preamble.

The final cover must also be designed to minimize erosion, since erosion would result in exposure of the covered wastes and increased infiltration. Such protection is provided by installing proper sloping, covering with appropriate vegetation, and other construction techniques. Finally, the cover must accommodate settling and subsidence so that its integrity is maintained.

Several practices can help minimize and accommodate settling and subsidence at some closed impoundments and especially at closed landfills (which are subject to the same general closure requirements as surface impoundments). These include placing wastes and fill material (especially if biodegradable material) uniformly throughout the unit and constructing the final cover with a slightly greater slope than ultimately desired. Another potentially useful approach involves phasing of final closure. For example, the permittee may place an interim, partial, or temporary cover (cap) on the unit and, after the initial (and likely most severe) subsidence and settling have occurred, install the final cover. In such a case, the Regional Administrator can extend the 180-day closure period of § 264.113(b), provided that the interim cover will adequately minimize infiltration or that the bottom liner is still functioning.

Once the final cover has been installed and compliance with the closure provisions has been certified, the post-closure period begins. Post-closure care consists of maintaining the final cover and performing monitoring. Generally, monitoring consists of continued ground water monitoring and, if necessary, corrective action under Subpart F just as was required during the unit's active life. In a case where the impoundment has a double liner and leak detection system, leak detection, rather than ground water monitoring, must be continued during the post-closure period. If a leak is discovered, the owner or operator must notify the Regional Administrator, who will then modify the permit to require compliance with the ground water protection requirements of Subpart F. (After closure, repair or replacement of a leaking liner would involve at least a temporary destruction of the final cover, resulting in the potential for significant infiltration of liquids, and thus is not desirable.) The presence of a final cover on top of the unit should minimize infiltration of liquids into the unit and the discharge of liquid out of the unit. Thus, detection monitoring should be in place well before any ground water contamination could occur.

9. *Financial Responsibility for Piles and Surface Impoundments from which Wastes are Removed at Closure (Sections 264.228(d) and 264.258(d)).* As noted above, an owner or operator of a pile or surface impoundment who removes (and properly disposes of) or decontaminates all wastes, waste residues, and contaminated equipment and soils, has no further closure or post-closure obligations (except to have closure properly certified (§ 264.115)). However, the regulations recognize that complete removal may not be practicable in some cases and provide in such cases for placing a final cover over the unit and conducting post-closure monitoring and maintenance.

If capping and post-closure care become necessary, funds must be available for those tasks. In preparing the regulations, EPA became concerned that units whose owners or operators planned to remove or decontaminate all wastes at closure would have closure plans that address only removal and would have no post-closure plans. Correspondingly, these units would have financial responsibility only for the expected means of closure. Yet, further closure activities and postclosure care might be necessary in some cases due to unanticipated difficulty in removal or decontamination.

The above concerns presented a dilemma. On one hand, if EPA does not require owners and operators to have closure and post-closure plans to provide for capping the units and performing post-closure monitoring and maintenance, then sufficient funds might not be available to take these actions in appropriate circumstances. On the other hand, if EPA requires owners or operators to have financial responsibility for these activities, those who successfully remove all contamination at closure will have unnecessarily expended extra funds to demonstrate financial responsibility for capping and post-closure care.

EPA has attempted to balance these two competing considerations by correlating the financial responsibility requirements for capping and post-closure care to the likelihood that such activities will actually become necessary at particular piles or storage impoundments. Therefore, EPA separately considered two types of units: (1) Those that do not have liners that comply with the design standard of preventing migration (i.e., most existing portions), and (2) those that do have such liners.

Piles and storage surface impoundments that lack liners meeting the design standards, by definition do not prevent the migration of wastes to the subsurface soil or ground or surface water. At best, they minimize such migration, and at worst, they provide little or no control. At these units, it will often not be possible to remove all contaminated soils at closure. In some instances, leachate may already have contaminated the ground water. It is thus reasonable to conclude that these units will often need to be covered at closure and will require post-closure maintenance and monitoring. Therefore, EPA is requiring that such storage piles and storage impoundments have: (1) Closure plans to remove or decontaminate the wastes, waste residues, and contaminated equipment

and soils; (2) contingent closure plans to cover the units; and (3) contingent postclosure plans to perform post-closure monitoring and maintenance. The contingent plans must be followed only if compliance with the primary closure plan does not result in the removal of all contaminated soils.

The financial responsibility requirements for these units (contained in §§ 264.228(d) and 264.258(d), with conforming amendments in Subparts G and H) cover only the contingent plans. (If the owner or operator uses a trust fund for financial responsibility, he must pay for the waste removal or decontamination and no money is paid out from the fund to reimburse him for this activity unless he successfully completes removal or decontamination.) Thus, the owner or operator must demonstrate financial responsibility only for final cover and post-closure care. If the owner or operator is unable to pay for closure, funds will be available to cover the unit and provide post-closure care. Although the wastes will not have been removed in this event, society will be in no worse a position than it would have been if the unit had been permitted and closed as a disposal unit.

The Agency is aware that in some cases, it may be cheaper to close surface impoundments (or piles) as a disposal facility. Thus, this rule would result in less financial assurance than if coverage of closure as a storage impoundment (or pile) were required. The Agency believes that in these cases, owners or operators will simply apply for a permit as a disposal operation anyway. And, in the final analysis, it is ultimate protection that is sought; this can be provided by ensuring adequate closure as a disposal facility.

Piles and storage surface impoundments that have liners designed to prevent migration during their active lives should, in the normal course of events, succeed in such prevention if they plan to remove or decontaminate their wastes, etc., at closure. Therefore, EPA is not requiring contingent closure plans to cover the units or contingent post-closure plans to maintain or monitor the units. Consistent with this approach, financial responsibility for such activities is also not required. However, in some cases, a liner will fail to meet its design objective of preventing migration throughout the unit's life. In such a case, the owner or operator will need to obtain a permit modification that imposes final cover requirements as well as post-closure monitoring and maintenance requirements.

10. *Special Requirements for Ignitable or Reactive Waste and Incompatible Wastes (Sections 264.229 and 264.230).* Sections 264.229 and 264.230 continue the good-operating-practice provisions contained in the January 12, 1981, Subpart K regulations concerning the appropriate handling of ignitable and reactive wastes and incompatible wastes. The comments contained in those regulations have been deleted, however, since they merely reiterated the requirements of §§ 264.13, 264.17, and 264.73.

G. Waste Piles (Part 264, Subpart L)

Subpart L contains the design and operating standards for wastes piles used to store or treat hazardous wastes. Waste piles may not be used to intentionally dispose of wastes. If the owner or operator of a pile wishes to dispose of wastes, he must apply for a landfill permit and manage the pile as a landfill.

The basic requirements for waste piles are: (1) a liner to prevent migration of wastes out of the pile and into the subsurface soils and ground water or surface water during the pile's active life (with an exemption for existing portions); (2) leachate collection and removal; (3) control of run-on and run-off; and (4) removal of wastes at closure. Two exemptions from the ground-water protection requirements of Subpart F are provided. One is for piles that have double liners and leak detection systems. The other is for any pile that has a single liner from which the wastes are periodically removed so that the liner can be inspected for cracks, leaks or potential leaks. In addition, an exemption from both the Subpart L liner and leachate collection and removal standards and the Subpart F ground-water protection requirements is provided to dry piles that are inside or under structures protected from precipitation, run-on and wind dispersal. Finally, a variance from the liner and leachate collection and removal requirements is provided if the owner or operator demonstrates to the Regional Administrator that hazardous constituents will never migrate from the pile into ground water or surface water.

Many of the features of the Subpart L regulations (liners, leachate collection and removal systems, and double liners and leak detection systems to obtain exemptions from Subpart F) are explained in the general discussion of design and operating standards (see Section VII.E.2. of this preamble) or in the discussion of analogous provisions in Subpart K for surface impoundments (see Section VII.F. of this preamble) and will not be discussed again here. Features that relate specifically to piles are discussed below.

1. *Relationship to Previously Promulgated Design and Operating Standards for Piles.* These rules supersede the Subpart L design and operating standards for piles that were promulgated on January 12, 1981 (40 CFR Part 264 Subpart L. 46 FR 2802), and amended on November 6, 1981 (46 FR 55110). The January 12, 1981 regulations contained two sets of standards for piles that are contained, in revised format, in today's regulations. First, today's regulations, like the January 12 regulations, cover double-lined piles with leak detection systems between the liners. Second, they address single-lined piles that are periodically removed from their liners so that the liners may be inspected for puncture, cracking, or other similar damage. In addition, requirements for leachate collection and removal are contained, as are exclusions from ground-water protection requirements. (However, as discussed previously, today's regulations contain new provisions for imposing ground-water protection requirements in case of liner failure, unless the liner is repaired or replaced.)

An additional set of standards that is continued in today's regulations is the November 6, 1981 regulations for "indoor" piles (see 45 FR 55111). Those regulations provided that a pile is exempt from liner and leachate collection requirements if it (1) Is inside or under a structure that provides protection from precipitation so that neither run-off nor leachate is generated; (2) receives no free liquids; (3) is protected from run-on; and (4) will not generate leachate through decomposition or other reaction. In addition, such piles were not subject to ground-water protection requirements. Today's § 264.250(b) contains this set of standards.

Today's regulations provide greater flexibility than the January 12, 1981 standards by providing a set of standards authorizing the permitting of piles that have single liners and that are not periodically removed for liner inspection, provided that they comply with the Subpart F ground-water protection requirements. This additional standard is consistent with the basic regulatory philosophy for landfills and surface impoundments.

2. *Design and Operating Requirements (Section 264.251).* a. *Liners and Leachate Collection Systems*—Waste piles (except for existing portions) must have liners and leachate collection and removal systems above the liners. To reduce pressure

head on the liner, the leachate collection and removal system must be designed and operated to assure that leachate depth over the liner does not exceed one foot. The appropriate technologies needed to meet this requirement depend on the size of the pile, waste permeability, and climatic conditions. If the pile is small or the waste is permeable, a separate drainage layer below the waste may not be needed. Instead, merely using a relatively impermeable liner and sloping the liner so that any leachate will flow can provide a leachate collection and removal system which will meet the maximum one-foot head requirement. For larger piles and less permeable wastes, a separate drainage layer of relatively permeable material and, perhaps, a tile drainage system, will be needed to meet the maximum one-foot head requirement. Other techniques include diversion of run-on and covering the pile to prevent rain infiltration.

All leachate collection systems, but most importantly those incorporating drainage layers and tile drains, must be designed and built so that they will continue to function. More specifically, they must be capable of (1) withstanding the chemical attack that can result from contact with leachate; (2) withstanding the forces exerted by wastes, equipment, earth pressures, etc.; and (3) operating without clogging. Any of these phenomena (chemical attack, external forces, or clogging) can reduce or destroy the efficiency of these systems.

b. *Control of run-on and run-off*—Section 264.251(c)-(e) contains specific requirements regarding run-on and run-off. To minimize leachate generation, 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 pile during peak discharge from at least a 25-year storm. To minimize hazards from run-off of contaminated liquid, a runoff management system must collect and control the water volume resulting from at least a 24-hour, 25-year storm. Finally the collection and holding facilities associated with run-on (if any) and run-off control systems must be emptied or otherwise managed expeditiously after storms to maintain capacity of the system. This last requirement, not contained in the January 12, 1981 regulations, is intended to ensure that capacity of the system is not consumed by successive storm events.

The basic run-on and run-off control standards are similar to the January 12, 1981 requirements, except that the design storm to be protected against are now specified in the regulations. This specification responds to commenters who argued that the previous requirements were so vague as to leave owners and operators uncertain as to the extent of their responsibilities.

EPA chose the 25-year storm as the storm size which should be protected against in run-on and run-off systems for both piles and landfills. EPA is unaware of any hard data to quantify the relative degrees of risk reduction provided by differently sized run-on and run-off control systems. Differences in cost can be calculated more easily. EPA estimates that managing a 100-year storm requires a 7 to 25 percent increase over the cost required for a 25-year storm, depending on location, watershed size and unit size and design. For example, for a typically sized landfill, the cost difference might typically amount to $10,000. While this does not seem to be a prohibitive expense, EPA does not wish to require the additional protection if the potential benefits are *de minimis*. It can be argued, for example, that a storm more severe than a 25-year storm would produce such a large volume of run-off and such a short contact time with the waste that any hazardous constituent levels in the run-off would be very low.

However, in the absence of substantial data base, EPA remains concerned that, at least in some situations, designing only to accommodate a 25-year storm is inadequate. For example, if a pile or landfill has a 25-year active life, there is at least a 50-percent chance that the design capacity of the system will be exceeded during the unit's active life. Therefore, EPA requests information, including any available data, on the following questions:

(1) What relative benefits (in terms of types and magnitude of averted damage) can be expected from designing for a 100-year storm event versus designing for a 25-year event?

(2) What are the relative costs for 25-year and 100-year storm designs for variously sized and located piles and landfills?

(3) Under what circumstances and conditions does overflow of run-off and run-off control systems cause an adverse environmental or human health impact? Are there sensitive areas or conditions under which more stringent design is warranted? Can these be succinctly and clearly defined?

Readers should note that the selection of a 25-year criterion for run-on and run-off controls differs from the selection of a 100-year criterion set in the floodplain standards in § 264.18. Flooding is a potentially more serious event than either run-on or run-off, since a flood is capable of washing away large quantities of bulk wastes and drums of wastes, and may transport them considerable distances. Therefore, EPA believes that protection against a 100-year flood is necessary.

The final design and operating standard contained in § 264.251 continues the January 12, 1981 requirement that wind dispersal be controlled (e.g., by cover or wetting). The language has been modified to clarify that only particulate matter must be controlled. As explained in section VI.C. of this preamble, EPA is not regulating volatile emissions in the design and operating standards being promulgated today.

3. *Exemption of Certain Piles From the Ground-water Protection Requirements of Subpart F (Section 264.253).* Apart from the exemption from Subpat F for piles, impoundments and landfills that have double liners and leak detection systems, discussed above in Section VII.E.8. of this preamble, § 264.253 provides a special exemption from Subpart F for any waste pile that is periodically removed from the liner so that the liner may be inspected for cracks, erosion, or other conditions that could result in leakage. This exemption relies on inspection of the liner to assure that the liner is intact and is not allowing leachate to migrate through the liner. This inspection procedure obviates any need to monitor the ground water.

The liner must prevent migration of wastes into the subsurface soil or ground or surface water during the active life of the unit. Thus, it must be a low-permeability liner. Furthermore, it must be of sufficient strength and thickness to prevent failure due to puncture, cracking, tearing, or other physical damage from equipment used to place waste on the liner or remove waste from the liner for inspection.

Synthetic membrane liners are not likely to be capable of withstanding damage from repeated removal and replacement of wastes during liner inspections. Clay liners will also be unsuitable in many cases, because when exposed to air, they tend to dry out to some extent and crack, resulting in the development of channels through which leachate may migrate. Therefore, EPA expects that reinforced concrete with appropriate coatings will be the liner material chosen by most owners and operators wishing to qualify for a Subpart F exemption under § 264.253.

For piles obtaining a Subpart F exemption pursuant to § 264.253, the regulations further provide that the inspection plan generally required by

§ 264.15 include a schedule of inspection which includes periodic removal of the waste pile and testing of the liner to ensure that it has not deteriorated to the point at which it is no longer capable of containment or is already leaking.

This exemption is intended for, and as a practical matter will apply to, small piles, especially small piles where the normal operation of the pile periodically or routinely results in removal of the waste. The removal of the waste from other than small piles on a periodic and routine basis to inspect the liner, as required by the rule, would normally be impractical because of handling and storage difficulties. As discussed above in Section G.2.a., larger piles of less permeable wastes in wetter climates will need a relatively permeable drainage layer (e.g., gravel or sand) and possibly a tile drainage system in order to comply with the one-foot head requirement. To remove the wastes and drainage layers from such piles in order to meet the inspection requirement, will normally be impractical. Usually, only small piles will have sufficient drainage to the sides of the pile to meet the one-foot head requirement without a drainage layer. Exceptions might include large piles that are covered, located in areas of low rainfall, or that contain waste which is impermeable. The regulations do not specify the pile size in an exemption, but the practicality of both inspecting the liner and meeting the one-foot head requirement will limit the size in practice.

Finally, the rule requires that if the liner is leaking, the owner or operator must notify the Regional Administrator and either repair or replace the liner or else begin a detection monitoring program under Subpart F if such a program has already been incorporated in the pile's permit as a contingency. These two options are identical to the two options available for double-lined piles, impoundments and landfills that are exempt from Subpart F. (See discussion above in Section VII.E.8. of this preamble.)

4. *Monitoring and Inspection (Section 264.254).* Section 264.254 contains requirements for inspections of liner systems before and after installation. These are similar to the liner inspection requirements for surface impoundments discussed above in Section VII.F.7. of this preamble. Special inspection requirements for piles exempted from the Subpart F ground-water protection requirements are set forth in §§ 264.252 and 264.253.

5. *Special Requirements for Ignitable or Reactive Wastes and for Incompatible Wastes (Sections 264.256 and 264.257).* The language of the January 12, 1981, regulations for ignitable or reactive wastes has been modified to conform to the language contained in the analogous surface impoundment requirements in § 264.228. However, the substance of the regulations is unchanged. The regulatory language of the January 12, 1981 version of § 264.257 (incompatible wastes) has been retained, but the comments to that section have been deleted because they were merely explanatory and lacked regulatory effect.

6. *Closure and Post-closure Care (Section 264.258).* Since piles are storage facilities, all waste residues, and contaminated subsoils and equipment must be removed or decontaminated at closure. This requirement is identical to the first alternative for closing surface impoundments under § 264.228(a)(1), and is discussed in more detail in Section VII.F.9. of this preamble.

If the owner or operator removes or decontaminates all waste residues and makes all reasonable efforts to remove or decontaminate all contaminated containment systems, subsoils, structures, and equipment and finds after such efforts that some contamination remains that he cannot remove or decontaminate, then the pile will be considered a disposal unit under these regulations and must be closed in accordance with the closure requirements for landfills. Thereafter, the owner or operator must comply with the landfill post-closure requirements. The procedure is the same as for a surface impoundment whose owner or operator has planned to remove all wastes at closure and, because he finds that he cannot practicably remove or decontaminate all contaminated soil at closure, becomes a disposal unit subject to the second closure alternative under § 264.228(a)(2) and to post-closure requirements.

A "reasonable effort" to remove all contaminated subsoils includes removal of all wastes and waste residues in the unit, all contaminated liners and equipment, and at least some subsoil. After making reasonable attempts to remove all contaminated subsoil and failing thereby to remove all contaminated subsoil, the owner or operator may then cease further removal attempts but must close the unit and perform post-closure activities as he would do in the case of a landfill.

7. *Small Piles.* Several commenters on the January 12, 1981, regulations suggested that small, low-hazard temporary waste piles should be exempted from Subpart L requirements. While EPA believes that there may be some merit to these comments, it has not to date received enough information to be able to define the size, duration and contents of piles that might deserve such an exemption. EPA solicits information that would pertain to the appropriateness of such an exemption. In addition, the Agency solicits information supporting the possibility of exempting certain type of piles from particular design and operating requirements or Subpart F ground-water protection requirements.

H. Land Treatment (Part 264, Subpart M)

EPA believes that land treatment can be a viable management practice for treating and disposing of some types of hazardous wastes. Land treatment involves the application of waste on the soil surface or the incorporation of waste into the upper layers of the soil in order to degrade, transform or immobilize hazardous constituents present in hazardous waste. The success of land treatment particularly depends upon the operational management of the units. Unlike many landfills or surface impoundments, for example, land treatment does not use highly impermeable liners to contain wastes. Rather, land treatment relies on the dynamic physical, chemical, and biological processes occurring in the upper layers of the soil for the degradation, transformation, and immobilization of hazardous constituents. In this sense, land treatment can be viewed as an "open" system.

Because land treatment depends upon a number of soil/waste interactions for success, it is especially important that the units be carefully operated. Maintenance of proper soil pH to optimize microbial action and metal immobilization, careful management of waste application rate to prevent exceeding the soil's treatment capacity, and control of surface water run-off to prevent untreated hazardous waste from leaving the facility are several of the key operational aspects. In addition, well-managed land treatment includes monitoring in the unsaturated zone to provide information that the owner or operator will use in modifying his operating practices to maximize the success of treatment processes.

As described in other sections of this preamble, one of the principal objectives of the design and operating requirements applicable to each type of unit is to provide effective management of liquids at the facility to minimize the risk of ground-water contamination. At surface impoundments, landfills and piles this objective is principally served by the construction of barriers that

prevent liquids from entering the units and from entering the soil.

The general approach must be modified somewhat for land treatment units. Land treatment units are dissimilar to other land disposal units in that they are not designed and operated to minimize *all* releases to ground water. On the contrary, they are open systems that freely allow liquid to move out of the unit. The goal of land treatment, therefore, is to reduce the hazardousness of waste applied in or on the soil through degradation, transformation and immobilization processes.

The land treatment regulatory approach, however, does seek to minimize the uncontrolled migration of hazardous constituents into the environment. This is accomplished by using a defined layer of surface and subsurface soils (referred to as the "treatment zone") to degrade, transform or immobilize the hazardous constituents contained in the leachate passing through the system. Such treatment processes achieve the same general objectives as the liquids management strategy used at other types of land disposal in that they act to prevent hazardous constituents from migrating into the environment.

1. *Applicability (Section 264.270).* The regulations in this Subpart apply to owners and operators of new and existing land treatment units. There is no exemption for "existing portions" as found in the regulations for other types of land disposal. The requirements for land treatment units do not require the placement of liners under the waste and, thus, should not pose major retrofitting problems for existing portions.

2. *Treatment Program (Section 264.271).* The key element of a land treatment unit is the program which the owner or operator establishes to degrade, transform or immobilize the hazardous constituents in the wastes managed at the unit. Today's regulations indicate that there are three principal elements to the treatment program that will be specified in the facility permit. First, the permit will specify the wastes that may be handled at the unit. (The Regional Administrator will base his selection of the wastes allowed at the unit on the treatment demonstration under § 264.272.) EPA is concerned that parties who engage in uncontrolled dumping of waste not be allowed to claim that they are conducting a land treatment operation simply because some breakdown of waste constituents occurs when the waste is dumped. Therefore, EPA believes that land treatment should be reserved for those hazardous wastes having hazardous constituents that can be completely degraded, transformed, or immobilized through land treatment.

At present, the Agency believes that land treatment should be confined to wastes that are primarily organic and that can be greatly reduced in volume by physical, chemical, and biological decomposition in surface soils. The Agency also believes that the smaller inorganic or persistent organic fractions of these wastes can also be effectively treated in surface soils. Hazardous constituents such as heavy metals and persistent organic compounds are either unaffected or are only slowly affected by the primary treatment mechanisms—degradation and transformation. Instead, these hazardous constituents can be treated by immobilization in surface soils.

Effective immobilization of hazardous constituents at land treatment units can occur through chemical or physical processes. Hazardous constituents may be effectively immobilized via chemical reactions, such as precipitation, complexation, and cation exchange reactions, or via physical attenuation processes which entrap hazardous constituents within the soil matrix.

Dilution, however, does not constitute an acceptable treatment process. Dilution does not provide chemical, biological, or physical "treatment" (i.e., degradation, transformation or immobilization) of hazardous constituents. Rather, dilution allows wide dispersal of hazardous constituents in the soil matrix. Since they remain untreated, such constituents may eventually migrate and concentrate to unacceptable levels in ground water or surface water.

Second, the land treatment program will include a set of design and operating measures that are necessary to maximize degradation, transformation and immobilization of hazardous waste constituents. (The Regional Administrator will also base his selection of these design and operating conditions on the treatment demonstration under § 264.272.)

The waste application rate and the timing of such applications are two of the most important elements of a program for managing a land treatment unit. The Regional Administrator will, therefore, explicitly address these two factors in the facility permit. Another critical factor is pH control. Soil pH has a major influence on the magnitude of microflora populations, which are essential for degradation, and on the mobility of metals. There are many unit-specific operations that will be necessary to achieve the intended performance, such as proper tilling frequencies, maintenance of microbial populations (perhaps by the addition of fertilizers), and careful management of the water content of the treatment zone. These specifics of unit operation will also be addressed in the facility permit.

Third, the treatment program will include an unsaturated zone monitoring program. The purpose of this program is to determine the success of treatment in the treatment zone. The information provided by this monitoring will help in making modifications to the operating practices at the unit to maximize the success of treatment. Thus, the purpose of the monitoring is to assist in "fine-tuning" the land treatment program. The elements of the unsaturated zone monitoring program will be discussed in more detail later in this preamble.

As part of the development of the land treatment program, the Regional Administrator will define a list of hazardous constituents that are of concern. These are the constituents that the owner or operator must seek to degrade, transform or immobilize. As in Subpart F, the basic universe from which hazardous constituents are selected is the list of constituents in Appendix VIII of Part 261. (The preamble discussion of Subpart F explains the basic rationale for using Appendix VIII).

In the land treatment regulations, the hazardous constituents are those Appendix VIII constituents that are reasonably expected to be in, or derived from, waste placed in or on the treatment zone. The owner or operator must assist in establishing what the hazardous constituents will be at the facility by conducting a thorough waste analysis of the wastes that will be handled at the facility. (This step is required under the general waste analysis provision of § 264.13 because such information is necessary to ensure compliance with Subpart M.) It may be possible to develop waste analysis procedures that attempt to characterize broad classes of waste; if so, it will not be necessary to analyze each batch of waste that might be handled at the unit.

Another basic element of the treatment program is a clear definition of the treatment zone, the portion of the unsaturated zone in which the owner or operator intends to accomplish degradation, transformation and immobilization of hazardous constituents. The Regional Administrator will specify the vertical and horizontal dimensions of the treatment zone.

One of the crucial concerns about the treatment zone is its depth. EPA considered several options for defining

the appropriate depth of the treatment zone. One option was to make the treatment zone the "zone of incorporation." (This was the approach included in the February 5, 1981 proposed rules.) Commenters pointed out, however, that liquid hazardous wastes are sometimes spread on the surface of the soil and thus are not incorporated. In such cases a "zone of incorporation" is not a meaningful concept. Therefore, EPA decided not to use this approach.

A second option was to let the owner or operator define the treatment zone as long as it was above the water table. While this approach had the advantage of flexibility, EPA was concerned that an owner or operator could defeat the basic purpose of the unsaturated zone monitoring program by selecting a deep treatment zone. The purpose of the unsaturated zone monitoring program is to give relatively prompt feedback on the success of treatment in the treatment zone. If the treatment zone was deep, there would be a considerable lag time (possibly several years) between the time that waste was applied and the time that the failure of the treatment process was detected. EPA, therefore, concluded that there needed to be a maximum depth for the treatment zone.

Ultimately, EPA concluded that the treatment zone should be no deeper than 1.5 meters (5 feet).This depth from the initial surface soil elevation was chosen as a maximum depth for the treatment zone because soil conditions below this depth are generally not conducive to degradation and immobilization of hazardous constituents. Under the anaerobic and reducing conditions which occur in most soils below 1.5 meters, the solubility of most heavy metals increases. Also, the anaerobic conditions limit survival of the soil microflora necessary for degradation of most wastes. The 1.5 meter depth, as a maximum, should enable nearly all land treatment units the opportunity to operate successfully.

Today's regulations place one more constraint on the depth of the treatment zone. The Agency is today requiring a minimum distance of one meter (3 feet) between the bottom of the treatment zone and the seasonal high water table. This minimum distance is necessary to (1) allow for installation and implementation of the unsaturated zone monitoring, and (2) provide some minimum buffer to account for fluctuation in the seasonal high water table.

Unsaturated zone monitoring at land treatment units must include soil monitoring and soil pore-liquid monitoring immediately below the treatment zone. At least 15 cm (6 inches) of soil depth below the treatment zone is needed for adequate soil sampling. Thirty cm (12 inches) of soil will be sufficient, in most cases, for placement of the soil pore-liquid sampling device wholly below the treatment zone. However, due to the difficulties associated with field monitoring, sample collection will often occur somewhere above or below the desired depth. Hence sufficient soil depth (above the seasonal high water table) must be available to account for the inherent errors associated with field monitoring. The Agency believes that a one meter soil depth will accomplish this.

The seasonal high water table, as specified in local soil surveys (which have often been conducted jointly by the Soil Conservation Service and the State Agricultural Extension Agency), will often fluctuate over time. The degree of fluctuation will vary depending on the hydrologic and geologic characteristics of a particular site. In most cases, the Agency believes that a one meter soil buffer will adequately account for this fluctuation.

3. *Treatment Demonstration (Section 264.272).* The first step in the establishment of a land treatment program is to conduct a treatment demonstration. The purpose of this step is to establish what combination of operating practices at the unit (given the natural constraints at the site such as soild characteristics and climate) can be used to completely degrade, transform or immobilize the hazardous constituents in the wastes that the owner or operator seeks to manage at the unit.

The treatment demonstration is used to define two elements of the land treatment program. First, it establishes what wastes may be managed at the unit. The owner or operator may only apply those hazardous wastes that he has shown can be degraded, transformed or immobilized such that hazardous constituents are not expected to emerge from the treatment zone. Second, the treatment demonstration will define the initial set of waste management practices (including waste application rates) that will be incorporated into the facility permit. These practices may be modified over time as data from the unsaturated zone monitoring program indicates the need for adjustments.

The treatment demonstration occurs before the unit is at full-scale operation under a permit. The information generated from the demonstration will be submitted to the Regional Administrator and will be used to set permit conditions.

The treatment demonstration presents issues that are analogous to those that EPA has addressed for trial burns in the hazardous waste incinerator regulations. A treatment demonstration may involve field testing of particular wastes on a sample soil plot, or it may involve laboratory testing. (These are not the only methods of making a treatment demonstration, as will be discussed later in this preamble.) Where field testing or laboratory analyses are used, hazardous waste disposal or treatment is occurring and RCRA provides that such an activity requires a permit. EPA has provided a limited mechanism under the permit regulations, in § 122.27, for the issuance of phased land treatment permits that will allow some owners and operators to make a treatment demonstration using field testing or laboratory analyses without first receiving a disposal or treatment permit separate from the actual facility permit.

The basic criterion used in evaluating a treatment demonstration is that it must be possible to achieve complete degradation, transformation or immobilization of the hazardous constituents in a waste if that waste is to be applied at the unit. Within the limits of the tests used in the demonstration, this is a standard that requires 100% treatment. EPA believes that land treatment should be limited to wastes for which complete treatment is possible; therefore, the "100% treatment" criterion is most appropriate. EPA recognizes that it will not always be possible to achieve 100% treatment at an operating unit because of variations in climatic and other conditions not fully under the control of the owner or operator. Thus, the failure to achieve 100% treatment at an operating unit does not necessarily constitute a permit violation but rather it will often be grounds for modifying permit conditions to maximize the success of treatment at the unit.

The treatment demonstration can be accomplished using information derived from published literature, laboratory studies, field studies or actual facility operating experience (i.e., monitoring results). Successful demonstrations will most often involve data obtained from several of the above sources.

A literature search on the particular waste in question should first be conducted. Information in the published literature may assist in the design of laboratory or field experiments, or significantly reduce or eliminate the need for additional experimentation. However, the Agency believes that, for most land treated hazardous wastes, an inadequate data base is available in the

literature to predict unit-specific waste-soil interactions.

Laboratory studies may be used as rapid screening techniques for examining, within a reasonable time frame, the effects of various factors on treatment effectiveness. Extrapolation of this data to field conditions, however, may often be difficult because of the complex interactions occurring in the field. Therefore, field studies often will be necessary to verify certain lab-generated results.

For existing units, actual operating data (i.e., monitoring results) can also be effectively used to demonstrate treatment. The monitoring data must include results from soil-core, soil pore-liquid, and ground-water monitoring.

All data used to demonstrate the treatability of the hazardous constituents in a specific waste in a particular land treatment unit must be generated under conditions similar to those present at the unit. At a minimum, the following unit-specific characteristics and conditions must be simulated in the treatment demonstration:

(1) Characteristics of the land-treated waste;

(2) The depth and characteristics of the treatment zone;

(3) Topography of the treatment zone;

(4) Climate of the area; and

(5) Operating practices (such as waste application method and rate, tilling depth and frequency, and soil conditioning practices (*e.g.*, pH adjustment, fertilization, etc.)).

Specific guidance regarding the necessary elements of the treatment demonstration is provided in the *RCRA Land Treatment Guidance Document.*

4. *Design and Operating Requirements (Section 264.273).* In § 264.273, the regulations indicate what general design and operating requirements apply to land treatment units. The principal design and operating measures are those that are required as part of the land treatment program. These requirements can include limits on waste application rates and methods, measures to control soil pH, measures to enhance microbial or chemical reactions (*e.g.*, fertilization, tilling) and measures to control the moisture content of the treatment zone. The Regional Administrator will specify these design and operating conditions in the facility permit based on the results of the treatment demonstration under § 264.272.

In addition, there are other general design and operating requirements that apply to land treatment units that are analogous to those required at other types of land disposal units. The unit must have effective run-on and run-off management systems. These control systems are essential in limiting the transport of hazardous constituents either through the treatment zone toward ground water or off of the surface of the unit in an untreated condition where they may contaminate surface water or an off-site location.

Run-on controls are particularly important at land treatment units. EPA believes that proper treatment requires careful management of the soil's moisture content. Excess water in the treatment zone caused by run-on can significantly limit the treatment effectiveness and can also hinder such operations as tilling. In addition, run-on will increase the amount of water flowing down through the treatment zone and, therefore, increase the likelihood of the transport of hazardous constituents out of the treatment zone towards ground water.

Today's regulations provide that the owner or operator must design, construct, operate and maintain a run-on control system that is capable of preventing flow onto the active portion of the unit during the peak discharge from at least a 25-year storm. The peak discharge will have to be determined on a unit-specific basis and will depend on the rainfall patterns in the region as well as the size and terrain of the watershed. The rationale for the 25-year storm event is explained in the preamble discussion of the design and operating standards (Section VII.G.).

Today's rules also require that owners and operators of land treatment units must design, construct, maintain, and operate a run-off management system capable of collecting and controlling a water volume at least equivalent to a 24-hour, 25-year storm. The preamble discussion of the design and operating standards (Section VII.G.) contains further discussion of the rationale for this design.

Besides the general requirements to establish run-on and run-off systems, today's regulations require that the owner or operator manage the treatment zone in a manner designed to minimize run-off. In order for hazardous constituents to be properly treated, it is necessary that these constituents not be allowed to run off the surface of the unit. Minimization of run-off can be achieved through proper unit siting and design, particularly with regard to soil characteristics and slope, as well as through proper management of unit operation, including the method, rate, and scheduling of waste application.

Another requirement calls for control of wind dispersal at the unit if the treatment zone contains particulate matter that is subject to wind dispersal. Wind dispersal can be a serious concern at land treatment units because hazardous waste is generally placed on or barely under the soil surface. Measures to control wind dispersal will, however, be somewhat different than those used at other types of land disposal units. Potential control measures for land treatment units include establishment of vegetative cover, maintenance of proper surface soil moisture, and the use of chemical soil stabilizing agents.

5. *Food-chain Crops (Section 264.276).* In some cases an owner or operator may grow food-chain crops on a land treatment unit. This practice raises public health concerns. Accordingly, EPA has placed restrictions on the growth of food-chain crops on land treatment units. The Agency believes that food-chain crops can be safely grown on land treatment units if these standards are met.

Today's regulations on food-chain crops are basically the same as the restrictions found in the interim status standards. Growth of food-chain crops is not allowed unless the owner or operator complies with two primary criteria. First, he must demonstrate (for every hazardous constituent except cadmium) that hazardous constituents will not occur in greater concentrations in or on the crop grown on the unit than in or on the same crop grown on untreated soils under similar conditions in the same region. Second, if cadmium is a hazardous constituent at the unit, the owner or operator must comply with certain specified management practices that are designed to limit the entry of cadmium into the food chain.

The owner or operator must make the demonstration necessary to meet the first criterion before the crop is actually planted. This demonstration must describe the crop to be planted, the soil characteristics of the treatment zone (*e.g.*, pH, cation exchange capacity) and describe the procedures used in conducting any tests of crops, including the sample selection criteria, the sample size, the analytical methods and the statistical procedures used. Any tests attempting to measure crop uptake must be based on the specific wastes and application rates being used at the unit because these are critical factors in the validity of the test. The owner or operator may make this demonstration using field tests, greenhouse studies, available data, or, in the case or existing units, operating data. Of course, if the owner or operator wants to use field tests or greenhouse studies to make the demonstration, and he is not the owner

or operator of an existing unit already growing the specific crop, he will have to obtain a permit for conducting such activities.

The analysis provided by the owner or operator must show that hazardous constituent levels in the crop grown at the unit will not exceed those found in the same crop grown on untreated soils under similar conditions in the same region. (This test does not, however, mean that the comparison crop would be from another hazardous waste land treatment unit; data from such units cannot be used as the basis for comparison.)

The basic philosophy of this requirement is similar to that used in Subpart F for ground-water protection. In the absence of specific standards for hazardous constituents in food, EPA believes it reasonable to assure that there will be no significant increase of such constituents in the human food chain as a result of hazardous waste disposal.

In defining the crop to be used for comparison purposes, EPA considered several options. These included (1) dropping the "in the same region" test or (2) revising the test to call for comparisons to a national average of hazardous constituents found in crops grown on untreated soils. EPA rejected the first option because it does not want to encourage owners and operators to "shop around" for comparison data from the region of the country where the crops contain the highest levels of certain metals or other constituents. This might allow more highly contaminated food-chain crops to be marketed from land treatment units.

The Agency rejected the second alternative because it believes that there is not yet an adequate national data base for most hazardous constituents in crops grown on untreated soils. Therefore, because the Agency has been unable to identify less burdensome but adequately protective demonstration alternatives, the alternatives in today's rules are the same as those in the interim status standards.

EPA has not provided for a health-based variance from the food-chain crop standard based on narrative criteria. EPA believes that specific contaminant limits for food should be established in national rulemaking to allow for input from Federal agencies like the Food and Drug Administration, which are chiefly responsible for setting such standards.

Today's regulations differ from the interim status standards in identifying the constituents of concern under the standard. The interim status standards require that the comparison must be made for constituents listed in Appendix VII and in Table I of § 261.24. Today's rules, however, require this same demonstration to be made for all hazardous constituents (i.e., all Appendix VIII constituents) that are reasonably expected to be in, or derived from, the waste being land treated.

The Agency has made this demonstration more comprehensive in light of several comments stating that the safety of food-chain crops grown on land treatment units could not be ensured if the required demonstration included only Appendix VII and Table I constituents. Commenters have observed that may hazardous constituents not listed in Appendix VII or Table 1 of § 261.24 could threaten human health if present in food-chain crops from land treatment units. The Agency agrees with these commenters and has decided, because of the high level of risk that could be associated with inadvertent or undetected non-compliance with the standards for food-chain crops, to require this more comprehensive demonstration.

If the owner or operator demonstrates that the food-chain crops grown at the unit will not have contaminant levels above those found in similar crops grown on untreated soils under similar circumstances in the same region, the Regional Administrator will indicate in the facility permit that these crops may be grown at the unit. The owner or operator may not plant any food-chain crop not identified in the permit.

The second component of the food-chain crop standard applies only to cadmium. The regulations set forth two sets of management practices that can be used to ensure that cadmium will not cause any adverse effects on human health or the environment. These requirements are nearly identical to those established in the Criteria for the Classification of Solid Waste Disposal Facilities and Practices (40 CFR Part 257). The rationale for the requirements are the same.

It should be noted that today's regulations provide for "phasing in" the limits on annual application rates according to the same schedule found in the Criteria. On February 5, 1981 EPA had proposed to eliminate this phasing-in approach from the Part 264 regulations. EPA has decided, however, to retain the phasing approach to maintain equity between solid and hazardous waste facility owners and operators. Since both standards address aggregate cadmium levels in the waste, hazardous wastes present no greater risks to food-chain crops than solid wastes if the standards are met.

6. *Unsaturated Zone Monitoring (Section 264.278).* As indicated earlier, the purpose of unsaturated zone monitoring is to provide feedback on the success of treatment in the treatment zone. The information obtained from this monitoring will be used to adjust the operating conditions at the unit in order to maximize degradation, transformation and immobilization of hazardous constituents in the treatment zone.

For example, if a significant increase of a hazardous constituent is detected in unsaturated zone monitoring, the owner or operator will examine more closely the facility characteristics that significantly affect the mobility and persistence of that constituent. These significant facility characteristics may include treatment zone characteristics (*e.g.*, pH, cation exchange capacity, organic matter content), or operational practices (*e.g.*, waste application method and rate). Modifications to one or more of these characteristics may be necessary to maximize treatment of the hazardous constituent within the treatment zone and to minimize additional migration of that constituent to below the treatment zone.

It should be emphasized that unsaturated zone monitoring is not a substitute for ground-water monitoring. Both are required at land treatment units. Ground-water monitoring is designed to determine the effect of hazardous waste leachate on the ground water. Unsaturated zone monitoring cannot perform that function as a general matter. Instead, unsaturated zone monitoring simply gives an indication of whether hazardous constituents are migrating out of the treatment zone.

Likewise, unsaturated zone monitoring is not equivalent to the leak detection monitoring that is used at some other types of disposal units (*e.g.*, double-lined surface impoundments). Leak detection monitoring is used in conjunction with a relatively "closed" design (*e.g.*, two liners with a drainage layer between them) that is designed to pick up any liquid migrating from the unit. EPA believes that such a design can be a substitute for the ground-water monitoring and response program of Subpart F.

Unsaturated zone monitoring, however, operates in an open system that allows liquids to pass through the unsaturated zone. While EPA believes that unsaturated zone monitoring is generally reliable, it cannot provide the same level of certainty about the migration of hazardous constituents from the facility that a double-lined surface impoundment (with a leak detection monitoring program) can

provide. Therefore, unsaturated zone monitoring cannot be a substitute for ground-water monitoring.

Some commenters have expressed concern about the reliability and practicality of unsaturated zone monitoring, particularly soil-pore liquid monitoring. EPA believes that adequate technology and expertise is available to develop effective and reliable systems.

The Agency also believes that the inconvenience cited by some commenters can be avoided. Commenters stated that the placing of lysimeters (one type of device for monitoring soil-pore liquid) on the active portion of a land treatment unit would hinder site operations. However, the Agency knows of a number of existing land treatment units with monitoring systems engineered so that the above-ground portion of the device for sampling soil-pore liquid is located off the actual treatment zone. This and other methods can be used to avoid any inconvenience associated with the location of these devices.

The unsaturated zone monitoring program must be designed to determine the presence of hazardous constituents below the treatment zone. Generally this means that the owner or operator must monitor for the hazardous constituents identified for each hazardous waste that is placed in or on the treatment zone.

EPA believes, however, that there may be some situations where this general monitoring burden may be reduced without compromising the objectives of the unsaturated zone monitoring program. Some hazardous constituents will be more difficult to degrade, transform or immobilize than others. Therefore, if the owner or operator monitors for the constituents that are difficult to treat and can demonstrate that such constituents are not migrating from the treatment zone, then EPA can be reasonably certain that other hazardous constituents are being adequately treated.

The Regional Administrator may address this situation by selecting principal hazardous constituents (PHCs) for the unit. A PHC is a hazardous constituent contained in the waste applied at a unit that is difficult to degrade, transform or immobilize in the treatment zone. The owner or operator may ask the Regional Administrator to establish PHCs at the unit if the owner or operator can demonstrate to the Regional Administrator's satisfaction that degradation, transformation or immobilization of the PHCs will assure adequate treatment of the other hazardous constituents in the waste.

The Regional Administrator will be particularly concerned with two factors when deciding whether to establish PHCs. First, he will be concerned with the mobility of the constituent. Since PHCs will be monitored in the area below the treatment zone, the Regional Administrator will want to assure that the PHCs give an early warning of the failure of the treatment process. Therefore, a PHC must be one of the most mobile constituents in the treatment zone. Second, a PHC must be one of the most concentrated and persistent constituents in the treatment zone. This is to assure that the constituent provides a reliable indication of the success of treatment in the treatment zone.

In the selection of principal hazardous constituents, the Regional Administrator will evaluate the results of waste analyses, literature reviews, laboratory tests, and field studies. Waste analyses will be used to identify the hazardous constituents in the waste. Information obtained from literature reviews, laboratory tests, and field studies (including monitoring results for existing units) will be used to assess the relative mobility and persistence of the various hazardous constituents. The extent of data needed to support the selection of one or more principal hazardous constituents for a particular waste will be determined by the Regional Administrator.

Both soil-core and soil-pore liquid monitoring are required in today's rules. These two monitoring procedures are intended to complement one another. Soil-core monitoring will provide information primarily on the movement of "slower-moving" hazardous constituents (such as heavy metals), whereas soil-pore liquid monitoring will provide essential additional data on the movement of fast-moving, highly soluble hazardous constituents that soil-core monitoring may miss.

The general elements of the unsaturated zone monitoring program are patterned after those required for ground-water monitoring in Subpart F. As in the detection monitoring program, the unsaturated zone monitoring program is designed to determine whether the level of hazardous constituents in the soil or soil-pore liquid below the treament zone shows statistically significant increases over the background levels of those constituents in the soil or soil-pore liquid. In addition, today's regulations include requirements for monitoring systems, sampling frequency and sampling and analysis procedures and methods that are analogous to those in Subpart F. Some modifications of the Subpart F monitoring program must be made, however, to make it compatible with land treatment.

First, the basis for establishing background values differs. In the ground-water monitoring program, background values are based on data taken from upgradient monitoring wells. Such a concept is not applicable to land treatment units. Background values at land treatment units are established by sampling the soil and soil-pore liquid in a background plot. A background plot is generally a segment of the soil near the unit that has characteristics similar to that of the treatment zone and that has not been contaminated by hazardous waste. At a new unit, however, the owner or operator could use the actual treatment zone prior to waste application as the background plot. The key characteristic of the background plot is its similarity to the treatment zone.

Second, the unsaturated zone monitoring program will rely on statistical procedures that are somewhat different than those used for detection monitoring programs under Subpart F. In order to account for seasonal variations in soil-pore liquid quality, background values will be based on one year of quarterly sampling as in the detection monitoring program. Since background soil levels are not likely to change significantly during such a time frame, today's rules allow that background soil levels may be established following a one-time sampling. Unsaturated zone monitoring is similar to compliance monitoring, however, in that there may be several constituents to be monitored. Thus, the probability of an experiment error rate is high. Therefore, the statistical procedures used in the unsaturated zone monitoring program will be based on a narrative standard as used in the compliance monitoring program.

This standard seeks to provide "reasonable confidence" that the migration of hazardous constituents from the treatment zone will be indicated after balancing the risk of false positives and the risk of false negatives. (This preamble discusses the rationale for this standard in Section VII.D.10.) If the number of constituents to be monitored is small, then this standard can be met by the use of the Student's t-test protocol described in § 264.97(h).

While EPA believes that the standard for statistical procedures just described should be adequate for most situations, EPA intends to further analyze the appropriateness of other statistical procedures for unsaturated zone monitoring. For example, EPA is

considering whether other factors that might affect background levels of soil pore-water quality should be specifically addressed in devising the monitoring protocols. EPA specifically asks for public comment on this issue.

Third, the unsaturated zone monitoring program does not call for measurements of the flow and direction of ground water. The gradient in the ground water is not relevant to unsaturated zone monitoring and, thus, such information is not necessary.

Fourth, the response to the detection of a statistically significant increase in Subpart M differs from the response required in Subpart F. The results of unsaturated zone monitoring are to be used in the modification of the operating practices at the unit. Thus, the required response is the submission, within 90 days, of a permit modification application that sets forth how the owner or operator will adjust his operating practices (including waste application rates) to maximize degradation, transformation and immobilization of hazardous constituents in the treatment zone. However, an opportunity exists in today's rules for not submitting the permit modification application, but only if the owner or operator can successfully demonstrate to the Regional Administrator that the statistically significant increase results from an error in sampling, analysis, or evaluation. This error demonstration must be submitted to the Regional Administrator within 90 days of the owner or operator's knowledge of the statistically significant increase.

As indicated earlier in this preamble, the appearance of hazardous constituents below the treatment zone does not in itself constitute a violation of the regulations. (This is analogous to the fact that a landfill liner which has been designed not to leak does not violate the design standards if the liner fails at some future time.) Under the regulatory strategy in these regulations, contaminants that are not controlled by the design and operating measures will be addressed by the monitoring and response program in Subpart F.

7. Recordkeeping (Sections 264.279). Today's rules state that the operating record for the unit (as required in § 264.73) must include information on the dates and rates of the application of hazardous wastes. Waste application dates and rates are two vital factors, as discussed earlier in this preamble, which the owner or operator must carefully track and manage in order to achieve proper waste treatment.

8. Closure and Post-closure Care (Section 264.280). The closure and post-closure care requirements in today's regulations are quite similar to those that are required in the interim status regulations. The interim status regulations, however, expressed the requirements as a set of considerations that were designed to achieve general environmental objectives stated in the regulations. Today's regulations state the general design and operating "considerations" as actual duties that the owner or operator must meet. Those duties are designed to achieve the same general environmental objectives as the interim status requirements.

During the closure period the owner or operator must continue the operating practices that are designed to maximize degradation, transformation, and immobilization at the unit. Operating practices designed to maximize treatment include tilling of the soil, control of soil pH and moisture content, and fertilization. These practices must generally be continued throughout the closure period. In addition, during the closure period, the owner or operator must continue those practices that were designed to minimize run-off from the treatment zone and to control wind dispersion (if needed). The run-on and run-off systems must be maintained. The owner or operator must also adhere to the restrictions on food-chain crops specified in the permit.

The owner or operator must continue to operate the unsaturated zone monitoring program as provided for under §264.278 with one exception. Soil-pore liquid monitoring may be terminated 90 days after the last application of waste at the unit. EPA expects that the fast-moving constituents that the soil-pore liquid monitoring system is designed to detect should migrate out of the treatment zone soon after these constituents are applied if they are to migrate at all. EPA believes that any such migration is likely to occur in less than 90 days after the waste is applied. After the 90 days, the soil-core monitoring program becomes the principal mechanism for detecting migration out of the treatment zone.

The major element of the closure procedures at a land treatment unit is the placement of a vegetative cover that is capable of maintaining growth without extensive maintenance. Section 264.280(a)(8) requires the owner or operator to establish a vegetative cover at such time that the cover will not substantially impede degradation, transformation, or immobilization of hazardous constituents. Thus, the vegetative cover must not be established until sufficient treatment has occurred so that the placement of the cover and termination of certain operating practices (e.g., tilling) will not substantially inhibit treatment processes.

Once the vegetative cover is established, certain general practices designed to maximize treatment processes (e.g., tilling) cannot be conducted without damaging or destroying the vegetative cover. Such practices should not, therefore, continue once the cover is established. Accordingly, today's regulations provide in § 264.280(a)(1) that those practices aimed at enhancing degradation, transformation, and immobilization of hazardous constituents that would be inconsistent with the establishment of the vegetative cover under § 264.280(a)(8) should not be continued once the cover is established.

A vegetative cover consists of any plant material established on the treatment zone to provide protection against wind or water erosion, or to aid in the treatment of hazardous constituents. The major function of the vegetative cover during closure and post-closure care is to minimize wind and water erosion. Perennial grasses are often used because they can be rapidly established into a thorough cover. However, the best suited plant species will depend on the season and region of the country. Agronomists from the State Agricultural Extension Service, USDA, or nearby universities can be valuable sources of information regarding crop selection and cultivation practices which are best suited to a given region.

Section 246.115 of the general requirements for closure requires that the owner or operator submit a certification from an independent registered professional engineer that a unit has been closed in accordance with the approved closure plan specified in the permit. In the case of land treatment units, EPA believes that a qualified soil scientist should be as qualified as a professional engineer to evaluate the adequacy of such measures as vegetative cover. Therefore, today's regulations provide that an independent qualified soil scientist may make the certification.

During the post-closure care period, the owner or operator must continue many of the activities required during the active life (including the closure period). These include control of wind dispersal, maintenance of run-on and run-off systems and continuance of food-chain crop restrictions. The owner or operator must also continue soil-core monitoring but may suspend soil-pore liquid monitoring 90 days after the date of the last waste application. (This time

period may have already passed during the closure period.) In addition, the vegetative cover established during closure must be maintained.

The owner or operator must also continue to take actions that foster degradation, transformation and immobilization processes in the treatment zone. These operating measures must be tempered somewhat during the post-closure care period. Only those measures that do not interfere with the other post-closure care requirements should be continued. Thus, the application of lime to maintain the pH in the treatment zone is an acceptable practice but tilling of the soil that destroys the vegetative cover at the unit should not be continued. The Regional Administrator may wish to state in the facility permit, the level of treatment, particularly degradation or transformation, required at a particular site prior to the start of post-closure care. This would greatly influence the type and extent of actual "treatment" activities necessary during the post-closure care period and may assure greater control over completion of these treatment processes. Guidance for specification of levels of treatment is provided in the *RCRA Land Treatment Guidance Document.* (See Section VII.G. of this Preamble.)

The post-closure care regulations also set out a variance that would allow the owner or operator to be relieved from compliance with the post-closure care requirements as well as the closure requirement for establishment of a vegetative cover. This variance can be obtained if the Regional Administrator finds, based on a demonstration by the owner or operator that the level of hazardous constituents *within* the treatment zone does not exceed the background values for those constituents by statistically significant amounts. Such a demonstration may be made at any time after the last application of waste is made at the unit. The sampling and data evaluation standards, including the requirements for evaluation of statistical significance, are specified in today's rules. These requirements are almost identical to corresponding standards contained in § 264.278. They include only soil monitoring and analysis, however, not soil-pore liquid monitoring.

It is important to note that an owner or operator who can successfully make the showing that hazardous constituents are no longer present in the treatment zone at statistically significant amounts may be eligible for a further exemption during the post-closure care period. If the owner or operator can also demonstrate that no hazardous constituents have migrated below the treatment zone during the active life of the land treatment unit, there is little prospect that corrective action measures under Subpart F would be necessary. Accordingly, the regulations provide that an owner or operator that can make both such demonstrations to the Regional Administrator may be exempted from Subpart F.

9. *Special Requirements for Ignitable or Reactive Waste (Section 264.281).* As is required for the other types of land disposal units, today's regulations restrict land treatment of ignitable and reactive waste. The rationale for this provision is the same for land treatment as it is for the other types of disposal units.

10. *Special Requirements for Incompatible Wastes (Section 264.282).* As is required for other types of land disposal units, today's regulations restrict land treatment of incompatible waste. The rationale for this provision is the same for land treatment as it is for the other types of disposal units. It should be recognized, however, that one way a waste is incompatible with a land treatment unit occurs when it operates to undermine treatment processes in the treatment zone (*e.g.,* by destroying microbial populations).

I. Landfills (Part 264, Subpart N)

Subpart N contains the design and operating standards for landfills used to dispose of hazardous wastes. The basic requirements are: (1) A liner to prevent migration of wastes out of the landfill and into the subsurface soil or ground water or surface water during the landfill's active life (with an exemption for existing portions, such as cells or trenches that already contain wastes); (2) a leachate collection and removal system; (3) control of run-on and run-off; and (4) capping the wastes at closure and conducting post-closure care. An exemption from the ground-water protection requirements of Subpart F is provided for landfills that have double liners and leak detection systems. A waiver of the liner and leachate collection and removal requirements is provided if the owner or operator demonstrates to the Regional Administrator that hazardous constituents will never migrate from the landfill into ground or surface water.

Many of the features of the Subpart N regulations (liners; leachate collection and removal systems; and double liners and leak detection systems installed to qualify for exemptions from Subpart F) are explained in the general discussion of design and operating standards (see Section VII.E. of this preamble) or in the discussion of analogous provisions in Subparts K and L for surface impoundments and piles (see Section VII.F. and VII.G. of this preamble). They will not be discussed again here. The few remaining issues that are unique to landfills will be discussed below.

1. *Special Requirements for Ignitable or Reactive Wastes and for Incompatible Wastes (Sections 264.312 and 264.313).* Sections 264.312 and 264.313 are based upon the analogous Part 265 interim status standards. Section 265.312 was amended on June 29, 1981, and § 264.312 is based on the amended version. A discussion of the basis for the current restriction on landfilling ignitable and reactive wastes is set forth in the preamble to those standards at 46 FR 33402 (June 29, 1981).

2. *Special Requirements for Liquid Waste (Section 264.314).* Section 264.314 restricts the disposal of liquids in landfills. It is based upon the analogous Part 265 interim status standards, including portions which were recently promulgated on March 22, 1982 (47 FR 12316).

3. *Special Requirements for Containers (Section 264.315).* Section 264.315 provides that containers (except for very small containers) must be either (1) at least 90 percent full when placed in a landfill, or (2) crushed, shredded, or similarly reduced in volume to the maximum practical extent before burial in the landfill. The purpose of the rule is to minimize subsidence in the landfill resulting from decaying containers having void spaces.

The analogous interim status standard in § 265.315 provides only that an empty container must be crushed, etc., before placement in the landfill. However, it fails to define the term "empty" (and "full") and to address the subsidence that may be caused by the disposal of partially empty containers. Today's promulgation of § 264.315 (and the proposal of a parallel modification of § 265.315) addresses these regulatory gaps.

In the February 5, 1981 proposal, EPA proposed that to be considered full, containers have either 3 inches or less of void space or 10 percent or less volume of void space, whichever is less. Some commenters argued for less stringent numbers. Other commenters argued that crushing or shredding empty containers is impractical. These commenters did not provide EPA with data to support their comments.

The Agency believes that by allowing only full containers or those that have been crushed or otherwise reduced in void space to be placed in a landfill, disruptive subsidence of the final cover

resulting from the placement of partially filled containers in landfills can be avoided. The Agency disagrees with the commenter who suggested that crushing or shredding empty containers is impractical. Several landfills are currently doing so and container crushing equipment is readily available.

Those owners or operators having containers which are partially filled may either (a) fill them to greater than 90 percent of their capacity, (b) empty them and then crush or shred them to the maximum extent practical, or, (c) to the extent technology and safety allow, reduce the volume of the partially full containers. The provision allowing landfilling of containers that are 90% full means that there could be about 4 inches of void space in the typical 55-gallon drum.

The Agency would prefer to set a performance limit on the required effectiveness of volume reduction and has considered imposing a requirement limiting maximum remaining void space after crushing to 10 percent of the precrushed volume. EPA presently lacks the data necessary to determine the practicality of such a limit. The Agency is, therefore, seeking comment, particularly from those currently crushing drums and those manufacturing crushing equipment, as to what numeric performance level may practically be required.

One commenter suggested that all containers which are so small that void spaces in them would not significantly affect the stability of a landfill should be allowed. The Agency agrees and is, therefore, exempting very small containers, such as an ampule.

4. *Disposal of Small Containers of Hazardous Waste in Overpacked Drums (Lab Packs) (Section 264.316).* Section 264.316 provides that small containers of hazardous wastes in overpacked drums, commonly known as "lab packs," may be placed in landfills if certain requirements are met. This provision allows disposal of ignitable or liquid wastes in drums in accordance with these special conditions. This regulation is based upon the recently promulgated interim status standard for lab packs (46 FR 56592, November 17, 1981).

J. Interim Status Conforming Changes (Part 265)

Some of the regulations promulgated today in Part 264 suggest conforming changes to parallel sections of Part 265. The Part 265 requirements were previously promulgated in interim final form and interested parties have commented on them. The changes made today are necessary to ensure consistency in application of policy decisions or to ensure a lack of conflict between the provisions of the two parts. Some changes, however, must be proposed because they contain significant changes to existing rules and the public has not had an opportunity to comment on the appropriateness of applying them during the interim status period. These are proposed in another section of today's **Federal Register.**

A careful side-by-side reading of the Part 264 rules promulgated today and the existing Part 265 rules, will identify a number of additional differences which are not substantive. Most of these differences are necessary because Part 265 is intended to be largely self implementing, whereas the Part 264 requirements are implemented with substantial interaction with the Agency through the permitting process. Therefore, conforming changes have not been made to address those differences. Some other differences represent EPA's effort to make the new Part 264 requirements more easily understood. Conforming changes that are solely a matter of exposition are not made in this rulemaking (except when associated with some other change).

1. *Waste Piles—Containment (Section 265.253).* In the Part 264 regulations, the addition of the 25-year storm event as the design criterion for run-on and run-off control systems resulted from comments on the interim status and permitting requirements which contain only narrative design criteria. EPA has, therefore, adopted the same storm event as the design criterion for interim status as well. The Agency has also adopted as an interim status requirement the Part 264 provision that run-off collection systems be emptied expeditiously to maintain capacity.

2. *Waste Piles—Closure and Post-closure Care (Section 265.258).* The interim status requirements for waste piles contained no closure requirements. At the time they were written, the Agency thought that the requirements would be obvious. Since the rules applied only to storage piles, the wastes would have to be removed at closure in accordance with Subpart G. Any pile which would remain at closure is considered to be a landfill and would be subject to the closure and post-closure requirements of Subpart N. However, some comments and questions received by EPA indicated some confusion on this point. Therefore, a section to clarify the closure requirements is being added to both the Part 264 standards and to the interim status requirements.

3. *Land Treatment—General Operating Requirements (Section 265.272).* This section is being changed to add the 25-year storm design criterion for run-on and run-off control systems and to require them to be emptied or managed expeditiously to prevent successive storm events from filling them up, reducing available capacity. The same changes are being made to the pile requirements (see paragraph 1 above), and the rationale is the same as for the corresponding Part 264 changes.

In addition, a requirement is being added to ensure control of wind dispersal of particulate matter at land treatment units. A similar requirement is contained in the requirements for waste piles and landfills. The Part 265 requirements currently contain a requirement that the owner or operator must consider wind dispersal controls as a part of closure.

4. *Land Treatment—Food Chain Crops (Section 265.276).* Previously, this section of Part 265 required that future property owners be notified by a stipulation in the land record or property deed which stated that food chain crops should not be grown due to a possible health hazard. One commenter on the May 19, 1980 standards suggested that the stipulation state that, rather than not allowing food chain crops to be grown on the site in the future, food chain crops could be grown but only in compliance with the requirements of § 265.276(c)(2). The Agency agrees with this commenter, as it believes that compliance with § 265.276(c)(2) whenever food chain crops are grown provides adequate public health and environmental protection.

5. *Land Treatment—Recordkeeping (Section 265.279).* The redundancy caused by the inclusion of certain recordkeeping requirements in both §§ 265.73 and 265.279 has been eliminated. Since records are required under § 265.73 of the quantity and location of each hazardous waste placed in the unit, there is no need for the same requirements to appear in § 265.279. Section 265.279 now only addresses the keeping of records on hazardous waste application dates and rates. These are additional recordkeeping requirements to those specified in § 265.73.

6. *Land Treatment—Closure and post-closure care (Section 265.280).* Several changes have been made to the closure and post-closure care requirements of § 265.280 in order to make the interim status requirements more consistent with the closure and post-closure care requirements for land treatment units.

In today's rules, under § 265.280(d), several monitoring, maintenance, and control activities are required of land treatment unit owners or operators during the closure period. These are, for the most part, extensions through

closure of activities which are required during earlier unit operations. The unsaturated zone monitoring system must be maintained and operated in compliance with specifications to be provided in the closure plan. (As in the Part 264 regulations, the owner or operator may terminate soil-pore water monitoring 90 days after the last waste application.) The run-on and run-off management systems required under § 265.272 (b) and (c), respectively, must be maintained. These new requirements constitute minimum operation and maintenance standards for unit closure and replace the earlier § 265.280 standards requiring that these operations only be "considered" for inclusion in the closure plan. In addition, control of wind dispersal of hazardous waste during closure (as well as post-closure) is now required.

In response to a comment received on the May 19, 1980 standards, today's rules allow the use of an independent qualified soil scientist to verify that the unit has been closed in accordance with the specifications in the approved closure plan. A qualified soil scientist will have a knowledge of the factors most likely to influence the fate and transport of hazardous waste constituents in the soil.

The existing § 265.280 requirement that the unsaturated zone monitoring system be operated and maintained during the post-closure care period is also being revised today. Under today's rules, both Parts 264 and 265, only soil core monitoring and not soil-pore water monitoring is required during the post-closure care period. Because waste is no longer being applied to the unit during the post-closure care period, the Agency believes that soil-pore water monitoring, which is primarily intended to detect the movement of the more mobile hazardous constituents, is unnecessary. Soil-core monitoring should provide all the monitoring information necessary to determine whether hazardous constituents are migrating toward ground water during the post-closure care period.

7. *Land Treatment—Special requirements for ignitable or reactive waste (Section 265.281).* In response to a comment on the May 19, 1980 regulations, a paragraph has been added to § 265.281 to allow the land treatment of ignitable or reactive wastes if they are protected from conditions leading to ignition or reaction. This clause provides greater flexibility to the owner or operator. The Agency does not think, however, that such ignition, or especially reaction, can be prevented very easily in a land treatment unit unless the wastes were rendered non-ignitable or non-reactive.

8. *Landfills—General operating requirements (Section 265.302).* As with the waste pile and land treatment regulations, the interim status requirements for landfills are being modified to adopt the 25-year storm criterion for design of run-on and run-off control systems (see paragraphs 1 and 3 above). The common sense requirement that these systems be expeditiously emptied after storms to maintain capacity has similarly been added.

9. *Landfills—Special requirements for ignitable or reactive wastes (Section 265.312).* As a result of a delayed compliance date for the restriction on landfilling of liquid waste in containers (§ 265.314(c)), the language in the regulations respecting ignitable waste is more complicated and confusing than is necessary. Accordingly, these provisions have been simplified in both Parts 264 and 265. The change divorces consideration of the physical state of the waste (i.e., whether it is a liquid or a solid) from the management requirements regarding its ignitability. Requirements respecting ignitability are covered in §§ 264.312 and 265.312, and those requirements relating to liquids are covered in §§ 264.314 and 265.314. This does not represent a substantive change, only a clarification. Previous rulemaking actions on this topic have indicated EPA's intent to address the problems associated with the ignitable characteristic of a waste under § 265.312 and the liquid nature of a waste under § 265.314. The restrictions on liquid wastes in general, coupled with the requirements that ignitable wastes be in containers when landfilled, as a practical matter, result in a virtual ban on the landfilling of liquid ignitable wastes.

10. *Landfills—Special requirements for liquid wastes (Section 265.314).* The standards adopted in § 264.314 concerning the acceptance of bulk liquids in landfills are slightly different from the interim status requirements promulgated May 19, 1980. The language has been changed to specify that bulk liquids can be placed in landfills only when the facility is equipped with a liner system (underliner and leachate collection system) that meets the requirements of the regulations (§ 264.302(a)). The same change is also being made to the interim status requirements (§ 265.314). The new language replaces the May 19, 1980 requirement that a facility receiving bulk liquids have a liner system which is chemically and physically resistant to the liquid and a functioning leachate detection system capable of removing the percolating liquids. Since that requirement does not specify the design or required effectiveness of the liner system in any way, the Agency is concerned that a substantial portion of the added liquids would be allowed to pass through the liner and escape. The changes made today specifying compliance with the liner performance standards of Part 264, will ensure that bulk liquids will be placed in landfills only when the liner system has been designed to fully contain the wastes so that all leachate can be collected and removed. According to EPA's information, only a relative few existing landfills are equipped with appropriate liners and leachate collection units. Therefore, bulk disposal of liquids in many existing landfills may be curtailed upon the effective date of these requirements, at least until new, appropriately designed cells can be built at those landfills.

K. Permitting Requirements (Part 122)

On May 19, 1980, EPA promulgated the consolidated permit regulations (40 CFR Part 122, 45 FR 33418) which include requirements for permitting hazardous waste management facilities under RCRA. Owners and operators of facilities which treat, store, or dispose of hazardous waste must obtain permits from EPA, and EPA must issue those permits in accordance with the Part 122 and Part 124 regulations.

1. *Introduction.* Part 122 provides for a two-part hazardous waste permit application; Part A and Part B. Requirements for the content of Part A of the permit application remain unchanged from the May 19, 1980 promulgation. (40 CFR 122.24, 45 FR 33434). Requirements for the content of Part B of the permit application were amended January 12, 1981 (40 CFR 122.25, 46 FR 2869) to provide specific information requirements for owners and operators of hazardous waste treatment and storage facilities. Today's amendments to § 122.25 specify the contents of Part B of the permit application for new and existing waste piles, surface impoundments, land treatment units, and landfills. In order to receive a RCRA permit for any of these types of units, owners or operators must submit sufficient information in Parts A and B to enable EPA to determine whether the unit is in compliance with the Part 264 standards, or for a new unit, whether it will be in compliance with those standards.

2. *Background.* On May 19, 1980, EPA promulgated certain general regulations under Parts 264 and 122 applicable to

hazardous waste management facilities to be permitted under RCRA (45 FR 33221, 33434). The Part 264 regulations contained administrative and technical standards for operating permitted facilities. The Part 122 regulations, among other things, specified what information owners or operators of facilities had to submit to EPA in their permit applications to demonstrate their compliance with the Part 264 standards. Sections 122.4, 122.24 and 122.25 set forth the required content of Parts A and B of the permit application, respectively.

On January 12, 1981, EPA supplemented the May 19, 1980 rules by promulgating specific standards for several types of hazardous waste treatment and storage facilities, among them surface impoundments and waste piles (Part 264, Subparts K and L, 46 FR 2868–2872). At that time, EPA also added companion requirements to § 122.25, directing permit applicants for treatment and storage facilities to submit information in their Part B's pertinent to the new Part 264 standards (46 FR 2889–2891).

On February 13, 1980, EPA promulgated temporary standards for permitting new land disposal facilities (40 CFR Part 267, 46 FR 12429). Those regulations included technical and administrative requirements for new disposal surface impoundments, new land treatment units, and new landfills. No specific permit application requirements were promulgated at that time.

As explained earlier in this preamble, today's amendments to Part 264 Subparts K, L, M and N subsume and replace the specific standards for surface impoundments, waste piles, land treatment units, and landfills as promulgated January 12, 1981, and February 13, 1981. Similarly, today's new Part B permit application requirements subsume and replace the Part B requirements of January 12, 1981, for surface impoundments and waste piles, and add new Part B requirements for land treatment units and landfills.

3. *Contents of Part B for Surface Impoundments, Waste Piles, Land Treatment Units, and Landfills.* The required content of Part B of the permit application is specified in three subsections in § 122.25. Paragraph (a) lists general information required for all types of units. Paragraph (b) lists information required for individual types of units (e.g., waste piles, landfills). Paragraph (c) lists ground-water monitoring information required for surface impoundments, waste piles, land treatment units, and landfills.

Section 122.25(a) remains substantially unchanged from the January 12, 1981 promulgation. (Conforming cross-references have been added to paragraphs (a)(5) and (a)(13).) Thus, applicants for RCRA permits for waste piles, surface impoundments, land treatment units, and landfills must address in their Part B permit applications the general information requirements (paragraph (a)) published in the January 12, 1981 **Federal Register**, as well as the specific information requirements (paragraph (b)) published today for each respective unit type, and, where applicable, the ground-water monitoring information requirements (paragraph (c)) published today. Part B requirements pertaining to ground-water monitoring apply to all four types of units unless they are exempted by § 264.90 (applicability of Subpart F).

As in the January 12, 1981, promulgation of § 122.25(b), today's specific Part B requirements are each tied to a Part 264 standard and, wherever possible, parallel the structure of the respective Subparts in Part 264. In general, the Part B requirements in today's rules state the form and subject matter of the information required (e.g., detailed plans of liner systems) and refer to the companion regulation in Part 264 which is germane to the permit application.

In the Part B submission, the permit applicant must submit information in sufficient detail to enable the Regional Administrator to judge whether the unit will be in compliance with the Part 264 standards, and thus eligible for a RCRA permit. The applicant must address each aspect of design and operation included under individual Part 264 standards. For example, § 122.25(b)(7)(ii) requires that detailed plans and an engineering report be submitted which describe the liner system to be used in a landfill, as required under § 264.301. Section 264.301 lists, among other things, a number of design standards for liners, including the strength, thickness, and chemical properties of the liner material. Each of these characteristics of the liner material must be addressed in the Part B submission for landfills. If the applicant submits a Part B which does not address each requirement with enough detail so that the Director[1] can make an informed judgment as to whether the unit will meet the Part 264 standards, the applicant will be asked to clarify his submission by providing more information (see § 124.3(c)).

[1] The term "Director" is used in EPA's permitting regulations to mean the Regional Administrator in any State where EPA is running the RCRA hazardous waste program, and the State Director in any State with authorization to run its hazardous waste program (or a part of its program) in lieu of EPA's running the Federal program.

4. *When to Submit Parts A and B.* As provided in § 122.21 in EPA's May 19, 1980 hazardous waste regulations (45 FR 33432), the submission of Part A of the permit application is a condition of "interim status" for existing hazardous waste management facilities. That regulation further provides that the Director shall set a date, giving at least six months notice, for submission of Part B of the permit application for existing facilities. Therefore, owners and operators of existing facilities are not required to submit Part B until requested by EPA, although they may voluntarily submit Part B of the permit application before it has been requested by EPA. Owners and operators of new facilities must submit Part A and Part B of the permit application at least 180 days before physical construction is expected to commence. Owners and operators may not commence construction of new facilities until a permit has been issued.

5. *Special Permitting Procedures for Land Treatment Units.* Section 264. 272 provides that a treatment demonstration must be made prior to the permitting of any land treatment unit. The purpose of the treatment demonstration is to show that hazardous constituents in the waste can be completely degraded, transformed, or immobilized in the treatment zone. The § 264.272 requirements allow the owner or operator to use, among other means, field tests or laboratory analyses to make the treatment demonstration. Therefore, the owner or operator of a new land treatment unit, or the owner or operator of an existing unit who wants to land treat new waste, needs the opportunity to use field tests or laboratory analyses to make this demonstration. However, field tests and laboratory analyses can only be performed under a permit because they involve the treatment and disposal of hazardous waste.

Paragraph (c) has been added to § 122.27 to allow an owner or operator who needs to make a treatment demonstration to obtain a phased permit which will cover not only the field test and laboratory analyses but also facility construction and operation. In this way, the owner or operator may not have to obtain a permit separate from the actual facility permit to conduct field tests or laboratory analyses. If the Director finds, based on the information submitted by the owner or operator in Part B of the permit application for a land treatment unit, that substantial information exists upon which to base the issuance of an operation permit (i.e., the applicant has submitted information indicating a likelihood that he can

achieve complete treatment at his facility), the Director may issue a two-phase facility permit.

The issuance of a two-phase facility permit would avoid the necessity of two separate permitting procedures—the first for permitting the field tests or laboratory analyses for the treatment demonstration, and the second for design, construction, operation, and maintenance of the actual land treatment unit. However, if the Director finds that owner or operator has not submitted substantial information indicating a likelihood that he can achieve complete treatment at his facility (based, for example, on land treatment of very similar waste) a two-phase facility permit will not be issued. In this latter case, the owner or operator must apply for and receive a demonstration permit to conduct the field tests or laboratory analyses and perform these tests or analyses prior to the Director's consideration of a facility permit. Section 122.27(c)(1) provides that a demonstration permit need only contain conditions implementing the requirements of § 264.272(c). Thus the conditions that would be included in any demonstration permit would be the same as those that would be included in the first phase of a two-phase land treatment facility permit. Minimum conditions are specified, but the Director may include any conditions he finds may be necessary to protect human health and the environment.

An owner or operator who wants to receive a two-phase permit to accommodate conducting field tests or laboratory analyses, must include a treatment demonstration plan in Part B of his permit application. See § 122.25(b)(6)(i). The demonstration plan must propose that the field tests or laboratory analyses be performed under conditions similar or directly relating to those present in the treatment zone of the unit. Specific conditions for which similarity or direct relevance are necessary are listed in § 264.272(c). These include: waste characteristics, climate, topography, soil characteristics (including treatment zone depth), and operating practices (including unsaturated zone monitoring). It is important to note that any waste constituents listed in Appendix VIII of Part 261 that are reasonably expected to be in, or derived from, waste to be land treated at the actual unit are those constituents for which a treatment demonstration is required. An owner or operator may, of course, use a combination of field tests, and laboratory analyses, and other data to demonstrate that all Appendix VIII constituents contained in the waste can be treated completely.

Following receipt of the Part B application, including the treatment demonstration plan, the Director will process the two-phase facility permit completely through the Part 124 procedures, including preparation of a draft permit and an opportunity for public comment and hearing, assuming he has enough information on which to base draft permit conditions for the design, construction, operation and maintenance of the unit. After completion of this process, and if the Director deems it appropriate, the two-phase facility permit will be issued. The first phase of the permit will become effective as provided in § 124.15(b). The second phase will not be effective until after the owner or operator has successfully completed the treatment demonstration and the Director has made any modifications necessary to ensure compliance with all Subpart M requirements.

Included in the first phase of the permit will be the conditions for performance of the treatment demonstration. The conditions will be established based upon the treatment demonstration plan submitted by the owner or operator. These permit conditions will include design and operating parameters (including the duration of the tests or analyses and, in the case of field tests, the horizontal and vertical dimensions of the treatment zone), monitoring procedures, post-demonstration clean-up activities, and all other Part 264 requirements which the Director finds appropriate. In order for the owner or operator to proceed with actual construction and operation, *i.e.*, proceed into phase two of the permit, it is necessary that he complete the treatment demonstration satisfactorily.

The Director will include, as conditions in the second phase of the facility permit, all Subpart M requirements pertaining to unit design, construction, operation, and maintenance, as well as all other applicable Part 264 requirements. The Director will establish the conditions in the second phase of the permit based upon the substantial but inconclusive or incomplete information contained in the Part B application.

Following completion of the field tests or laboratory analyses, the owner or operator must submit to the Director a certified statement, signed by a person authorized to sign a permit application or report under § 122.6, that the tests or analyses were carried out in accordance with the conditions specified in phase one of the permit. All data collected during the field tests or laboratory analyses must also be provided to the Director.

The Director will then determine whether the results of the field tests or laboratory analyses, together with any other data submitted by the owner or operator relevant to the treatment demonstration, meet the requirements of § 264.272, *i.e.*, that the hazardous constituents in the waste can be completely degraded, transformed, or immobilized under conditions similar to those of the treatment zone. If the Director determines that the hazardous constituents can be completely treated, he will (1) modify the second phase of the permit to incorporate any additional requirements which he finds will be necessary for operation of the unit in compliance with Part 264, Subpart M, based upon the data from the completed treatment demonstration and (2) make the second phase of the permit effective.

The permit modification to include changes based upon the completed treatment demonstration may proceed as a minor modification under § 122.17, if any such change is minor. Otherwise, it will proceed as a permit modification under § 122.15(a)(2).

The Agency thinks that adjustments to a number of the operating procedures at land treatment units will, in many cases, be considered minor modifications. For example, modifications to (1) waste application rate, technique, or frequency, (2) liming or fertilization practices, or (3) tilling depth and frequency would usually be considered minor modifications, except where there were substantial increases in the waste application rate or frequency. Examples of modifications likely to be considered "major" include significant changes in (1) characteristics of the land treated wastes (e.g., moisture content) and (2) treatment zone characteristics (e.g., depth of soil, soil texture, slope).

If the results of the first treatment demonstration are inconclusive and the owner or operator wants to do additional field tests or laboratory analyses, the Director may modify the permit (whether it is an individual permit that covers only a treatment demonstration or whether it is the treatment demonstration phase of a two-phase permit) to authorize such additional tests, incorporating in the permit those terms and conditions necessary to meet § 264.272(c) requirements. The modification of a permit to allow a second treatment demonstration may be made as a minor modification, provided the conditions

for the second demonstration are substantially the same as the conditions for the first demonstration.

A permit applicant seeking a demonstration permit (rather than a two-phase facility permit) must also submit a treatment demonstration plan in Part B of his application. Such a permit applicant should consult with the Director before submitting his Part B information because the Director may allow him to submit less information in his Part B application than would be required for a two-phase facility permit. Once a complete application has been received, the Director will process it under the Part 124 procedures using the substantive standards in § 264.272(c).

6. *Clarification of the Scope of the RCRA Permit Requirement.* EPA is today making two clarifying changes to § 122.21(d), "scope of the RCRA permit requirement". The first change clarifies that owners and operators of hazardous waste management facilities are required to have permits during any post-closure period (see § 264.117) and any compliance period (see § 264.96) applicable to their facilities, as well as during the active life of the units (including the closure period).

a. *Post-closure Permits*—EPA has always intended that owners and operators be required to have permits during the active life of their units and, for disposal units, through the post-closure care period as well. EPA could have issued regulations (like the Part 265 interim status standards) that are enforceable independent of a permit to impose many of the requirements that apply to a facility after closure, but imposing standards through the permit allows EPA and facility owners and operators a much greater opportunity to tailor the requirements to individual facilities. Such individualized requirements provide a greater assurance of human health and environmental protection because they allow site specific implementation of general standards (such as the location of ground-water monitoring wells).

Using a permit as the vehicle for imposing post-closure care requirements also means that EPA has an existing system—the permitting procedures and requirements in 40 CFR Parts 122 and 124—to use when interaction between EPA and the facility owner or operator is necessary during the post-closure care period. For example, this would be necessary if the Regional Administrator wanted to extend the post-closure care period under § 264.117(a)(2)(ii) because of data obtained after facility closure. Such interaction would also be critically important under the Subpart F ground-water monitoring standards promulgated today. If an owner or operator found hazardous constituents in ground water under his facility while doing detection monitoring, he then would be required to establish a compliance monitoring program. If he were violating the ground-water protection standard for his facility while doing compliance monitoring, he would then need to establish a corrective action program. EPA think that the establishment of such ground-water monitoring programs should be done through the permitting process. That process ensures procedural protections for owners and operators of hazardous waste management facilities and also ensures an opportunity for public participation as mandated under Section 7004(b) of RCRA.

Although EPA's intent, as evidenced in the Parts 122 and 264 regulations,[2] has always been that disposal facilities are required to obtain permits during the post-closure care period, that was not stated as clearly as it might have been in the regulations. EPA is remedying that deficiency today by amending the Part 122 regulations to expressly provide that disposal facilities are required to get permits for the post-closure care period.

EPA intends that all disposal facilities, including those that close during interim status, be required to have post-closure permits. This is a logical corollary to the definition of "regulated unit" included in today's Part 264 regulations. EPA believes that, to assure adequate protection of human health and the environment, it is important that any wastes disposed after today's Part 264 standards become effective be subject to those standards, although the standards will not be directly applied until a permit is issued for the unit. The fact that an owner or operator may close a unit or his entire facility before EPA issues him a permit should not preclude the Agency from issuing a permit that incorporates applicable Part 264 post-closure care standards, including Subpart F ground-water monitoring requirements.

In addition to sacrificing some measure of human health and environmental protection, the Agency thinks that it would be inequitable to allow the owner or operator of one hazardous waste disposal unit to operate under the less protective interim status requirements, then close when EPA required him to submit Part B of his permit application, and thereafter be subject only to the interim status requirements, while another operator would be subject to the stricter Part 264 requirements because his Part B application was requested earlier. Such a system would create inequities whereby persons whose permits were processed last could get a significant competitive advantage.

As noted above, today's regulations do limit the applicability of the Part 264 regulations to "regulated units"—*i.e.*, units that continue to receive wastes after the effective date of the regulations. To be consistent, post-closure permits will be limited to the same class of units. Thus, disposal units which stop accepting waste before the effective date of today's regulations will not have to get permits covering the post-closure care period. However, those disposal units that continue to receive waste after the effective date of today's regulations will be required to have post-closure permits, even if they close before receiving an initial RCRA permit.

A conforming change to § 122.10, Schedules of compliance, is also being made to clarify how and when permit applicants or permittees cease conducting regulated activities at hazardous waste disposal facilities. The change to that section points out that owners and operators of treatment and storage facilities have closure responsibilities and that owners and operators of disposal facilities have both closure and post-closure responsibilities.

b. *Permits for Individual Units.* The second change EPA is making to the scope of the RCRA permit requirement clarifies that EPA can issue or deny a permit to one or more units at a facility without affecting the interim status of any remaining units for which a permit has not been issued or denied. EPA normally would permit all of the hazardous waste management activities at a facility simultaneously but there may be circumstances where this would be impossible or undersirable. For example, an owner or operator might want to add a new surface impoundment to his facility, but he may also be storing hazardous waste in an underground tank that cannot be entered for inspection, a process for which EPA has not issued permitting standards. In such a situation, EPA would want to be able to proceed with permitting the new surface impoundment without affecting the interim status of any unpermitted units such as the facility's underground tank.

[2] For example, § 264.118 requires a post-closure care plan that must be approved as part of the permitting process and becomes a condition of the permit. Section 122.15(a)(7) notes that allowable permit modifications include changes in the period for post-closure care and permission to disturb the integrity of the containment system under § 264.117(c).

The Agency is making a conforming change to § 122.15(a)(7) to provide that any permit issued to a facility for less than all of the units at the facility may be modified to include conditions applicable to units that are permitted later.

7. *Changes to the Conditions Under Which EPA May Modify Permits.* EPA is today adding four causes for permit modification to § 122.15(a)(7) (in addition to the conforming change described above) and three causes for minor permit modifications to § 122.17(e). The circumstances under which these causes for modifications would be invoked are discussed in the preamble to the accompanying regulations in Subparts F and M of Part 264.

8. *Request for Part 122 Comments.* Today's amendments to §§ 122.10, 122.15, 122.17, 122.21, 122.25, and 122.27 are promulgated in interim final form. EPA solicits comments from the public on all of these amendments. The Agency would especially welcome comments on the Part B requirements for surface impoundments, waste piles, land treatment units and landfills, and on the special permitting procedures for land treatment units. Comments pertaining specifically to regulatory amendments to Part 122 should be sent to "Docket 3005—permitting requirements for land disposal facilities." The Agency will consider all timely comments before promulgating these regulations in "final final" form.

VIII. General Solicitation of Public Comments

EPA generally solicits comment on today's rules and their supporting rationale provided in this preamble. On many regulatory issues, the Agency is particularly interested in the public's response and has highlighted these areas throughout the preamble. For convenience, the areas on which the Agency has specifically requested comments are catalogued below. EPA seeks comment on:

1. Requiring financial assurance for corrective action to remedy ground-water contamination at facilities and how to structure these requirements.

2. Promulgating regulations that would consist of general environmental performance standards similar to those contained in 40 CFR § 267.10 to be used in permitting unique facilities that do not fit into the descriptions of classes of facilities we now have standards to cover (containers, tanks, surface impoundments, waste piles, land treatment units, landfills, and incinerators.)

3. Exempting from Subpart F (Ground-water Protection Standard) facilities located over an uppermost aquifer which is so dirty that it would never be used for any purpose and which, regardless of any future level of contamination is not capable through hydraulic connection of significantly contaminating another usable aquifer or surface water.

4. Factors that can be employed to demonstrate that no adverse health and environmental effects can potentially result from a flood washout if a variance from the floodplain requirement for designing to prevent washout is to be granted.

5. How to construct a statistical test procedure that when used in a ground-water monitoring program involving a large number of comparisons will have low probability of falsely identifying a non-contaminating unit, yet provide high probability of identifying a truly contaminating unit.

6. How to give further specificity to the general criteria for evaluating statistical procedures employed in ground-water monitoring.

7. Alternatives to the coefficient of variation in defining when ground-water monitoring data are likely to be normally distributed.

8. Crafting the liner and/or leachate collection system exemption for existing portions of units to better address those situations where substantial retrofitting would not be necessary and no exemption is warranted, and to better handle those situations where upgrading at an old site may provide very little additional environmental protection and an exemption may be desirable.

9. The decision by the Agency not to grant a waiver from the facility closure standards where a site may be able to show location characteristics that may make it unnecessary for ground-water protection. (EPA still wants to have a cover designed in accordance with the closure requirements to provide air and surface water protection.)

10. EPA's decision not to provide a waiver now from the design and operating requirements to any sites over State-exempted aquifers that are contaminated and that are not protected under the Underground Injection Control Program.

11. Where seepage facilities may be appropriate.

12. Where small or short-term piles not currently exempted from Subpart F ought to be exempted.

13. The relative benefits and costs of designing piles and landfills to protect against the 25-year and 100-year storm event.

14. The circumstances and conditions where overflow of run-on and run-off control systems may cause an adverse environmental or human health impact.

15. Exempting small, low hazard, temporary waste piles from Subpart L requirements.

16. Alternative statistical procedures to be used in the conduct of unsaturated zone monitoring at land treatment units.

17. The reasonableness of the requirement that containers destined for landfill be either (1) at least 90 percent full or else (2) crushed, shredded, or similarly reduced in volume.

Specifically, EPA seeks data on the quantitative relationship between landfill void space and subsidence. EPA also seeks data from manufacturers and users of drum-crushing equipment.

18. Part B permit application requirements for surface impoundments, waste piles, land treatment facilities, and landfills, and on the special permitting procedures for land treatment units.

IX. Regulatory Analysis

A. Executive Order 12291: Regulatory Impact Analysis

Executive Order 12291 requires each Federal agency, "to the extent permitted by law," to prepare and consider a Regulatory Impact Analysis (RIA) in connection with every major rule. The order further requires that a final RIA be transmitted to the Office of Management and Budget (OMB) at least 30 days before the Agency publishes the major rule. EPA has determined that the land disposal regulation promulgated today is a major rule. However, EPA has concluded that the existing facility portion of this rule is exempt from the requirement that a final RIA be submitted to OMB 30 days prior to promulgation. Section 8 of the Executive Order, *Exemptions,* states that the "procedures prescribed by this Order shall not apply to: . . . (2) Any regulation for which consideration or reconsideration under the terms of this order would conflict with deadlines imposed by statute or by judicial order."

Completing an RIA and transmitting it to OMB 30 days before EPA publishes these regulations for existing facilities would conflict with judicial deadlines. A court order in *State of Illinois v. Gorsuch* (D.D.C., Civil Action No. 78–1689), signed on November 13, 1981, directed EPA to promulgate regulations for existing hazardous waste land disposal facilities on or before February 1, 1982. Although the order was temporarily stayed, the appeals court has now ordered that these regulations

be promulgated by July 15, 1982. If EPA were to delay promulgation until completing the RIA and transmitting it to OMB, it would violate the deadline ordered by the Court. Therefore, EPA is exempt from compliance.

EPA began work on an RIA for land disposal facilities before November 13, 1981, but preparing the analaysis requires collecting data that are currently unavailable in-house and then analyzing these data. The effort is now in its data gathering stages. When complete, the RIA will examine the need for the regulation, alternative approaches, and the costs, benefits, and distributional effects of the alternative approaches. EPA expects to complete a draft of this analysis in May of 1983, and will consider these results to determine whether any changes to the land disposal standards are warranted.

Within time and data constraints, EPA was able to address some of the analytical requirements of the Executive Order. The Agency prepared preliminary estimates for the range of costs these regulations may impose on regulated units of particular kinds and sizes, on facilities, and for the total costs of the regulations. EPA then allocated these costs to particular waste generating industries and compared them to other economic parameters to obtain measures of the relative significance of the costs resulting from this rule. The results are summarized in D through H of this section:

D. *Individual Unit Costs;* E. *Closure Analysis;* F. *Total Costs;* G. *Industry Analysis;* and H. *Sensitivity Analysis.* The docket for this rulemaking and the EPA regional libraries contain a more extensive report on this analysis.

Athough the Agency has not completed its formal benefits analysis for land disposal regulations, it expects these regulations to provide important benefits. First, they will promote economic efficiency. By internalizing the costs of waste management, the regulations promote the allocation of resources to the area of their highest social value through the free market pricing system. Second, they will promote equity. Currently, people living near hazardous waste facilities bear some of the cost of disposal in the form of risk of ground-water contamination and the damages that can result to property values and to health. These regulations will provide a uniform, nation-wide protective floor that requires the owners of hazardous waste facilities to take steps that will reduce the likelihood that populations will be exposed to harmful ground-water contamination. They will thus shift some of the cost of land disposal from those who live near the sites to users of the products that generate the waste.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires each Federal agency to prepare a final Regulatory Flexibility Analysis (RFA) when it promulgates a final rule. (5 U.S.C. 604). The purpose of the RFA is to describe the effects the regulations will have on small entities and examine alternatives that may reduce these effects. An agency head may delay completing the analysis for up to 180 days after publishing the rule in the **Federal Register,** if he publishes a finding that the final rule is being promulgated in response to an emergency that makes timely compliance impracticable. (5 U.S.C. 608).

EPA intends to study the impact of today's regulations on small entities. However, as in the case of the RIA, developing an RFA is a difficult and time-consuming task. EPA finds that the court-ordered deadline constitutes an emergency and that completing the RFA by the Court-ordered deadline has not been practicable. EPA will publish the RFA within 180 days of today's publication, in compliance with the Regulatory Flexibility Act.

C. Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1980 (44 U.S.C. 3507), EPA will submit the reporting and recordkeeping provisions that are included in this final rule to OMB for approval. They will not become effective until EPA obtains OMB approval. A notice of the effective date of the reporting and recordkeeping provisions of this interim final rule will be published in the **Federal Register** when OMB approval is obtained.

D. Individual Unit Costs

EPA estimated unit costs using engineering models. A number of engineering models were developed because the unit costs and costs per unit of waste vary significantly with the size and type of unit. The resulting unit costs provide the basis for the total cost of the design and operating standards. Although we show costs for corrective action following, EPA based calculations of the total cost of corrective action on a facility basis rather than on a unit basis.

1. *General Approach.* The cost estimation procedure for model units has three components: estimating costs for design and operating changes, estimating costs for a range of corrective action scenarios, and transforming costs into "annual revenue requirements." All cost estimates are in 1981 dollars.

First, to estimate costs for design and operating measures, the steps owners and operators of hazardous waste disposal units might take to comply with the regulations were identified. Since some of the these measures were already required under the Interim Status Standards (ISS regulations), the analysis separated these requirements in order to estimate the cost of the additional requirements resulting from this Part 264 rulemaking.[3] The analysis also separated pre-ISS costs for landfills and surface impoundments. The ISS baseline costs used in this analysis do not reflect state requirements.

Where the under-liner requirements of the design and operating standards were applicable, the Agency examined three possibilities: (1) Owners and operators would install only the single synthetic liners needed under the regulations, (2) they would install the double liner (synthetic/clay) system suggested by the guidance, or (3) they would install double synthetic liners to enable them to avoid monitoring the ground water.

Second, EPA estimated the costs of corrective action activities using three different timing assumptions for the length of corrective action and two counterpumping strategies reflecting hydrogeologic conditions. Timing will depend on how well units and facilities perform, and on how quickly ground-water quality can be restored. The counterpumping strategy used will reflect the judgments of owners or operators, Regional Administrators and State Directors; technical conditions will affect but not control those decisions.

To keep the total number of cost cases presented manageable a single set of unit cost estimates and a "median" set of hydrogeologic assumptions were used. The hydrogeologic assumptions were used as averages although they do not necessarily reflect average nationwide conditions. EPA believes that the values used are the best available for estimating total costs, given time and resource constraints. However, actual facility costs in particular cases may be higher or lower than the estimates presented in this section. To present a more complete picture of potential costs, the sensitivity analyses examine the effects of varying key technical assumptions. In addition, the docket report contains a more detailed description of the assumptions

[3] ISS requirements currently in place were used. No adjustments were made to reflect conforming changes to ISS regulations published with today's rule.

used in preparing these estimates, and includes analysis of the sensitivity of results to alternative unit cost assumptions.

Third, the stream of costs over time was converted into "annual revenue requirements" using discounted cash flow analysis. Annual revenue requirements are the added revenues a facility would have to obtain (through increased prices for its products or for its waste management services) in each year of facility operation, in order to cover the costs of these regulations. This approach provides a consistent basis for presenting and comparing relevant costs. However, it implicitly assumes that future costs can be predicted, and recovered at an even rate over a facility's operating life.[4] Since each facility will face great uncertainty about corrective action costs, and different competitive conditions, revenue requirements estimated using this perfect amortization assumption are not necessarily good predictors of actual pricing behavior under Part 264 regulations.

Because annualizing smooths uneven cash flows, this analysis also reports first year costs to provide an indication of the maximum cash flow burden that facilities could face for design and operating requirements, and for corrective action if necessary.

Costs for regulatory requirements related to bulk and containerized liquids, and the permitting process are not included in the estimates reported here. These costs may be significant, but additional data are needed before reliable estimates can be made. Costs for floodplain standards are addressed in the sensitivity analysis.

2. *Design and Operating Standards.* To comply with the design and operating standards, new storage and disposal facilities and lateral expansions of existing units must install liners, and in the case of piles and landfills, leachate collection systems. While the regulations do not absolutely require a synthetic liner for landfills, waste piles, and surface impoundments, in nearly all cases, at least a single synthetic liner is the practical result of the regulatory requirement. Those installing double liner systems with a leak detection system between them are exempt from ground water monitoring and the other requirements of Subpart F. Additionally, waste piles may be placed on a sturdy impermeable base and regularly inspected in lieu of the requirements of Subpart F.

Owners and operators will choose to install the liner system that is most advantageous for them. This will not necessarily lead them to install the lowest cost liner that EPA will allow, since greater investment in the liner system should lower the probability that corrective action will need to be taken. The probability that corrective action will be needed depends on the containment system used, and on hydrogeologic conditions, but EPA is currently unable to quantify these relationships. The Agency believes that some owners and operators will choose each of the different liner systems, reflecting their local hydrogeologic conditions and their differing estimates of the relationship between liner investments and the probability of having to perform corrective action. To indicate the range of potential liner costs, the cost for each of the liner systems is shown.

3. *Corrective Action Costs and Timing.* The costs associated with corrective action for a unit or facility depend on when contamination is discovered, the specific contaminants, the magnitude of the plume, and numerous site-specific hydrogeologic factors. The Agency can estimate corrective action costs for simple sets of conditions, but does not know what conditions are actually like for the average of all facilities. For this analysis it was assumed that ground water begins 10 feet down, that plumes reach a depth of 75 feet, and that the aquifer can be characterized by "median" hydrogeologic conditions.[5]

The Part 264 regulations require removal of contamination from ground water, at the "waste boundary" for new plumes, and to the property boundary for existing plumes. For this analysis, EPA chose to make the conservative assumption that corrective action would need to deal with well-established plumes. Cost estimates are based on counterpumping, and include costs for treating pumped water, preparing corrective action plans, and monitoring ground water as required in the regulations.

Costs for corrective action are sensitive to assumptions about when corrective action begins and how long it must continue in order to remove all statistically significant contamination. To bound the range of actual costs an owner or operator could encounter, EPA developed costs for three scenarios: action beginning in year zero and continuing 150 years,[6] action beginning in zero and continuing for 20 years, and action beginning in year 49 and continuing for 20 years. (The 20 year figure was chosen to match the assumption that operating lives are 20 years.)

The analysis also used two different counterpumping strategies because corrective action costs are also fairly sensitive to the pumping strategy required. Where hydraulic gradients are unidirectional, (i.e., in "simple" cases) recovery wells can be located at the downgradient toe of the plume. This is Strategy 1, and involves minimum costs for a counterpumping program. The simple conditions needed for this approach probably are not very common. Where hydraulic gradients are not unidirectional,[7] another strategy is needed to assure that all contamination is contained. Wells are located inside the plume and pumping is maintained at a rate sufficient to reverse all gradients in the vicinity of the plume. This is Strategy 2, and it involves higher costs.

The range of cost estimates that results from these alternative assumptions reflects EPA's uncertainty about conditions at actual facilities.[8] To

[4] In computing annual revenue requirements a 3% real discount rate and a twenty-year facility operating life were used in all cases.

[5] Plume depths of 75 feet will be typical only for well-established plumes; new plumes will be shallower and less expensive to control. The median hydrogeologic conditions used were hydraulic gradient (change in ground water "elevation") of 5 feet per mile, and transmissivity (flow rate across a one square mile cross-section, per foot of hydraulic gradient) of 100,000 gallons per foot per day. These assumptions result in an aquifer discharge (total ground water flow volume) of 0.5 million gallons per square mile of aquifer cross-section per day.

[6] The discounted present value of costs incurred over a long but finite furture period is essentially identical to the discounted costs incurred in pumping "forever," if costs are incurred as expenditures are made. A corrective action period of 150 years captures about 99% of the cost of continuing the action forever.

[7] This can occur due to complex hydrogeology, the pressure of emplaced wastes on the aquifer, or pumping at off-site wells surrounding the plume.

[8] The unit cost data, hydrogeologic assumptions and algorithms used here to estimate containment costs have been subjected to some peer review and testing, and EPA believes the cost estimates that result from use of this model are the best estimates available at this time. However, the algorithms and data must still be considered to be incompletely verified and validated.

Several key assumptions should be noted. (1) A simplified treatment cost model was used that may significantly underestimate costs for higher concentrations and more complex mixtures of contaminants, and may somewhat overestimate costs for smaller plumes and for treatment of volatiles. (2) Cost estimates are probably less reliable for facilities with small waste piles and the smallest surface impoundments than for other facilities because corrective action costs for plumes of less than one-half acre in area were not modelled. (3) The cost estimating model is directly applicable only within the limits established by the assumptions made to facilitate cost estimation. The use of two counterpumping strategies compensates for this simplification to some extent. (4) In addition, the alogrithms do not account for replacement or retirement of wells or treatment facilities. Wells can become unuseable within months, or last for years, depending on corrosivity and other characteristics of the plume. Treatment may be required as long as pumping continues, or may be unnecessary during the latter stages of corrective action. For economic analysis purposes EPA assumed that wells will last for 30 years and that treatment facilities will be used for as long as remedial action continues.

display the alternative cases, the relevant tables have columns displaying each timing scenario discussed above. For each timing case, the range of costs shown reflects cost differences between Strategy 1 and Strategy 2.

To estimate the cost of counterpumping it was necessary to estimate the size of the plumes to be contained. Plume width is the most sensitive parameter within the modelling framework used for corrective action cost estimates, and their is reason to expect that unit width serves as a conservative estimate of plume width. If a unit fails becuase of age, then a general failure across the unit is likely so that the width of the unit might approximate the width of the plume; if a unit fails due to a localized problem or single rupture, then the plume width should be smaller than the unit width. Thus, using unit width as a proxy for plume width should result in a conservative measure of the cost of counterpumping.[9]

Corrective action costs will occur only to the extent that ground water is contaminated and to the extent that protection of the environment requires taking corrective action.

4. *Cost for Landfills.* Table 1 shows the annual revenue requirements needed to compensate for the cost of Part 264 requirements for on-site landfills of different sizes without corrective action. It covers the annual revenue requirements associated with the cost of required liners, final cover and leachate collection systems. It assumes that waivers are not obtained, and that no landfills currently use any of the features required under Part 264. This tends to overstate costs since there are landfills that are at favorable locations that would qualify for some site specific waivers or include these features.

TABLE 1.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 REGULATIONS WITHOUT CORRECTIVE ACTION: [1] LANDFILLS BY UNIT SIZE

Size (MT [2]/yr)	Single synthetic liner		Double liner (synthetic/clay)		Double synthetic liner	
	Per Year ($000)	Per MT [2]	Per Year ($000)	Per MT [2]	Per Year ($000)	Per MT [2]
500	$31	$62	$52	$104	$43	$86
2,000	49	25	94	47	82	41
5,000	79	16	164	33	145	29
7,000	98	14	207	30	184	26
15,000	149	10	323	22	290	19
35,000	277	8	622	18	561	18
60,000	379	6	862	14	779	13

[1] Costs shown are those estimated for on-site landfills in these size categories. They are slightly different from costs estimated for off-site landfills. If costs were based on off-site landfills, double liner (synthetic/clay) costs would be lower than double synthetic liner costs.
[2] MT indicates metric ton.

TABLE 1.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 REGULATIONS WITHOUT CORRECTIVE ACTION: [1] LANDFILLS BY UNIT SIZE—Continued

Size (MT [2]/yr)	Single synthetic liner		Double liner (synthetic/clay)		Double synthetic liner	
	Per Year ($000)	Per MT [2]	Per Year ($000)	Per MT [2]	Per Year ($000)	Per MT [2]
123,000	566	5	1,306	11	1,180	10

Table 2 shows the additional annual revenue requirements associated with corrective action if it is needed.

TABLE 2.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 CORRECTIVE ACTION REGULATIONS: LANDFILLS BY UNIT SIZE

Size (metric tons per year)	Detect year 0 pump 150 years		Detect year 0 pump 20 years		Detect year 49 pump 20 years	
	Per year ($000)	Per metric ton	Per year ($000)	Per metric ton	Per year ($000)	Per metric ton
500	138–198	276–396	65–95	130–190	17–24	34–46
2,000	149–225	75–113	71–109	36–55	18–27	9–14
5,000	172–267	34–53	82–128	16–26	21–31	4–6
7,000	178–275	25–39	85–132	12–19	21–32	3–5
15,000	194–309	13–21	93–148	6–10	24–36	2–2
35,000	216–361	6–10	104–174	3–5	26–42	1–1
60,000	232–391	4–6	113–190	2–3	28–46	[1]–1
123,000	252–422	2–3	123–206	1–2	30–50	[1]–[1]

[1] Less than 50 cents.
[2] MT indicates metrc tons.

Thus, if a 15,000 MT/year landfill with a double synthetic liner did not contaminate ground water to the extent that corrective action was necessary, the incremental annual revenue requirement would be $290,000 or $19 per metric ton. If contamination were detected immediately resulting in immediate counterpumping for 20 to 150 years, an additional revenue requirement of between $93,000 to $194,000, or $6 to $13 per ton would be added to the basic Part 264 costs (using Strategy 1 counterpumping).

To help put these costs in perspective, costs estimated in the absence of regulations (pre-ISS) range from $11 to $240 per metric ton for the large and small on-site landfills, respectively. ISS incremental cost estimates for these two sizes range from $6 to $128 per metric ton. Prices at commercial landfills in 1981 ranged from $55 per metric ton to $240 per metric ton, depending on the type of waste and whether it was in drums or bulk. This does not include transportation, which averaged about $0.15 per ton mile.

Table 3 shows the costs that existing landfills could incur in the first year as a result of the Part 264 requirements. Potential first year costs for design and operating requirements (D&O) using a double liner (synthetic/clay) and for immediate corrective action are reported separately for Strategy 1 and Strategy 2.[10] In the example discussed above, the first year cost is $305,000 if no corrective action is needed, and an additional $315,000 to $465,000 if counterpumping is undertaken immediately.

TABLE 3.—FIRST YEAR COSTS PER UNIT DUE TO PART 264 REGULATIONS: LANDFILLS BY UNIT SIZE

Size (metric tons per year)	Basic cost: no corrective action/double liner [1]	Corrective action cost: immediate counterpumping ($000)
500	$50	$185–$295.
2,000	91	205–365.
5,000	158	255–405.
7,000	196	265–415.
15,000	305	315–465.
35,000	584	375–585.
60,000	610	425–685.
123,000	1,226	475–795.

[1] (Synthetic/clay.)

5. *Costs for Surface Impoundments.* EPA estimated costs for existing surface impoundments using basically the same methods that were used to estimate the cost for landfills, but varied some features to reflect differences in the regulations and the units affected, and estimated two additional cost cases. It was assumed that surface impoundments close as landfills in all cases. (Costs for units where all waste, liners and contaminated subsoils are removed at closure, and for clay-lined storage impoundments, are not reported.)

[9] When estimating corrective action costs for facilities, EPA assumed that facility width, rather than unit width, approximates the plume width.

[10] First year Part 264 D&O costs are approximately the same as annual revenue requirements because the major incremental cost element in the cost model is the cell liner, which is installed for one cell in each year of the landfill's operating life.

The no-corrective-action case was estimated in much the same way as the no-corrective-action case for landfills. However, surface impoundments generate dredged material that must be landfilled; [11] the incremental cost of disposing of this material in a Part 264 landfill rather than in an ISS landfill is counted as a surface impoundment cost in this section.[12] In addition, operators of existing surface impoundments may choose to (1) continue operations without installing liners; (2) close the existing unit and construct a new impoundment lined with one of the three liners described earlier; or (3) retrofit the existing impoundment with any of these three liners. Costs are estimated for all of these cases. The retrofit case includes the costs of disposing of contaminated material from the existing impoundments, and the replacement case including closure and post closure care costs for existing units. Neither case includes land costs nor the economic costs of disrupted plant operations, which are likely to vary a great deal across sites.

Tables 4, 5, and 6 summarize these results. Costs are reported on the basis of the size of the impoundment rather than per unit of waste because the amount of liquid processed through an impoundment of a given size can be highly variable. The cost for an impoundment will depend on the compliance elements that the unit selects or is required to undertake—no scenario would include more than one kind of corrective action or more than one kind of alteration.

[11] For this analysis it was assumed that dredged material is disposed of in a 123,000 MT/yr. landfill. Landfill disposal costs vary depending on the type of liner system. It was assumed that the landfill would not need corrective action. If corrective action were necessary, costs would be slightly higher.

[12] Because these higher landfilling costs are also included in the landfill cost estimates, landfill and surface impoundment costs cannot simply be added to get total costs.

TABLE 4.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 REGULATIONS WITHOUT CORRECTIVE ACTION: SURFACE IMPOUNDMENTS BY UNIT SIZE

Size (acres)	Base cost ($000)	Retrofit cases			Replacement cases		
		Single synthetic liner ($000)	Double liner ($000)	Double synthetic liner ($000)	Single synthetic liner ($000)	Double liner ($000)	Double synthetic liner ($000)
0.25	$4-6	$9	$13	$9	$19	$23	$18
0.5	6-9	15	22	18	26	31	27
1.0	10-16	25	37	34	35	45	42
2.0	16-25	48	71	71	59	78	76
5.0	48-81	92	148	157	106	153	156
11.0	95-157	228	348	374	252	354	367

TABLE 5.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 CORRECTIVE ACTION REGULATIONS: SURFACE IMPOUNDMENTS BY UNIT SIZE.

Size (acres)	Detect year 0 pump 150 years ($000)	Detect year 0 pump 20 years ($000)	Detect year 49 pump 20 years ($000)
0.25 & 0.5 [1]	$122-$163	$58-$77	$15-$19.
1.0	128-180	61-86	16-22.
2.0	138-198	65-95	17-24.
5.0	149-225	71-109	18-27.
11.0	169-261	81-125	20-31.

[1] Costs for plumes associated with surface impoundments smaller than 0.5 acre were not estimated. Cost reported is for a 0.5 acre impoundment.

TABLE 6.—FIRST YEAR COSTS PER UNIT DUE TO PART 264 REGULATIONS: SURFACE IMPOUNDMENTS BY UNIT SIZE

Size (acres)	Basic cost: no corrective action	Corrective action cost: [1] counter-pumping	Facility alteration [2]	
			Retrofit liner	Replace facility
.25	([3])	$159-$209	$123	$142
.5	$1	159-209	226	220
1.0	2	169-254	442	390
2.0	3	189-299	862	718
5.0	8	209-369	2,141	1,765
11.0	18	254-399	4,622	3,868

[1] Assumes corrective action is taken in Year Zero.
[2] Assumes double synthetic liner
[3] Less than $500.

Thus, if a 2-acre surface impoundment did not contaminate ground water to the extent that corrective action was necessary, the incremental revenue requirement would by $16,000 to $25,000 per year, depending on the type of liners used by off-site landfills where the dredged material is disposed of. If the owner chooses to retrofit, the incremental annual cost will be $48,000 to $71,000; if he replaces the impoundment, the incremental annual cost will be $59,000 to $78,000, depending on the type of liner system installed.

If corrective action is necessary and counterpumping is undertaken immediately, an additional annual revenue requirement of $65,000 to $138,000 would be added to the basic Part 264 cost (under Strategy 1 counterpumping).

The first year cost for the basic requirement is $3,000; if counterpumping is undertaken, the first year cost is $189,000 to $299,000; and if the unit elects to retrofit the first year cost is $862,000.

Current prices that could provide perspective for these costs are not readily observed, because most surface impoundments are on-site. However, it was possible to estimate the total revenue requirements for new impoundments constructed and operated to comply with ISS requirements, using assumptions consistent with those used for Part 264 cost estimates. These annualized revenue requirements ranged from $42,000 for the smallest facility, to $424,000 for the largest, including revenue requirements of $6,000 to $174,000 in the absence of any regulation.

6. *Costs for Land Treatment Units.* The Agency estimated costs for land treatment units on a model plant basis, as for landfills and surface impoundments, and calculated corrective action costs in an identical fashion (i.e. for action by all facilities in Year Zero or Year 49), though for units of different sizes. It was necessary to make assumptions about the numbers of units that would be required to undertake certain operating modifications under Part 264 rules. EPA assumed that ten percent of land treatment units would require a pH adjustment, 90 percent would require irrigation and a crop cover to control wind dispersal, 25 percent would need to increase their soil monitoring and number of lysimeters. EPA assumed that all units would conduct one waste field test, and that all would close with hazardous constituents in the treatment zone. It was also assumed that ten percent of all units would encounter problems during operation (i.e., they would fail ongoing tests of soil core and soil pore liquids), resulting in operating modifications: three percent of all units (30 percent of those with problems) would adjust their pH, five percent would expand the treatment area, and two percent would reduce their waste

loadings. Tables 7, 8, and 9 summarize the results.

TABLE 7.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 REGULATIONS WITHOUT CORRECTIVE ACTION: LAND TREATMENT BY UNIT SIZE

Size (acres)	Basic cost (no corrective action)	
	Per year ($000)	Per metric ton[1]
1.7	$17	$48
6.5	19	14
20.1	45	11
74.3	122	8
247.1	361	7

[1] Based on an average application rate of 206 MT per acre per year. In practice the amount of waste processed per acre is highly variable.

TABLE 8.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 CORRECTIVE ACTION REGULATIONS: LAND TREATMENT BY UNIT SIZE

Size (acres)	Detect year 0 pump 150 years	Detect year 0 pump 20 years	Detect year 49 pump 20 years
1.7	$134-187	$63-89	$16-22.
6.5	154-236	73-114	19-28.
20.1	178-276	85-133	21-33.
74.3	225-371	109-180	27-44
247.1	285-472	140-234	34-56

TABLE 9.—FIRST YEAR COSTS PER UNIT DUE TO PART 264 REGULATIONS: LAND TREATMENT BY UNIT SIZE

Size (acres)	Basic cost	Corrective action cost
	No corrective action ($000)	Immediate counterpumping ($000)
1.7	$76	$175-265
6.5	81	205-365
20.1	103	265-425
74.3	134	395-625
247.1	226	565-1,025.

Thus, if the operator of an average size (20.1 acre) land treatment unit applies waste at an average rate (206 MT per acre per year) and does not contaminate ground water to the extent that corrective action is necessary, the incremental annual revenue requirement would be $45,000 or $11 per MT. If contamination is detected immediately resulting in immediate counterpumping, $85,000 to $178,000 per year or $21 to $45 per MT would be added to this basic Part 264 cost (under Strategy 1 counterpumping).

As shown in Table 9, the first year cost if no corrective action is needed for this size unit is $103,000. If corrective action is needed immediately, the first year cost increases by $265,000 to $425,000.

To put these costs in perspective, prices for commercial land treatment in 1981 ranged from $5 to $24 per metric ton.

7. Costs for Waste Piles. Waste pile unit cost estimates assume that all existing waste piles would be managed as storage rather than disposal units. Accumulated wastes must periodically be removed and disposed of in a landfill; therefore, the incremental costs of using a Part 264 rather than an ISS landfill are included here as a waste pile cost. (These costs are also reflected in the landfill cost estimates, so unit costs are not additive.) The analysis assumes that all piles are exposed and are at or above grade. Costs for enclosed piles (including the cost of enclosure) could be significantly lower, and costs for below grade piles are likely to be higher (in practice, many large below grade piles would probably close as landfills).

The analysis looked at three alternative compliance paths to reflect the options available to waste pile owners or operators under the regulations: (1) Retain the ISS sturdy impermeable base and undertake ground-water monitoring; (2) inspect the ISS base periodically (assumed to mean annually) without ground-water monitoring; or (3) install a new base with a double liner system and leachate collection system and dispense with inspections and ground-water monitoring (until leakage is detected). For waste piles, it was again assumed that corrective action consists of counter-pumping in Year Zero or Year 49.

Tables 10, 11, and 12 summarize the results. The annual revenue requirements shown in Table 10 include the cost of disposing of the waste pile and base at the time of closure in a Part 264, 123,000 MT/yr off-site landfill with a double (synthetic/clay) liner that does not require corrective action.

TABLE 10.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 REGULATIONS WITHOUT CORRECTIVE ACTION: WASTE PILES BY UNIT SIZE [1]

Size ($000 ft³)	Compliance option		
	Ground-water monitoring ($000)	Base inspection ($000)	Liner and leachate collection system ($000)
2	$15	$7	$7
10	17	9	9
25	21	13	13
100	27	20	19
500	27	23	17
1,000	26	27	15

[1] Costs for waste piles sized at 2,000 to 25,000 cubic feet assume a 1 year operating life. Costs for a 100,000 cubic foot pile assume a 2 year operating life, costs for a 500,000 cubic foot pile assume a 10 year operating life, and costs for a 1,000,000 cubic foot pile assume a 20 year operating life. Because operating lives differ, costs as a function of size do not increase monotonically.

TABLE 11.—ANNUAL REVENUE PER UNIT REQUIRED TO OFFSET INCREMENTAL COSTS DUE TO PART 264 CORRECTIVE ACTION REGULATIONS: WASTE PILES BY UNIT SIZE [1]

Size ($000 ft³)	Detect year 0 pump 150 years ($000)	Detect year 0 pump 20 years ($000)	Detect year 49 pump 20 years ($000)
2-500	$150-$196	$71-$93	$18-$23.
1,000	153-207	72-98	18-24.

[1] Costs for plumes associated with waste piles smaller than 500,000 cubic feet were not estimated. Cost reported is for a 500,000 cubic foot pile.

TABLE 12.—FIRST YEAR COSTS PER UNIT DUE TO PART 264 REGULATIONS: WASTE PILES BY UNIT SIZE

Size ($000 ft³)	Ground-water monitoring ($000)	Inspect base ($000)	Liner and leachate collection system ($000)	Immediate counterpumping ($000)
2	$44	$4	$12	(1)
10	44	4	12	(1)
25	44	4	12	(1)
100	44	4	12	(1)
500	44	4	14	165-$237.
1,000	44	4	17	170-265.

[1] Not estimated. Costs for 500,000 cubic foot pile provide an upper bound.

Thus, if the operator of a 100,000 cubic foot waste pile decides to inspect the unit's ISS base rather than monitor ground water or change to a liner and leachate collection and removal system, and does not contaminate ground water, the additional annual revenue requirement is $20,000. If contamination is detected in year zero and counterpumping is necessary, additional annual revenue requirements of $71,000 to $150,000 would be added to the basic Part 264 cost (under Strategy 1 counterpumping).

First year costs for the three Part 264 options are shown in Table 12. Without corrective action, these costs for the unit discussed above are $4,000 to $44,000, depending on the D&O option chosen. Corrective action taken in Year Zero could add up to $165,000 to $237,000 to these costs.

E. Closure Analysis

This section examines the economics of closing small on-site landfills and shipping wastes to commercial sites and replacing existing on-site surface impoundments. Small on-site landfills may become uneconomic compared to larger commercial facilities as a result of these regulations. Small surface impoundments may close to avoid liability for corrective action (related to past leakage) that could otherwise be imposed through the permit process.

If small landfills choose to close or if small surface impoundments are replaced, a substantial portion of all hazardous waste units will have been significantly affected by these regulations. EPA estimates that there are about 255 small (500 MT/yr. or less) landfills; this represents 44 percent of all landfills. There are about 2,760 small (one acre or less) surface impoundments, or 65 percent of all surface impoundments.

Results of the analysis on small landfill closures indicate that operators of small on-site landfills would in many cases be better off closing and shipping their wastes to off-site commercial facilities for disposal. For small surface impoundments, the economics favor replacing existing units under most circumstances if closure of the existing impoundment eliminates an obligation to undertake corrective action. Each of these issues is summarized below.

Table 13 indicates that under the Part 264 regulations, owner/operators of small on-site landfills could expect their annual revenue requirements to increase by about $62/ton assuming a single synthetic liner design and no corrective action. This is used as the base case. (With a double liner [synthetic/clay], this figure would be $104/ton, or $86/ton with a double-synthetic liner). If corrective action is considered likely, the increases in expected revenue requirements could range from $96 to $458 per ton. These expected cost increases understate the savings that could actually be achieved by closing, since major cost components of ISS like closure, post closure, and financial responsibility, as well as expenses for basic trench or cell construction, could be avoided or recovered if the landfill closed.

These incremental costs (which are conservative estimates of incremental savings from closure) compare with actual 1981 prices for commercial disposal that range from $55/ton to $240/ton. This sensitivity analysis assumes that prices for commercial services will not change as a result of the Part 264 regulations. This assumption is reasonable if commercial facilities already meet most design and operating standards and do not face corrective action requirements, and if commercial capacity is adequate to meet demand at current prices.

TABLE 13.—EFFECTS OF THE INCREMENTAL COSTS OF PART 264 REGULATIONS ON THE ECONOMIC VIABILITY OF SMALL ON-SITE LANDFILLS[1]

	Base case	Base case plus corrective action	
		Low	High
Incremental cost for 500 metric ton/year on-site landfill	$62/ton.	$96/ton	458/ton
Equivalent distance[2] to ship waste for disposal in commercial off-site landfill	0–47 miles.	0–273 miles.	1,453–2,687 miles

[1]Base case cost assumes single synthetic liner and no corrective action and that increased demand for off-site services does not significantly raise prices. Low cost assumes that the small landfill undertakes counterpumping under strategy 1 conditions for 20 years starting in year 49. High cost assumes that the small landfill undertakes counterpumping under strategy 2 conditions for 150 years starting in Year Zero.

[2]Distance calculated using a range of commercial disposal prices of $55 to $240/ton and a transportation cost of $0.15/ton mile.

Under the base case assumptions used in Table 13, it would be advantageous for a firm operating a small on-site landfill to close the landfill and ship its wastes to a commercial facility for disposal if the firm is quoted disposal prices that are at the low end of the actual range. Where the firm faces a price of $55/ton for commercial disposal, it could afford to ship wastes up to 47 miles, assuming a transportation cost of $0.15/ton mile. If the firm is quoted prices closer to $240/ton, it would be more cost-effective for the firm to continue running its landfill.

Where the firm expects that corrective action could be necessary at its landfill, it could close the landfill and ship wastes from 273 to 2687 miles for disposal in a commercial landfill charging $55/ton, instead of bearing the costs and responsibility for corrective action. Where the commercial disposal price is closer to $240/ton, it may be more cost-effective for the firm to continue disposing its wastes on site, but this would depend on the hydrogeologic conditions existing at the site and the expected duration of corrective action.

These economic factors may be offset by concerns over liability potentially associated with sending wastes off site, or by concerns over potential price increases at commercial facilities.

Similar comparisons can be made between the costs of replacing small surface impoundments to limit the possibility that corrective action will be needed, or doing nothing and hoping that corrective action will not be necessary. Actual decisions to close and replace a surface impoundment will be based on individual owner or operators expectations regarding the probability that their impoundments have been leaking or will leak in the future.

Table 14 compares the incremental costs of taking corrective action under various conditions with the costs of replacing 1/4 acre, 1/2 acre and 1 acre surface impoundments.

TABLE 14.—COMPARISON OF CORRECTIVE ACTION COSTS WITH CLOSE/CONSTRUCT COSTS FOR SMALL SURFACE IMPOUNDMENTS; INCREMENTAL ANNUAL REVENUE REQUIREMENTS

Impoundment size	Corrective action[1]			Close and construct[2] ($000)
	In year zero for 150 years ($000)	In year zero for 20 years ($000)	In year 49 for 20 years ($000)	
¼ acre	$128–$167	$62–$81	$19–$23	$19.
½ acre	$128–$169	$64–$83	$22–$28	26.
1 acre	$138–$190	$71–$96	$26–$32	35.

[1]Low end of range of corrective action costs based on Strategy 1 conditions; high end of range based on Strategy 2 conditions.

[2]Assumes double liner design, most expensive of possible systems.

Based on Table 14, it may often be more advantageous to close existing units and construct new ones where it appears likely that this would eliminate the need for corrective action. This may be the case where an impoundment is believed to have been leaking but has not yet resulted in significant contamination at the waste boundary. (In this case, the owner/operator would need to be able to distinguish contamination from the closed and the new unit, perhaps through use of tracers added to new waste or based on the arrangement of monitoring wells.) Of the three corrective action timing cases examined, electing to continue to operate the existing impoundment when corrective action will be necessary is only advantageous under the "best" assumptions, i.e., when action is not needed until Year 49 (the year before owner/operator responsibility ends) and continues for 20 years.

F. Total Costs

EPA estimates that the total annualized cost of these regulations (for existing facilities [13]) could range from $150 to $1,145 million. Details on the components of these cost estimates are reported in table 15.

The broad range covered by these estimates results primarily from the uncertainty regarding the amount of corrective action that will be needed. ISS monitoring will eventually provide an indication of the severity of current environmental problems. Currently, however, EPA is unable to predict reliably the number of facilities able to comply with the ground-water protection standard specified in the regulations. EPA cannot predict when facilities will fail, or how long corrective action will have to continue at a typical site. Data on a host of other site specific factors that will affect the cost of the corrective action are also unavailable. Finally, EPA cannot predict the number of facilities affecting ground water that might be able to avoid corrective action by showing that actual concentrations of Appendix VIII constituents at the compliance point pose no threat to human health or the environment.

To estimate total D&O costs EPA estimated the size distribution of units from the Part A's.[14] For each model unit, EPA multiplied the revenue requirements reported in *Individual Unit Costs* by the number of units, and summed [15] to obtain an estimate of total D&O costs.

The lower bound estimate of D&O costs assumes that landfills use single synthetic liners, and that waste piles choose to replace the containment system to avoid the need for ground water monitoring. The upper bound D&O estimates assume that landfills have double synthetic liners, that waste piles monitor ground water, and that surface impoundments are closed and replaced by new units with double synthetic liners.

To estimate total corrective action costs, EPA grouped individual units into facilities, and assumed that plume sizes were related to the acreage of the total waste management areas at the facilities. Part A data provided information on the number of facilities with various combinations of units, and allowed EPA to estimate the average total acreage at sites with each combination.[16] EPA added 50 percent to the calculated acreage to allow for common areas, variations in plume shape, and constraints on siting of recovery wells.

EPA assumed that all facilities were permitted simultaneously and immediately. To the extent that some facilities close rather than apply for permits, others apply for but do not receive permits, or permits are issued over time, costs will differ from these estimates.

Under the regulations, corrective action is only required in those cases where Appendix VIII constituents increase in ground water, and where the owner or operator is unable to show that the actual concentration of those constituents pose no threat to human health or the environment. Total costs as high as the high cost case are very unlikely since it assumes that all landfills install double synthetic liner systems, all existing surface impoundments close and build new impoundments with double synthetic liner systems, and that in spite of these actions, all facilities require immediate corrective action lasting 150 years and using an expensive counterpumping strategy. As the need for corrective action increases, and as owners and operators install more expensive liner systems the total cost of the regulations will increase from the low cost case toward the high cost case.[17]

The lower and upper bound costs are shown in Table 15. The annualized D&O cost for the regulations ranges from $150 to $468 million per year. Depending on the frequency, speed and concentration with which Appendix VIII constituents reach ground water, total incremental annualized costs could be as high as $1,145 million.

TABLE 15.—TOTAL ANNUAL REVENUE REQUIREMENTS FOR PART 264 REGULATIONS: ALL LAND DISPOSAL FACILITIES

[Dollars in millions]

	Baseline (pre-ISS + ISS)[1]	Incremental part 264	
		Low estimate	High estimate
Landfills D&O	$301	$81	$159
Surface impoundments D&O	534	102	401
(Adjustment for landfilled material)	(190)	(57)	(118)
Waste piles D&O	16	7	12
(Adjustment for landfilled material)	(10)	(3)	(6)
Land treatment D&O	51	20	20
Corrective action	—	—	677
Total	702	150	1,145

[1] The total baseline costs of $702 million includes pre-ISS costs of about $181 million for landfills and $180 million for surface impoundments. Similar data are not available for waste piles and land treatment units. Pre-ISS costs include land, excavation, and infrastructure costs incurred in establishing a land disposal facility. ISS costs include more than "good housekeeping" requirements. Approximately 72 percent of the ISS costs of $341 million included in the baseline are due to ISS closure ($82 million), post closure ($40 million), ground water monitoring ($42 million), and financial assurance ($82 million) requirements.

G. Industry Analysis

The economic impacts of these regulations will depend in part on how

[13] We were unable to estimate total costs for new facilities due to the difficulty of projecting the number of facilities that would be affected. Determining incremental costs for a single new facility is difficult in any event, because EPA has not previously estimated the costs of the Part 267 regulations that now apply to these facilities.

[14] Complete details are in the docket report. Based on Part A of TSDF permit applications, EPA estimates that there are 573 existing hazardous waste landfills, capable of accepting about 12 million tons of waste per year; 4240 surface impoundments with 11,169 acres of surface area; 241 land treatment facilities with 12,100 acres of operating area; and 608 waste piles with 87 million cubic feet of wastes. Thus, D&O costs are based on 5,662 units. Surveys to verify these estimates are now underway, and it is likely that the final estimates will be lower.

We were unable to simply add the capacities reported on the Part A's, because capacities for some types of units are reported in different units of measure there than the units of measure used in this analysis (i.e., landfills in acre-feet rather than metric tons, and surface impoundments in gallons or liters rather than acres of surface area. In addition, we assumed that the remaining operating like of all units was 20 years. Annual capacity figures for each kind of facility should therefore be viewed as estimated based on available data, rather than as aggregates of reported capacities.

[15] In adding costs for units to obtain totals an adjustment was made to avoid double counting the costs of landfilling surface impoundment sludge and wastes removed from piles.

[16] Once again, it was necessary to make assumptions in order to transform the units reported on the Part A's into acres of surface area. However, the corrective action cost estimates are based on 2484 facilities, the number of disposal facilities which submitted Part A of the permit application.

[17] Actually, the high cost case does not reflect the highest possible costs and the low cost case does not represent the lowest possible cost that could occur under the regulations, because waivers are potentially available for some requirements and because we use median technical assumptions in determining cost. It is, however, extremely unlikely that the true cost of these regulations will fall outside these boundaries.

the costs of the regulations are distributed across industries and firms. As described in *Total Costs,* EPA calculated upper and lower bound cost estimates. These two cost scenarios were then applied to selected industries, in order to obtain a preliminary indication of whether economic impacts might be significant. The industries examined were selected because there were large numbers of on-site land disposal facilities in the industries, or large quantities of waste shipped off-site, or both.

Upper and lower bound costs were allocated to industries using available information on the use of land disposal of hazardous waste in these industrial sectors. This information is sufficient to allow EPA to identify the industries on which these regulations are most likely to impose significant costs. However, cost estimates for any given industry are highly sensitive to the numbers and sizes of facilities attributed to that industry, and the data base used to derive these factors for individual industries is imprecise.

Table 16 lists the industries EPA examined, and their SIC codes. The range of potential annual revenue requirements is reported and compared to total costs of production, value added, and value of shipments in Table 17. The range of potential first year expenditures is compared to an estimate of annual capital expenditures for each industry in Table 18. Table 19, at the end of this section, provides estimates of the range of potential annual revenue requirements (in excess of pre-ISS costs) for the combination of ISS (Part 265) and Part 264 regulations. In all cases cost ranges reflect the upper and lower bound cases used earlier in this analysis.

These comparisons do not constitute an economic impact analysis at either the industry or firm level. At the industry level, they do provide an initial screening to judge whether economic impacts might be large or small. If the upper bound costs do not appear significant compared to economic parameters for an industry, then the analysis indicates that broad and significant economic impacts are unlikely. These comparisons are also useful in identifying those industries where the most significant impacts are likely to occur. However, the high cost case cannot indicate that there will in fact be significant impacts, because costs are probably overstated in the high cost case.

To the extent that economic aggregates such as value added are representative of firms in the industry sectors, the ratios reported here could also provide some insight into potential burdens for "typical" firms in each industry. However, it should be remembered that costs are likely to be overstated in the high cost case,[18] and that there are no truly typical firms. Four-digit SIC codes include highly diverse operations with widely varying costs of production, value added and value of shipments per unit of hazardous waste generated. In addition, facilities will use different mixes of on- and off-site disposal for these wastes, and so face different exposure to the regulations.

The docket report contains a full description of the methodology used to construct these tables.

[18] This scenario is appropriate for a firm with a mix of on- and off-site disposal, required to undertake corrective action lasting 150 years at an early date at all of its on-site facilities after having installed the most expensive technology modelled, and simultaneously faced with higher off-site costs due to the need for early corrective action at all available off-site facilities.

TABLE 16.—INDUSTRIES EXAMINED BY SIC CODES

Industry name	SIC code
Crop Planting and Protection	0721
Oil and Gas Extraction	1300
Wood Preserving	2491
Alkalies and Chlorine	2812
Inorganic Pigments	2816
Industrial Inorganic Chemicals	2819
Plastic Materials and Resins	2821
Synthetic Rubber	2822
Cellulosic Man-Made Fibers	2823
Organic Fibers, Noncellulosic	2824
Medicinals and Botanicals	2833
Paints and Allied Products	2851
Gum and Wood Chemicals	2861
Cyclic Crudes and Intermediates	2865
Industrial Organic Chemicals	2869
Nitrogenous Fertilizers	2873
Phosphatic Fertilizers	2874
Agricultural Chemicals	2879
Explosives	2892
Chemical Preparations, NEC	2899
Petroleum Refining	2911
Lubricating Oils and Greases	2992
Blast Furnaces and Steel Mills	3312
Electro-Metallurgical Products	3313
Steel Wire and Related Products	3315
Gray Iron Foundries	33215
Secondary Nonferrous Metals	3341
Copper Rolling and Drawing	33516
Plating and Polishing, Metal Coating and Allied Services	34719
Motor Vehicles and Bodies	3711
Motor Vehicle Parts and Accessories	3714

TABLE 17.—COMPARISON OF ANNUAL REVENUE REQUIREMENTS DUE TO PART 264 LAND DISPOSAL REGULATIONS TO SELECTED INDUSTRY MEASURES, BY SIC CODE

[Low and high cost cases]

Sic code	Annualized cost ($000)	Annualized cost as a percentage of—		
		Cost of production	Value added	Value of shipments
0721	$322–$3,309	(1)	(1)	(1)
1300	1,392–8,104	(1)	(1)	(1)
2491	774–15,572	.16–3.17	.38–7.61	.13–2.58.
2812	3,187–16,944	.20–1.09	.26–1.37	.13–.68.
2816	3,204–16,318	.44–2.26	.68–3.49	.31–1.57.
2819	1,079–73,034	.15–.97	.19–1.27	.10–.64.
2821	4,896–24,478	.04–.22	.08–.41	.03–.16.
2822	2,484–10,976	.18–.78	.46–2.03	.14–.62.
2823	1,640–7,242	.12–.53	.33–1.46	.11–.48.
2824	1,303–7,378	.05–.27	.08–.46	.04–.20.
2833	218–2,706	.02–.23	.02–.19	.01–.12.
2851	996–5,739	.03–.20	.06–.34	.02–.14.
2861	1,037–6,575	.1.74–11.03	2.44–15.45	1.15–7.31.
2865	2,517–15,885	.12–.73	.21–1.35	.08–.53.
2869	3,756–23,435	.04–.27	.07–.42	.03–.18.
2873	1,003–7,201	.05–.36	.07–.49	.03–.23.
2874	151–2,347	.01–.15	.02–.31	.01–.10.
2879	2,595–12,793	.23–1.13	.38–1.86	.18–.87.
2892	850–7,450	.36–3.19	.38–3.35	.24–2.06.
2899	1,322–7,815	.23–1.37	.33–1.94	.15–.90.
2911	23,939–116,687	.02–.08	.09–.43	.01–.07.
2992	1,068–5,230	.28–1.35	.66–3.24	.21–1.04.
3312	8,495–37,153	.04–.19	.10–.44	.04–.16.

TABLE 17.—COMPARISON OF ANNUAL REVENUE REQUIREMENTS DUE TO PART 264 LAND DISPOSAL REGULATIONS TO SELECTED INDUSTRY MEASURES, BY SIC CODE—Continued

[Low and high cost cases]

Sic code	Annualized cost ($000)	Annualized cost as a percentage of—		
		Cost of production	Value added	Value of shipments
3313	593–4,010	.13–.86.	.38–2.59	.11–.76.
3315	1,037–5,500	.20–1.07	.39–2.06	.16–.84.
33215	1,327–6,998	.12–.66	.16–.85	.09–.48.
3341	1,984–10,337	.24–1.23	.94–4.91	.20–1.06.
33516	4,721–20,085	.22–.92	.79–3.37	.19–.79.
34719	8,206–31,520	.65–3.3[illegible]	.84–4.24	.47–2.41.
3711	930–7,088	.00–.02	.01–.07	.00–.02.
3714	716–7,042	.01–.09	.02–.16	.01–.07.

[1] Necessary data unavailable.

TABLE 18.—COMPARISON OF FIRST YEAR EXPENDITURES DUE TO PART 264 LAND DISPOSAL REGULATIONS TO YEARLY CAPITAL OUTLAYS BY SIC CODE

[Low and high cost cases]

SIC code	First year expenditure ($000)	First year expenditure as percentage yearly capital expenditures
0721	$182–$9,430	(1)
1300	$991–38,997	(1)
2491	$474–42,900	2.37–124.75.
2812	$995–128,807	.25–41.58.
2816	$754–152,243	.73–141.54.
2819	$4,556–481,702	.72–65.01.
2821	$3,090–123,594	.23–6.05.
2822	$590–114,029	1.14–219.32.
2823	$869–46,052	1.51–90.74.
2824	$435–53,985	.11–24.31.
2833	$141–8,507	.07–3.49.
2851	$774–14,883	.12–4.27.
2861	$333–44,958	5.31–848.31.
2865	$698–116,540	.84–131.04.
2869	$1,719–137,204	.10–8.90.
2873	$376–43,233	.04–4.17.
2874	$106–7,358	.10 to 4.52.
2879	$1,115–83,884	.78 to 64.21.
2892	$433–31,665	3.03 to 166.98.
2899	$787–31,433	1.97 to 82.38.
2911	$15,049–783,313	.35 to 17.42.
2992	$863–11,883	4.97 to 40.56.
3312	$6,671–81,084	.52 to 3.83.
3313	$297–19,944	.49 to 50.22.
3315	$889–17,563	3.48 to 52.33.
33215	$948–15,039	6.39 to 68.53.
3341	$1,380–23,654	3.31 to 34.61.
33516	$3,216–84,597	1.02 to 105.25.
34719	$4,424–103 817	1.33 to 98.34.
3711	$155–46,625	.02 to 4.66.
3714	$265–29,022	.05 to 4.38.

[1] Necessary data unavailable.

TABLE 19.—COMPARISON OF ANNUAL REVENUE REQUIREMENTS DUE TO PART 264 LAND DISPOSAL REGULATIONS AND PART 265 LAND DIPOSAL REGULATIONS TO SELECTED INDUSTRY MEASURES BY SIC CODE

[Low and High Cost Cases]

SIC code	Annualized cost ($000,000)	Annualized cost as a percentage of—		
		Cost of production	Value added	Value of shipments
0721	$2–$5	(1)	(1)	(1)
1300	$6–$13	(1)	(1)	(1)
2491	$6–$21	1.24–4.25	2.96–10.19	1.01–3.46
2812	$12–$26	.78–1.66	.99–2.10	.49–1.05.
2816	$12–$25	1.65–3.46	2.54–5.34	1.14–2.41.
2819	$4–$6	.59–1.42	.77–1.85	.39–.93.
2821	$17–$36	.15–.32	.28–.60	.11–.23.
2822	$9–$8	.64–1.25	1.68–3.25	.51–.99.
2823	$5–$11	.38–.79	1.04–2.17	.34–.71.
2824	$5–$11	.19–.41	.31–.69	.14–.30.
2833	$1–$4	.12–.34	.10–.28	.06–.17.
2851	$4–$8	.13–.29	.21–.49	.09–.21.
2861	$4–$9	6.35–15.64	8.91–21.93	4.21–10.37.
2865	$10–$23	.45–1.07	.84–1.98	.33–.78.
2869	$15–$35	.18–.41	.27–.62	.12–.27.
2873	$4–$10	.21–.52	.29–.71	.13–.33.
2874	$1–$4	.06–.20	.12–.42	.04–.13.
2879	$9–$19	.82–1.72	1.34–2.82	.63–1.32.
2892	$4–$10	1.63–4.45	1.71–4.68	1.06–2.88.
2899	$5–$11	.80–1.94	1.13–2.74	.53–1.28.
2911	$89–$181	.06–.12	.33–.67	.05–.11.
2992	$3–$7	.77–1.84	1.84–4.42	.59–1.41.
3312	$23–$52	.12–.26	.27–.61	.10–.22.
3313	$2–$6	.46–1.20	1.39–3.60	.41–1.06.
3315	$4–$8	.72–1.59	1.38–3.05	.57–1.25.
33215	$4–$10	.37–.90	.48–1.17	.27–.66.
3341	$7–$15	.78–1.78	3.11–7.08	.67–1.53.
33516	$15–$31	.69–1.39	2.55–5.13	.60–1.21.
34719	$21–$46	2.20–4.86	2.81–6.22	1.60–3.53.
3711	$4–$11	.01–.03	.05–.11	.01–.03.
3714	$3–$10	.04–.13	.08–.22	.03–.10.

[1] Necessary data unavailable.

H. Sensitivity Analysis

The following reports on analysis of the sensitivity of counterpumping costs to the number of units or facilities affected, plume size, technical assumptions about hydrogeology and treatment costs, and the use of a confining slurry wall to reduce pumping rates and costs. This section also examines the potential cost of floodplain requirements.

1. *Sensitivity of Corrective Action Costs.* Total corrective action costs are very sensitive to whether corrective action occurs at individual units within a facility or at the facility as a whole. As described earlier in this preamble, two distributions were used to develop total costs in this analysis. The first distributed individual land disposal units by size and was used to estimate D&O costs on a unit-by-unit basis and to report costs by unit. The second distribution combined individual units to form multi-unit land disposal facilities and was used to estimate total corrective action costs on the basis of total acreage at land disposal sites.

If corrective action costs were to be estimated using the first distribution (on a unit-by-unit basis), instead of on a facility-by-facility basis, total costs reported would be significantly higher. Ranges of corrective action costs using the two distributions are reported in Table 20.

TABLE 20.—COMPARISON OF CORRECTIVE ACTION COSTS USING UNITS AND FACILITIES ($000,000)

Scenario	Corrective action costs	
	Detect year 49 and pump 20 [1]	Detect year 0 and pump 150 [2]
5,662 units	$96	$1,176
2,424	51	677

[1] Years using strategy 1.
[2] Years using strategy 2.

As table 20 shows, if all 5,662 land disposal units were to undertake corrective action individually, counterpumping costs would range from $96 million to $1,176 million per year and would be 80 to 90 percent higher than the total corrective action costs reported in *Total Costs.*

Both of these estimates depend in part on plume sizes, which in this analysis were necessarily related to the surface areas used for waste management. However, areas used are not directly reported on the Part A of the permit application for some units, and therefore had to be derived. In addition, plumes may be larger than the facility area when corrective action begins due to irregular shapes, the orientation of the facility relative to ground water flow, or site-specific constraints on the location of recovery wells. The 50 percent area add-on used for sites with more than one type of unit deals with some of this imprecision. In any event, corrective action costs are relatively insensitive to plume size, if hydrogeologic conditions are held constant. As reported in table 21, the cost of corrective action for a 25 acre plume is only 28 to 45 percent more expensive than counterpumping for a 5 acre plume, although the size of the plume has increased by 400 percent. Similarly, while a 125-acre plume is 125 times bigger than a 1-acre plume, the counterpumping cost associated with the 125-acre plume is only 1.9 to 2.6 times greater, depending on the strategy used and the timing of corrective action.

TABLE 21.—COMPARISON OF INCREASES IN COUNTERPUMPING COSTS WITH INCREASES IN PLUME SIZE

Plume size in acres	Counterpumping cost			
	Strategy 1 for 20 years starting in year 49		Strategy 2 for 150 years starting in year 0	
	$000	Percent change from previous value	$000	Percent change from previous value
1	16	—	180	—
5	18	13	225	25
25	23	28	327	45
75	28	22	420	28
125	30	7	466	11

In the corrective action scenario where each unit takes corrective action individually, the average plume size is 7.3 acres. The average plume size increases to 15.6 acres when it is

assumed that corrective action is taken on a facility basis. Even this difference, which probably is greater than the range of error in our plume size estimates, has an insignificant effect on total corrective action costs.

2. *Sensitivity of Costs to Hydrogeologic Assumptions.* EPA examined the effects of alternative assumptions regarding aquifer transmissivity and gradient on corrective action costs for two plume sizes.[19] The Agency found that changing gradient or transmissivity assumptions has almost no effect on costs for small plumes under Strategy 1 conditions. However, for large plumes changing the gradient from 0.5 to 50 feet per mile or changing the transmissivity from 10,000 to 1,000,000 gallons per day per foot can increase the annual revenue requirement calculated for counterpumping by about 50 percent. Under Strategy 2 conditions, the same changes in transmissivity can increase costs for small plumes by 50 percent and costs for large plumes by about 150 percent. Details of this analysis appear in the docket report.

3. *Sensitivity of Costs to Treatment Assumptions.* All corrective action cost estimates displayed in this preamble assume that the ground water removed through counterpumping is treated in a facility built on site to deal with a simple mix of contaminants in low concentrations. EPA used a simple average of costs for three types of treatment: activated carbon; reverse osmosis; and a treatment train consisting of coagulation, flocculation, sedimentation and filtration. These processes are capable of addressing the bulk of potential ground water contaminants, and except in unusual cases the concentrations of pollutants that are likely to be encountered should be within the ranges that can be treated by these systems.

On balance, these estimates give a reasonable indication of likely costs in average situations. Specific scenarios would need to be addressed to substantially improve on these estimates.

Moving from an average of treatment costs to costs for a single approach can change corrective action costs up or down by a third to a half.

Some cost decreases may be possible if the pumped water contains only volatile pollutants that can be treated through air stripping. Where the volumes of recovered water are very low and the contaminants to be removed are of a suitable kind, pre-engineered treatment equipment can be trucked to the site at some cost savings. Large cost increases are possible if the recovered water contains contaminants in high concentrations, or if the recovered water contains a mixture of contaminants. Mixtures can require use of a combination of the approaches examined here, or use of more complex chemical or biological treatment. (Details are contained in the docket report.)

4. *Adding a Slurry Wall to Reduce the Pumping Rate.* EPA also examined an alternative strategy for compliance based on use of a confining slurry wall and a surface cover to minimize the amount of pumping and treatment required. This approach removes contamination, but at a very slow rate, so that for purposes of cost calculation, it must be assumed that the plume will exist for a very long time. EPA found that this approach could save money in many cases, compared to pumping at a higher rate over a shorter period of time. The difficulty in using this technique may be in demonstrating that the plume will be effectively contained and removed.

EPA estimated the cost of this strategy for a small plume (100 ft x 200 ft), since slurry wall costs increase more rapidly with plume size than do counterpumping costs. EPA determined that with a slurry wall in place pumping rates would be in the range of 10,000 to 50,000 gallons per year (38 to 189 MT/year). Because these rates are very low relative to what they would be without the slurry wall (4 to 22 million gallons per year under base case conditions), EPA assumed that the contaminated ground water would be treated in pre-engineered facilities trucked to the site, at a cost of $85 per 1,000 gallons or $22 per metric ton. At this cost, over 250,000 gallons of recovered water—five to twenty-five times the amount expected—could be treated before a slurry wall becomes financially unattractive.

Use of a slurry wall would be even more attractive under pessimistic assumptions regarding gradient and transmissivity, because these changes would not affect the costs of the slurry wall approach. The slurry wall approach would be much less attractive with deeper plumes, and infeasible at depths greater than 150 feet.

5. *Costs of Floodplain Standards.* The Part 264 regulations require that facilities located in 100-year floodplains be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood.

Dike costs were only estimated for surface impoundments. It was assumed that impoundments are likely to be located in floodplains because they are often part of systems for treating industrial effluent before it is discharged in surface water. It was assumed that dikes are built around 3 sides of the surface impoundment, that there is a 40' buffer zone between the surface impoundment and the dike, and that dike construction is entirely independent from the surface impoundment.

EPA estimated the costs of constructing dikes of various heights to withstand the effects of a 100-year flood. Actual dike heights are likely to vary with floodplain topographies, river depths, and heights during 100-year floods. Costs were estimated for dike heights of 2, 3, 5, and 9 meters, but the 3-meter (about 10 feet) height is used as an average cost estimate. Dike widths varied with height and ranged from 14 meters for a 2-meter high dike to 49 meters for a 9-meter high dike. The width of the dike significantly increases the amount of land required for the facility. For example, a ¼-acre surface impoundment would need to be situated on 1.5 acres to accommodate the buffer zone and a 3-meter dike. Similarly, an 11 acre surface impoundment would require about 16 acres to allow for the buffer area and a 3-meter dike.

Annual revenue requirements for dikes of various heights were estimated in the same way that other D&O revenue requirements were estimated for surface impoundments. Costs for a 3 meter dike ranged from $3,000 for a ¼-acre surface impoundment to $17,000 for an 11-acre impoundment. For smaller surface impoundments, these costs were about 50 percent of the basic costs of complying with the Part 264 regulations, and roughly 20 to 25 percent of the costs of retrofitting or replacing a facility. For large surface impoundments, a 3-meter dike would add about 15 percent to the basic compliance cost, and about 6 percent to the retrofit or replacement cost.

If it is assumed that all surface impoundments construct 3-meter dikes to protect against washout from a 100-year flood, the total incremental cost would be $29 million.[20]

[19] In all cases, the small plume (100 ft x 200 ft) is approximately the size of the plume used to estimate corrective action costs for a ½ acre surface impoundment. This is two and one-half times as large as the plume size for the smallest (500 MT/yr) landfill modelled. The large plume (1000 ft x 2000 ft) is close in size to the plume used to estimate costs for a 35,000 metric ton per year landfill. A 20 acre surface impoundment would involve about the same size plume.

[20] Costs were estimated on a unit-by-unit basis for all 4240 surface impoundments. Estimating costs on

X. List of Subjects

40 CFR Part 122

Administrative practice and procedure, Air pollution control, Hazardous materials, Reporting requirements, Waste treatment and disposal, Water pollution control, Water supply, Confidential business information.

40 CFR Part 260

Administrative practice and procedure, Confidential business information, Hazardous materials, Waste treatment and disposal.

40 CFR Part 264

Hazardous materials, Packaging and containers, Reporting requirements, Security measures, Surety bonds, Waste treatment and disposal.

40 CFR Part 265

Hazardous materials, Packaging and containers, Reporting and recordkeeping requirements, Security measures, Surety bonds, Waste treatment and disposal, Waste supply.

Dated: July 9, 1982.

Anne M. Gorsuch,

Administrator.

For the reasons set out in the preamble, 40 CFR Parts 260, 264, 265, and 122 are amended as set forth below.

PART 260—HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

1. The Authority citation for Part 260 reads as follows:

Authority: Secs. 1006, 2002(a), 3001 through 3007, 3010, and 7004, of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), 6921 through 6927, 6930, and 6974).

§ 260.10 [Amended]

2. 40 CFR Part 260 is amended by removing the following from § 260.10:

"Constituent" or "hazardous waste constituent" means a constituent which caused the Administrator to list the hazardous waste in Part 261, Subpart D, of this chapter, or a constituent listed in Table 1 of § 261.24 of this chapter.

3. 40 CFR Part 260 is amended by adding the following terms and definitions to § 260.10 in alphabetical order:

"Certification" means a statement of professional opinion based upon knowledge and belief.

"Existing portion" means that land surface area of an existing waste management unit, included in the original Part A permit application, on which wastes have been placed prior to the issuance of a permit.

"Hazardous waste constituent" means a constituent that caused the Administrator to list the hazardous waste in Part 261, Subpart D, of this chapter, or a constituent listed in Table 1 of § 261.24 of this chapter.

"Treatment Zone" means a soil area of the unsaturated zone of a land treatment unit within which hazardous constituents are degraded, transformed, or immobilized.

"Uppermost aquifer" means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

4. In 40 CFR Part 264, the Table of Contents is amended by adding listings for Subparts F, M, and N, and revising listings for Subparts K and L, to read as follows:

* * * * *

Subpart F—Ground-water Protection

* * * * *

Subpart K—Surface Impoundments

Subpart L—Waste Piles

Subpart M—Land Treatment

Subpart N—Landfills

* * * * *

5. The authority citation for Part 264 reads as follows:

Authority: Secs. 1006, 2002(a), 3004, and 3005 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), 6924, and 6925).

6. In 40 CFR Part 264, Subpart B, §§ 264.10(b), 264.15(b)(4), and 264.18(b)(1) are revised to read as follows:

§ 264.10 Applicability.

* * * * *

(b) Section 264.18(b) applies only to facilities subject to regulation under Subparts I through O of this part.

a facility-by-facility basis for all land disposal sites would increase the total cost reported here by about 75 percent.

§ 264.15 General inspection requirements.

* * * * *

(b) * * *

(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.

* * * * *

§ 264.18 Location standards.

* * * * *

(b) *Floodplains.* (1) A facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or any hazardous waste by a 100-year flood, *unless* the owner or operator can demonstrate to the Regional Administrator's satisfaction that:

(i) Procedures are in effect which will cause the waste to be removed safely, before flood waters can reach the facility, to a location where the wastes will not be vulnerable to flood waters; or

(ii) For existing surface impoundments, waste piles, land treatment units, and landfills, no adverse effects on human health or the environment will result if washout occurs, considering:

(A) The volume and physical and chemical characteristics of the waste in the facility;

(B) The concentration of hazardous constituents that would potentially affect surface waters as a result of washout;

(C) The impact of such concentrations on the current or potential uses of and water quality standards established for the affected surface waters; and

(D) The impact of hazardous constituents on the sediments of affected surface waters or the soils of the 100-year floodplain that could result from washout.

* * * * *

7. In 40 CFR Part 264, Subpart E, § 264.73 is amended by revising paragraph (b)(6), and § 264.77 is amended by redesignating paragraph (c) as paragraph (b). It is further amended by revising newly redesignated paragraph (b) and adding a new paragraph (c) to read as follows:

§ 264.73 Operating record.

* * * * *

(b) * * *

(6) Monitoring, testing, or analytical data where required by Subpart F and §§ 264.226, 264.253, 264.254, 264.276, 264.278, 264.280, 264.303, 264.309, and 264.347;

* * * * *

§ 264.77 Additional reports.

* * * * *

(b) Facility closures specified in §264.115; and

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

8. 40 CFR Part 264 is amended by adding Subpart F to read as follows:

Subpart F—Ground-water Protection

§ 264.90 Applicability.

(a) Except as provided in paragraph (b) of this section, the regulations in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous waste in surface impoundments, waste piles, land treatment units, or landfills. The owner or operator must satisfy the requirements of this subpart for all wastes (or constituents thereof) contained in any such waste management unit at the facility that receives hazardous waste after the effective date of this subpart (hereinafter referred to as a "regulated unit"). Any waste or waste constituent migrating beyond the waste management area under § 264.95(b) is assumed to originate from a regulated unit unless the Regional Administrator finds that such waste or waste constituent originated from another source.

(b) The owner or operator is not subject to regulation under this subpart if:

(1) He is exempted under § 264.1;

(2) He designs and operates a surface impoundment in compliance with § 264.222, a pile in compliance with § 264.250(c), § 264.252, or § 264.253, or a landfill in compliance with § 264.302;

(3) The Regional Administrator finds, pursuant to § 264.280(d), that the treatment zone of a land treatment 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 treatment 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.

(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 subsoils 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 § 264.96 if the owner or operator is conducting a compliance monitoring program under § 264.99 or a corrective action program under § 264.100.

§ 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 operator 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 § 264.96. The Regional Administrator will establish this ground-water protection standard in the facility permit when hazardous constituents have entered 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 § 122.35 of this chapter.

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

(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 not 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:

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

Constituent	Maximum concentration [1]
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,9a-octahydro-1, 4-endo, endo-5,8-dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenylethane)	0.1
Toxaphene (C(—H(—Cl$, Technical chlorinated camphene, 67–69 percent chlorine)	0.005
2,4-D (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	0.01

[1] Milligrams per liter.

(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 § 122.35 of this chapter.

§ 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 background 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 1.00:

(i) 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

(ii) 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 (h)(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:

(i) Is appropriate for the distribution of the data used to establish background values or concentration limits; and

(ii) 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.

§ 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 persistance 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 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 availabtlity 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 constituents 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

(5) 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 consitutents 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)(4) 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 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 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.

§ 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 guality, 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 constitutents, 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 pursuant 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.

(i) If the owner or operator determines, pursuant to paragraph (h) 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 (h) 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.

§ 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(i)(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.

§§ 264.101–264.109 [Reserved]

9. In 40 CFR Part 264, Subpart G, § 264.110 is amended by revising paragraph (b), § 264.112 is amended by revising paragraphs (a), introductory text, and (a)(1), § 264.117 is amended by revising paragraphs (a)(1)(i) and (ii), and § 264.118 is amended by revising paragraph (a), introductory text, (a)(1), (2)(i) and (ii) to read as follows:

§ 264.110 Applicability.

* * * * *

(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 264.258.

§ 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 submitted with the permit application, in accordance with § 122.25(a)(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;

* * * * *

§ 264.117 Post-closure care and use of property.

(a)(1) * * *

(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.

* * * * *

§ 264.118 Post-closure plan; amendment of plan.

(a) The owner or operator of a disposal facility must have a written post-closure plan. In addition, certain piles and certain surface impoundments from which the owner or operator intends to remove the wastes at closure are required by §§ 264.228 and 264.258 to have post-closure plans. The plan must be submitted with a permit application, in accordance with § 122.25(a)(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 post-closure plan will become a condition of any permit issued. A copy of the approved plan and all revisions to the plan must be kept at the facility until the post-closure care period begins. This plan must identify the activities that will be carried on after closure 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;

(2) * * *

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

* * * * *

10. In 40 CFR Part 264, Subpart H, § 264.144 is amended by revising paragraph (b); § 264.142 is amended by revising paragraph (a), except for the comment; § 264.144 is amended by revising paragraph (a); and § 264.145 is amended by revising the undesignated paragraph preceding paragraph (a) to read as follows:

§ 264.140 Applicability.

* * * * *

(b) The requirements of §§ 264.144 and 264.145 apply only to owners and operators of:

(1) 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 264.258.

* * * * *

§ 264.142 Cost estimate for closure.

(a) The owner or operator must have a written estimate, in current dollars, of the cost of closing the facility in accordance with the requirements in §§ 264.111–264.115 and applicable closure requirements in §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, and 264.351. The estimate must equal the cost of closure at the point in the facility's operating life when the extent and manner of its operation would make closure the most expensive, as indicated by its closure plan (see § 264.112(a)).

* * * * *

§ 264.144 Cost estimate for post-closure care.

(a) The owner or operator of a facility subject to post-closure monitoring or maintenance requirements must have a written estimate, in current dollars, of the annual cost of post-closure monitoring and maintenance of the facility in accordance with the applicable post-closure regulations in §§ 264.117–264.120, 264.228, 264.258, 264.280, and 264.310. The post-closure cost estimate is calculated by multiplying the annual post-closure cost estimate by the number of years of post-closure care required under Subpart G of Part 264.

* * * * *

§ 264.145 Financial assurance for post-closure care.

The owner or operator of a facility subject to post-closure monitoring or maintenance requirements must establish financial assurance for post-closure care in accordance with the approved post-closure plan for the facility. He must choose from the following options:

* * * * *

11. In 40 CFR Part 264, Subparts K and L are revised to read as follows:

Subpart K—Surface Impoundments

§ 264.220 Applicability.

The regulations in this subpart apply to owners and operators of facilities that use surface impoundments to treat, store, or dispose of hazardous waste except as § 264.1 provides otherwise.

§ 264.221 Design and operating requirements.

(a) A surface impoundment (except for an existing portion of a surface impoundment) must have a liner that is designed, constructed, and installed to prevent any migration of wastes out of the impoundment to the adjacent subsurface soil or ground water or surface water at any time during the active life (including the closure period) of the impoundment. The liner may be constructed of materials that may allow wastes to migrate into the liner (but not into the adjacent subsurface soil or ground water or surface water) during the active life of the facility, provided that the impoundment is closed in accordance with § 264.228(a)(1). For impoundments that will be closed in accordance with § 264.228(a)(2), the liner must be constructed of materials that can prevent wastes from migrating into the liner during the active life of the facility. The liner must be:

(1) 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;

(2) 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

(3) Installed to cover all surrounding earth likely to be in contact with the waste or leachate.

(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 alternate design and operating practices, together with location characteristics, will prevent the migration 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 impoundment 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) A surface impoundment must be designed, constructed, maintained, and operated to prevent overtopping resulting from normal or abnormal operations; overfilling; wind and wave action; rainfall; run-on; malfunctions of level controllers, alarms, and other equipment; and human error.

(d) A surface impoundment must have dikes that are designed, constructed, and maintained with sufficient structural integrity to prevent massive failure of the dikes. In ensuring structural integrity, it must not be presumed that the liner system will function without leakage during the active life of the unit.

(e) 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.

§ 264.222 Double-lined surface impoundments: Exemption from Subpart F ground-water protection requirements.

(a) The owner or operator of a double-lined surface impoundment is not subject to regulation under Subpart F of this part if the following conditions are met:

(1) The impoundment (including its underlying liners) must be located entirely above the seasonal high water table.

(2) The impoundment must be underlain by two liners which are

designed and constructed in a manner that prevents the migration of liquids into or out of the space between the liners. Both liners must meet all the specifications of § 264.221(a).

(3) A leak detection system must be designed, constructed, maintained, and operated between the liners to detect any migration of liquids into the space between the liners.

(b) If liquid leaks into the leak detection system, the owner or operator must:

(1) Notify the Regional Administrator of the leak in writing within seven days after detecting the leak; and

(2)(i) Within a period of time specified in the permit, remove accumulated liquid, repair or replace the liner which is leaking to prevent the migration of liquids through the liner, and obtain a certification from a qualified engineer that, to the best of his knowledge and opinion, the leak has been stopped; or

(ii) If a detection monitoring program pursuant to § 264.98 has already been established in the permit (to be complied with only if a leak occurs), begin to comply with that program and any other applicable requirements of Subpart F of this part within a period of time specified in the permit.

(c) 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.

§§ 264.223–264.225 [Reserved]

§ 264.226 Monitoring and inspection.

(a) During construction and installation, liners (except in the case of existing portions of surface impoundments exempt from § 264.221(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 blisters; and

(2) Soil-based and admixed liners and covers must be inspected for inperfections 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 surface impoundment 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 overtopping control systems;

(2) Sudden drops in the level of the impoundment's contents; and

(3) The presence of liquids in leak detection systems, where installed to comply with § 264.222; and

(4) Severe erosion or other signs of deterioration in dikes or other containment devices.

(c) Prior to the issuance of a permit, and after any extended period of time (at least six months) during which the impoundment was not in service, the owner or operator must obtain a certification from a qualified engineer that the impoundment's dike, including that portion of any dike which provides freeboard, has structural integrity. The certification must establish, in particular, that the dike:

(1) Will withstand the stress of the pressure exerted by the types and amounts of wastes to be placed in the impoundment; and

(2) Will not fail due to scouring or piping, without dependence on any liner system included in the surface impoundment construction.

§ 264.227 Emergency repairs; contingency plans.

(a) A surface impoundment must be removed from service in accordance with paragraph (b) of this section when:

(1) The level of liquids in the impoundment suddenly drops and the drop is not known to be caused by changes in the flows into or out of the impoundment; or

(2) The dike leaks.

(b) When a surface impoundment must be removed from service as required by paragraph (a) of this section, the owner or operator must:

(1) Immediately shut off the flow or stop the addition of wastes into the impoundment;

(2) Immediately contain any surface leakage which has occurred or is occurring;

(3) Immediately stop the leak;

(4) Take any other necessary steps to stop or prevent catastrophic failure;

(5) If a leak cannot be stopped by any other means, empty the impoundment; and

(6) Notify the Regional Administrator of the problem in writing within seven days after detecting the problem.

(c) As part of the contingency plan required in Subpart D of this part, the owner or operator must specify a procedure for complying with the requirements of paragraph (b) of this section.

(d) No surface impoundment that has been removed from service in accordance with the requirements of this section may be restored to service unless the portion of the impoundment which was failing is repaired and the following steps are taken:

(1) If the impoundment was removed from service as the result of actual or imminent dike failure, the dike's structural integrity must be recertified in accordance with § 264.226(c).

(2) If the impoundment was removed from service as the result of a sudden drop in the liquid level, then:

(i) For any existing portion of the impoundment, a liner must be installed in compliance with §§ 264.221(a) or 264.222; and

(ii) For any other portion of the impoundment, the repaired liner system must be certified by a qualified engineer as meeting the design specifications approved in the permit.

(e) A surface impoundment that has been removed from service in accordance with the requirements of this section and that is not being repaired must be closed in accordance with the provisions of § 264.228.

§ 264.228 Closure and post-closure care.

(a) At closure, the owner or operator must:

(1) Remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste unless § 261.3(d) of this chapter applies; or

(2)(i) Eliminate free liquids by removing liquid wastes or solidifying the remaining wastes and waste residues;

(ii) Stabilize remaining wastes to a bearing capacity sufficient to support final cover; and

(iii) Cover the surface impoundment with a final cover designed and constructed to:

(A) Provide long-term minimization of the migration of liquids through the closed impoundment;

(B) Function with minimum maintenance;

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

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

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

(b) If some waste residues or contaminated materials are left in place at final closure, the owner or operator must comply with all post-closure requirements contained in §§ 264.117–264.120, 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) Maintain and monitor the leak detection system in accordance with § 264.222, where such a system is present between double liner systems;

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

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

(c) (1) If an owner or operator plans to close a surface impoundment in accordance with paragraph (a)(1) of this section, and the impoundment does not comply with the liner requirements of § 264.221(a) and is not exempt from them in accordance with § 264.221(b), then:

(i) The closure plan for the impoundment under § 264.112 must include both a plan for complying with paragraph (a)(1) of this section and a contingent plan for complying with paragraph (a)(2) of this section in case not all contaminated subsoils can be practicably removed at closure; and

(ii) The owner or operator must prepare a contingent post-closure plan under § 264.118 for complying with paragraph (b) of this section in case not all contaminated subsoils can be practicably removed at closure.

(2) The cost estimates calculated under §§ 264.142 and § 264.144 for closure and post-closure care of an impoundment subject to this paragraph must include the cost of complying with the contingent closure plan and the contingent post-closure plan, but are not required to include the cost of expected closure under paragraph (a)(1) of this section.

(d) During the post-closure care period, if liquids leak into a leak detection system installed under § 264.222, the owner or operator must notify the Regional Administrator of the leak in writing within seven days after detecting the leak. The Regional Administrator will modify the permit to require compliance with the requirements of Subpart F of this part.

§ 264.229 Special requirements for ignitable or reactive waste.

Ignitable or reactive waste must not be placed in a surface impoundment, unless:

(a) The waste is treated, rendered, or mixed before or immediately after placement in the impoundment 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; or

(b) The waste is managed in such a way that it is protected from any material or conditions which may cause it to ignite or react; or

(c) The surface impoundment is used solely for emergencies.

§ 264.230 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 surface impoundment, unless § 264.17(b) is complied with.

§§ 264.231-264.249 [Reserved]

Subpart L—Waste Piles

§ 264.250 Applicability.

(a) The regulations in this subpart apply to owners and operators of facilities that store or treat hazardous waste in piles, except as § 264.1 provides otherwise.

(b) The regulations in this subpart do not apply to owners or operators of waste piles that are closed with wastes left in place. Such waste piles are subject to regulation under Subpart N of this part (Landfills).

(c) The owner or operator of any waste pile that is inside or under a structure that provides protection from precipitation so that neither run-off nor leachate is generated is not subject to regulation under § 264.251 or under Subpart F of this part, provided that:

(1) Liquids or materials containing free liquids are not placed in the pile;

(2) The pile is protected from surface water run-on by the structure or in some other manner;

(3) The pile is designed and operated to control dispersal of the waste by wind, where necessary, by means other than wetting; and

(4) The pile will not generate leachate through decomposition or other reactions.

§ 264.251 Design and operating requirements.

(a) A waste pile (except for an existing portion of a waste pile) must have:

(1) A liner that is designed, constructed, and installed to prevent any migration of wastes out of the pile into the adjacent subsurface soil or ground water or surface water at any time during the active life (including the closure period) of the waste pile. The liner may be constructed of materials that may allow waste to migrate into the liner itself (but not into the adjacent subsurface soil or ground water or surface water) 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 pile. 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 resistent to the waste managed in the pile and the leachate expected to be generated; and

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

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

(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 alternate design and operating practices, together with location characteristics, will prevent the migration 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 attenuative capacity and thickness of the liners and soils present between the pile 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 must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the pile during peak discharge from at least a 25-year storm.

(d) 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.

(e) 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.

(f) If the pile contains any particulate matter which may be subject to wind dispersal, the owner or operator must cover or otherwise manage the pile to control wind dispersal.

(g) 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.

§ 264.252 Double-lined piles: Exemption from Subpart F ground-water protection requirements.

(a) The owner or operator of a double-lined waste pile is not subject to regulation under Subpart F of this part if the following conditions are met:

(1) The pile (including its underlying liners) must be located entirely above the seasonal high water table.

(2) The pile must be underlain by two liners which are designed and constructed in a manner that prevents the migration of liquids into or out of the space between the liners. Both liners must meet all the specifications of § 264.251(a)(1).

(3) A leak detection system must be designed, constructed, maintained, and operated between the liners to detect any migration of liquids into the space between the liners.

(4) The pile must have a leachate collection and removal system above the top liner that is designed, constructed, maintained, and operated in accordance with § 264.251(a)(2).

(b) If liquid leaks into the leak detection system, the owner or operator must:

(1) Notify the Regional Administrator of the leak in writing within seven days after detecting the leak; and

(2) (i) Within a period of time specified in the permit, remove accumulated liquid, repair or replace the liner which is leaking to prevent the migration of liquids through the liner, and obtain a certificaton from a qualified engineer that, to the best of his knowledge and opinion, the leak has been stopped; or

(ii) If a detection monitoring program pursuant to § 264.98 has already been established in the permit (to be complied with only if a leak occurs), begin to comply with that program and any other applicable requirements of Subpart F of this part within a period of time specified in the permit.

(c) 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.

§ 264.253 Inspection of liners: Exemption from Subpart F ground-water protection requirements.

(a) The owner or operator of a pile is not subject to regulation under Subpart F of this part if the following conditions are met:

(1) The pile (including its underlying liner) must be located entirely above the seasonal high water table.

(2) The pile must be underlain by a liner (base) that meets all the specifications of § 264.251(a)(1).

(3) The wastes in the pile must be removed periodically, and the liner must be inspected for deterioration, cracks, or other conditions that may result in leaks. The frequency of inspection will be specified in the inspection plan required in § 264.15 and must be based on the potential for the liner (base) to crack or otherwise deteriorate under the conditions of operation (*e.g.*, waste type, rainfall, loading rates, and subsurface stability).

(4) The liner must be of sufficient strength and thickness to prevent failure due to puncture, cracking, tearing, or other physical damage from equipment used to place waste in or on the pile or to clean and expose the liner surface for inspection.

(5) The pile must have a leachate collection and removal system above the liner that is designed, constructed, maintained, and operated in accordance with § 264.251(a)(2).

(b) If deterioration, a crack, or other condition is identified that is causing or could cause a leak, the owner or operator must:

(1) Notify the Regional Administrator of the condition in writing within seven days after detecting the condition; and

(2)(i) Repair or replace the liner (base) and obtain a certification from a qualified engineer that, to the best of his knowledge and opinion, the liner (base) has been repaired and leakage will not occur; or

(ii) If a detection monitoring program pursuant to § 264.98 has already been established in the permit (to be complied with only if a leak occurs), begin to comply with that program and any other applicable requirements of Subpart F of this part within a period of time specified in the permit.

(c) 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.

§ 264.254 Monitoring and inspection.

(a) During construction or installation, liners (except in the case of existing portions of piles exempt from § 264.251(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 blisters; 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 waste pile 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) The presence of liquids in leak detection systems, where installed to comply with § 264.252;

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

(4) The presence of leachate in and proper functioning of leachate collection and removal systems, where present.

§ 264.255 [Reserved]

§ 264.256 Special requirements for ignitable or reactive waste.

Ignitable or reactive waste must not be placed in a waste pile unless:

(a) The waste is treated, rendered, or mixed before or immediately after placement in the pile 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; or

(b) The waste is managed in such a way that it is protected from any material or conditions which may cause it to ignite or react.

§ 264.257 Special requirements for incompatible wastes.

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

(b) A pile of hazardous waste that is incompatible with any waste or other material stored nearby in containers, other piles, open tanks, or surface impoundments must be separated from the other materials, or protected from them by means of a dike, berm, wall, or other device.

(c) Hazardous waste must not be piled on the same base where incompatible wastes or materials were previously piled, unless the base has been decontaminated sufficiently to ensure compliance with § 264.17(b).

§ 264.258 Closure and post-closure care.

(a) At closure, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste unless § 261.3(d) of this chapter applies.

(b) If, after removing or decontaminating all residues and making all reasonable efforts to effect removal or decontamination of contaminated components, subsoils, structures, and equipment as required in paragraph (a) of this section, the owner or operator finds that not all contaminated subsoils can be practicably removed or decontaminated, he must close the facility and perform post-closure care in accordance with the closure and post-closure care requirements that apply to landfills (§ 264.310).

(c)(1) The owner or operator of a waste pile that does not comply with the liner requirements of § 264.251(a)(1) and is not exempt from them in accordance with §§ 264.250(c) or 264.251(b), must:

(i) Include in the closure plan for the pile under § 264.112 both a plan for complying with paragraph (a) of this section and a contingent plan for complying with paragraph (b) of this section in case not all contaminated subsoils can be practicably removed at closure; and

(ii) Prepare a contingent post-closure plan under § 264.118 for complying with paragraph (b) of this section in case not all contaminated subsoils can be practicably removed at closure.

(2) The cost estimates calculated under §§ 264.142 and 264.144 for closure and post-closure care of a pile subject to this paragraph must include the cost of complying with the contingent closure plan and the contingent post-closure plan, but are not required to include the cost of expected closure under paragraph (a) of this section.

§§ 264.259–264.269 [Reserved]

12. 40 CFR Part 264 is amended by adding Subparts M and N to read as follows:

Subpart M—Land Treatment

§ 264.270 Applicability.

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

§ 264.271 Treatment program.

(a) An owner or operator subject to this subpart must establish a land treatment program that is designed to ensure that hazardous constituents placed in or on the treatment zone are degraded, transformed, or immobilized within the treatment zone. The Regional Administrator will specify in the facility permit the elements of the treatment program, including:

(1) The wastes that are capable of being treated at the unit based on a demonstration under § 264.272;

(2) Design measures and operating practices necessary to maximize the success of degradation, transformation, and immobilization processes in the treatment zone in accordance with § 264.273(a); and

(3) Unsaturated zone monitoring provisions meeting the requirements of § 264.278.

(b) The Regional Administrator will specify in the facility permit the hazardous constituents that must be degraded, transformed, or immobilized under this subpart. Hazardous constituents are constituents identified in Appendix VIII of Part 261 of this chapter that are reasonably expected to be in, or derived from, waste placed in or on the treatment zone.

(c) The Regional Administrator will specify the vertical and horizontal dimensions of the treatment zone in the facility permit. The treatment zone is the portion of the unsaturated zone below and including the land surface in which the owner or operator intends to maintain the conditions necessary for effective degradation, transformation, or immobilization of hazardous constituents. The maximum depth of the treatment zone must be:

(1) No more than 1.5 meters (5 feet) from the initial soil surface; and

(2) More than 1 meter (3 feet) above the seasonal high water table.

§ 264.272 Treatment demonstration.

(a) For each waste that will be applied to the treatment zone, the owner or operator must demonstrate, prior to application of the waste, that hazardous constituents in the waste can be completely degraded, transformed, or immobilized in the treatment zone.

(b) In making this demonstration, the owner or operator may use field tests, laboratory analyses, available data, or, in the case of existing units, operating data. If the owner or operator intends to conduct field tests or laboratory analyses in order to make the demonstration required under paragraph (a) of this section, he must obtain a treatment or disposal permit under § 122.27(c). The Regional Administrator will specify in this permit the testing, analytical, design, and operating requirements (including the duration of the tests and analyses, and, in the case of field tests, the horizontal and vertical dimensions of the treatment zone, monitoring procedures, closure and clean-up activities) necessary to meet the requirements in paragraph (c) of this section.

(c) Any field test or laboratory analysis conducted in order to make a demonstration under paragraph (a) of this section must:

(1) Accurately simulate the characteristics and operating conditions for the proposed land treatment unit including:

(i) The characteristics of the waste (including the presence of Appendix VIII of Part 261 of this chapter constituents);

(ii) The climate in the area;

(iii) The topography of the surrounding area;

(iv) The characteristics of the soil in the treatment zone (including depth); and

(v) The operating practices to be used at the unit.

(2) Be likely to show that hazardous constituents in the waste to be tested will be completely degraded,

transformed, or immobilized in the treatment zone of the proposed land treatment unit; and

(3) Be conducted in a manner that protects human health and the environment considering:

(i) The characteristics of the waste to be tested;

(ii) The operating and monitoring measures taken during the course of the test;

(iii) The duration of the test;

(iv) The volume of waste used in the test;

(v) In the case of field tests, the potential for migration of hazardous constituents to ground water or surface water.

§ 264.273 Design and operating requirements.

The Regional Administrator will specify in the facility permit how the owner or operator will design, construct, operate, and maintain the land treatment unit in compliance with this section.

(a) The owner or operator must design, construct, operate, and maintain the unit to maximize the degradation, transformation, and immobilization of hazardous constituents in the treatment zone. The owner or operator must design, construct, operate, and maintain the unit in accord with all design and operating conditions that were used in the treatment demonstration under § 264.272. At a minimum, the Regional Administrator will specify the following in the facility permit:

(1) The rate and method of waste application to the treatment zone;

(2) Measures to control soil pH;

(3) Measures to enhance microbial or chemical reactions (*e.g.*, fertilization, tilling); and

(4) Measures to control the moisture content of the treatment zone.

(b) The owner or operator must design, construct, operate, and maintain the treatment zone to minimize run-off of hazardous constituents during the active life of the land treatment unit.

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

(d) 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.

(e) 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 the design capacity of the system.

(f) If the treatment zone contains particulate matter which may be subject to wind dispersal, the owner or operator must manage the unit to control wind dispersal.

(g) The owner or operator must inspect the unit weekly and after storms to detect evidence of:

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

(2) Improper functioning of wind dispersal control measures.

§§ 264.274-264.275 [Reserved]

§ 264.276 Food-chain crops.

The Regional Administrator may allow the growth of food-chain crops in or on the treatment zone only if the owner or operator satisfies the conditions of this section. The Regional Administrator will specify in the facility permit the specific food-chain crops which may be grown.

(a)(1) The owner or operator must demonstrate that there is no substantial risk to human health caused by the growth of such crops in or on the treatment zone by demonstrating, prior to the planting of such crops, that hazardous constituents other than cadmium:

(i) Will not be transferred to the food or feed portions of the crop by plant uptake or direct contact, and will not otherwise be ingested by food-chain animals (*e.g.*, by grazing); or

(ii) Will not occur in greater concentrations in or on the food or feed portions of crops grown on the treatment zone than in or on identical portions of the same crops grown on untreated soils under similar conditions in the same region.

(2) The owner or operator must make the demonstration required under this paragraph prior to the planting of crops at the facility for all constituents identified in Appendix VIII of Part 261 of this chapter that are reasonably expected to be in, or derived from, waste placed in or on the treatment zone.

(3) In making a demonstration under this paragraph, the owner or operator may use field tests, greenhouse studies, available data, or, in the case of existing units, operating data, and must:

(i) Base the demonstration on conditions similar to those present in the treatment zone, including soil characteristics (*e.g.*, pH, cation exchange capacity), specific wastes, application rates, application methods, and crops to be grown; and

(ii) Describe the procedures used in conducting any tests, including the sample selection criteria, sample size, analytical methods, and statistical procedures.

(4) If the owner or operator intends to conduct field tests or greenhouse studies in order to make the demonstration required under this paragraph, he must obtain a permit for conducting such activities.

(b) The owner or operator must comply with the following conditions if cadmium is contained in wastes applied to the treatment zone:

(1)(i) The pH of the waste and soil mixture must be 6.5 or greater at the time of each waste application, except for waste containing cadmium at concentrations of 2 mg/kg (dry weight) or less;

(ii) The annual application of cadmium from waste must not exceed 0.5 kilograms per hectare (kg/ha) on land used for production of tobacco, leafy vegetables, or root crops grown for human consumption. For other food-chain crops, the annual cadmium application rate must not exceed:

Time period	Annual Cd application rate (kilograms per hectare)
Present to June 30, 1984	2.0
July 1, 1984 to Dec. 31, 1986	1.25
Beginning Jan. 1, 1987	0.5

(iii) The cumulative application of cadmium from waste must not exceed 5 kg/ha if the waste and soil mixture has a pH of less than 6.5; and

(iv) If the waste and soil mixture has a pH of 6.5 or greater or is maintained at a pH of 6.5 or greater during crop growth, the cumulative application of cadmium from waste must not exceed: 5 kg/ha if soil cation exchange capacity (CEC) is less than 5 meq/100g; 10 kg/ha if soil CEC is 5–15 meq/100g; and 20 kg/ha if soil CEC is greater than 15 meq/100g; or

(2)(i) Animal feed must be the only food-chain crop produced;

(ii) The pH of the waste and soil mixture must be 6.5 or greater at the time of waste application or at the time the crop is planted, whichever occurs later, and this pH level must be maintained whenever food-chain crops are grown;

(iii) There must be an operating plan which demonstrates how the animal feed will be distributed to preclude ingestion by humans. The operating plan

must describe the measures to be taken to safeguard against possible health hazards from cadmium entering the food chain, which may result from alternative land uses; and

(iv) Future property owners must be notified by a stipulation in the land record or property deed which states that the property has received waste at high cadmium application rates and that food-chain crops must not be grown except in compliance with paragraph (b)(2) of this section.

§ 264.277 [Reserved]

§ 264.278 Unsaturated zone monitoring.

An owner or operator subject to this subpart must establish an unsaturated zone monitoring program to discharge the following responsibilities:

(a) The owner or operator must monitor the soil and soil-pore liquid to determine whether hazardous constituents migrate out of the treatment zone.

(1) The Regional Administrator will specify the hazardous constituents to be monitored in the facility permit. The hazardous constituents to be monitored are those specified under § 264.271(b).

(2) The Regional Administrator may require monitoring for principal hazardous constituents (PHCs) in lieu of the constituents specified under § 264.271(b). PHCs are hazardous constituents contained in the wastes to be applied at the unit that are the most difficult to treat, considering the combined effects of degradation, transformation, and immobilization. The Regional Administrator will establish PHCs if he finds, based on waste analyses, treatment demonstrations, or other data, that effective degradation, transformation, or immobilization of the PHCs will assure treatment at at least equivalent levels for the other hazardous constituents in the wastes.

(b) The owner or operator must install an unsaturated zone monitoring system that includes soil monitoring using soil cores and soil-pore liquid monitoring using devices such as lysimeters. The unsaturated zone monitoring system must consist of a sufficient number of sampling points at appropriate locations and depths to yield samples that:

(1) Represent the quality of background soil-pore liquid quality and the chemical make-up of soil that has not been affected by leakage from the treatment zone; and

(2) Indicate the quality of soil-pore liquid and the chemical make-up of the soil below the treatment zone.

(c) The owner or operator must establish a background value for each hazardous constituent to be monitored under paragraph (a) of this section. The permit will specify the background values for each constituent or specify the procedures to be used to calculate the background values.

(1) Background soil values may be based on a one-time sampling at a background plot having characteristics similar to those of the treatment zone.

(2) Background soil-pore liquid values must be based on at least quarterly sampling for one year at a background plot having characteristics similar to those of the treatment zone.

(3) The owner or operator must express all background values in a form necessary for the determination of statistically significant increases under paragraph (f) of this section.

(4) In taking samples used in the determination of all background values, the owner or operator must use an unsaturated zone monitoring system that complies with paragraph (b)(1) of this section.

(d) The owner or operator must conduct soil monitoring and soil-pore liquid monitoring immediately below the treatment zone. The Regional Administrator will specify the frequency and timing of soil and soil-pore liquid monitoring in the facility permit after considering the frequency, timing, and rate of waste application, and the soil permeability. The owner or operator must express the results of soil and soil-pore liquid monitoring in a form necessary for the determination of statistically significant increases under paragraph (f) of this section.

(e) The owner or operator must use consistent sampling and analysis procedures that are designed to ensure sampling results that provide a reliable indication of soil-pore liquid quality and the chemical make-up of the soil below the treatment zone. At a minimum, the owner or operator must implement procedures and techniques for:

(1) Sample collection;

(2) Sample preservation and shipment;

(3) Analytical procedures; and

(4) Chain of custody control.

(f) The owner or operator must determine whether there is a statistically significant change over background values for any hazardous constituent to be monitored under paragraph (a) of this section below the treatment zone each time he conducts soil monitoring and soil-pore liquid monitoring under paragraph (d) of this section.

(1) In determining whether a statistically significant increase has occurred, the owner or operator must compare the value of each constituent, as determined under paragraph (d) of this section, to the background value for that constituent according to the statistical procedure specified in the facility permit under this paragraph.

(2) The owner or operator must determine whether there has been a statistically significant increase below the treatment zone 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 soil and soil-pore liquid samples.

(3) The owner or operator must determine whether there is a statistically significant increase below the treatment zone using a statistical procedure that provides reasonable confidence that migration from the treatment zone will be identified. The Regional Administrator will specify a statistical procedure in the facility permit that he finds:

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

(ii) Provides a reasonable balance between the probability of falsely identifying migration from the treatment zone and the probability of failing to identify real migration from the treatment zone.

(g) If the owner or operator determines, pursuant to paragraph (f) of this section, that there is a statistically significant increase of hazardous constituents below the treatment zone, he must:

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

(2) Within 90 days, submit to the Regional Administrator an application for a permit modification to modify the operating practices at the facility in order to maximize the success of degradation, transformation, or immobilization processes in the treatment zone.

(h) If the owner or operator determines, pursuant to paragraph (f) of this section, that there is a statistically significant increase of hazardous constituents below the treatment zone, he may demonstrate that a source other than regulated units caused the increase or that the increase resulted from an 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 (g)(2) of this section, he is not relieved of the

requirement to submit a permit modification application within the time specified in paragraph (g)(2) of this section unless the demonstration made under this paragraph successfully shows that a source other than regulated units caused the increase or that the increase resulted from an 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 below the treatment zone that he intends to make a determination under this paragraph;

(2) Within 90 days, submit a report to the Regional Administrator demonstrating that a source other than the regulated units 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 unsaturated zone monitoring program at the facility; and

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

§ 264.279 Recordkeeping.

The owner or operator must include hazardous waste application dates and rates in the operating record required under § 264.73.

§ 264.280 Closure and post-closure care.

(a) During the closure period the owner or operator must:

(1) Continue all operations (including pH control) necessary to maximize degradation, transformation, or immobilization of hazardous constituents within the treatment zone as required under § 264.273(a), except to the extent such measures are inconsistent with paragraph (a)(8) of this section.

(2) Continue all operations in the treatment zone to minimize run-off of hazardous constituents as required under § 264.273(b);

(3) Maintain the run-on control system required under § 264.273(c);

(4) Maintain the run-off management system required under § 264.273(d);

(5) Control wind dispersal of hazardous waste if required under § 264.273(f);

(6) Continue to comply with any prohibitions or conditions concerning growth of food-chain crops under § 264.276;

(7) Continue unsaturated zone monitoring in compliance with § 264.278, except that soil-pore liquid monitoring may be terminated 90 days after the last application of waste to the treatment zone; and

(8) Establish a vegetative cover on the portion of the facility being closed at such time that the cover will not substantially impede degradation, transformation, or immobilization of hazardous constituents in the treatment zone. The vegetative cover must be capable of maintaining growth without extensive maintenance.

(b) For the purpose of complying with § 264.115, when closure is completed the owner or operator may submit to the Regional Administrator certification by an independent qualified soil scientist, in lieu of an independent registered professional engineer, that the facility has been closed in accordance with the specifications in the approved closure plan.

(c) During the post-closure care period the owner or operator must:

(1) Continue all operations (including pH control) necessary to enhance degradation and transformation and sustain immobilization of hazardous constituents in the treatment zone to the extent that such measures are consistent with other post-closure care activities;

(2) Maintain a vegetative cover over closed portions of the facility;

(3) Maintain the run-on control system required under § 264.273(c);

(4) Maintain the run-off management system required under § 264.273(d);

(5) Control wind dispersal of hazardous waste if required under § 264.273(f);

(6) Continue to comply with any prohibitions or conditions concerning growth of food-chain crops under § 264.276; and

(7) Continue unsaturated zone monitoring in compliance with § 264.278, expect that soil-pore liquid monitoring may be terminated 90 days after the last application of waste to the treatment zone.

(d) The owner or operator is not subject to regulation under paragraphs (a)(8) and (c) of this section if the Regional Administrator finds that the level of hazardous constituents in the treatment zone soil does not exceed the background value of those constituents by an amount that is statistically significant when using the test specified in paragraph (d)(3) of this section. The owner or operator may submit such a demonstration to the Regional Administrator at any time during the closure of post-closure care periods. For the purposes of this paragraph:

(1) The owner or operator must establish background soil values and determine whether there is a statistically significant increase over those values for all hazardous constituents specified in the facility permit under § 264.271 (b).

(i) Background soil values may be based on a one-time sampling of a background plot having characteristics similar to those of the treatment zone.

(ii) The owner or operator must express background values and values for hazardous constituents in the treatment zone in a form necessary for the determination of statistically significant increases under paragraph (d)(3) of this section.

(2) In taking samples used in the determination of background and treatment zone values, the owner or operator must take samples at a sufficient number of sampling points and at appropriate locations and depths to yield samples that represent the chemical make-up of soil that has not been affected by leakage from the treatment zone and the soil within the treatment zone, respectively.

(3) In determining whether a statistically significant increase has occurred, the owner or operator must compare the value of each constituent in the treatment zone to the background value for that constituent using a statistical procedure that provides reasonable confidence that constituent presence in the treatment zone will be identified. The owner or operator must use a statistical procedure that:

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

(ii) Provides a reasonable balance between the probability of falsely identifying hazardous constituent presence in the treatment zone and the probability of failing to identify real presence in the treatment zone.

(e) The owner or operator is not subject to regulation under Subpart F of this chapter if the Regional Administrator finds that the owner or operator satisfies paragraph (d) of this section and if unsaturated zone monitoring under § 264.278 indicates that hazardous constituents have not migrated beyond the treatment zone during the active life of the land treatment unit.

§ 264.281 Special requirements for ignitable or reactive waste.

The owner or operator must not apply ignitable or reactive waste to the treatment zone unless:

(a) The waste is immediately incorporated into the soil 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; or

(b) The waste is managed in such a way that it is protected from any material or conditions which may cause it to ignite or react.

§ 264.282 Special requirements for incompatible wastes.

The owner or operator must not place incompatible wastes, or incompatible wastes and materials (see Appendix V of this part for examples), in or on the same treatment zone, unless § 264.17(b) is complied with.

§§ 264.283–264.299 [Reserved]

Subpart N—Landfills

§ 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) A landfill (except for an existing portion of a landfill) must have:

(1) A liner that is designed, constructed, and installed to prevent any migration of wastes out of the landfill to the adjacent subsurface soil or ground water or surface water at anytime 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 migration 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 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.

(d) 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.

(e) 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.

(f) 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.

(g) 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.

§ 264.302 Double-lined landfills: Exemption from Subpart F ground-water protection requirements.

(a) The owner or operator of a double-lined landfill is not subject to regulation under Subpart F of this part if the following conditions are met:

(1) The landfill (including its underlying liners) must be located entirely above the seasonal high water table.

(2) The landfill must be underlain by two liners which are designed and constructed in a manner to prevent the migration of liquids into or out of the space between the liners. Both liners must meet all the specifications of § 264.301(a)(1).

(3) A leak detection system must be designed, constructed, maintained, and operated between the liners to detect any migration of liquid into the space between the liners.

(4) The landfill must have a leachate collection and removal system above the top liner that is designed, constructed, maintained, and operated in accordance with § 264.301(a)(2).

(b) If liquid leaks into the leak detection system, the owner or operator must:

(1) Notify the Regional Administrator of the leak in writing within seven days after detecting the leak; and

(2)(i) Within a period of time specified in the permit, remove accumulated liquid, repair or replace the liner which is leaking to prevent the migration of liquids through the liner, and obtain a certification from a qualified engineer that, to the best of his knowledge and opinion, the leak has been stopped; or

(ii) If a detection monitoring program pursuant to § 264.98 has already been established in the permit (to be complied with only if a leak occurs), begin to comply with that program and any other applicable requirements of Subpart F of this part within a period of time specified in the permit.

(c) 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.

§ 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 blisters; 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) The presence of liquids in leak detection systems, where installed to comply with § 264.302;

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

(4) The presence of leachate in and proper functioning of leachate collection and removal systems, where present.

§§ 264.304–264.308 [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.

§ 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 §§ 264.117–264.120, 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) Maintain and monitor the leak detection system in accordance with § 264.302, where such a system is present between double liner systems;

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

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

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

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

(c) During the post-closure care period, if liquid leaks into a leak detection system installed under § 264.302, the owner or operator must notify the Regional Administrator of the leak in writing within seven days after detecting the leak. The Regional Administrator will modify the permit to require compliance with the requirements of Subpart F of this Part.

§ 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 in 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 liquid waste.

(a) Bulk or non-containerized liquid waste or waste containing free liquids must not be placed in a landfill unless:

(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) 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.

§ 264.315 Special requirements for containers.

Unless they are very small, such as an ampule, containers must be either:

(a) At least 90 percent full when placed in the landfill; or

(b) Crushed, shredded, or similarly reduced in volume to the maximum practical extent before burial in the landfill.

§ 264.316 Disposal of small containers of hazardous waste in overpacked drums (lab packs).

Small containers of hazardous waste in overpacked drums (lab packs) may be placed in a landfill if the following requirements are met:

(a) Hazardous waste must be packaged in non-leaking inside containers. The inside containers must be of a design and constructed of a material that will not react dangerously

with, be decomposed by, or be ignited by the contained waste. Inside containers must be tightly and securely sealed. The inside containers must be of the size and type specified in the Department of Transportation (DOT) hazardous materials regulations (49 CFR Parts 173, 178, and 179), if those regulations specify a particular inside container for the waste.

(b) The inside containers must be overpacked in an open head DOT-specification metal shipping container (49 CFR Parts 178 and 179) of no more than 416-liter (110 gallon) capacity and surrounded by, at a minimum, a sufficient quantity of absorbent material to completely absorb all of the liquid contents of the inside containers. The metal outer container must be full after packing with inside containers and absorbent material.

(c) The absorbent material used must not be capable of reacting dangerously with, being decomposed by, or being ignited by the contents of the inside containers in accordance with § 264.17(b).

(d) Incompatible wastes, as defined in § 260.10 of this chapter, must not be placed in the same outside container.

(e) Reactive wastes, other than cyanide- or sulfide-bearing waste as defined in § 261.23(a)(5) of this chapter, must be treated or rendered non-reactive prior to packaging in accordance with paragraphs (a) through (d) of this section. Cyanide- and sulfide-bearing reactive waste may be packed in accordance with paragraphs (a) through (d) of this section without first being treated or rendered non-reactive.

§§ 264.317-264.339 [Reserved]

13. 40 CFR Part 264 is amended by adding Appendix IV to read as follows:

Appendix IV

Cochran's Approximation to the Behrens-Fisher Students' t-test

Using all the available background data (n_b readings), calculate the background mean (X_B) and background variance (s_B^2). For the single monitoring well under investigation [n_m reading), calculate the monitoring mean (X_m) and monitoring variance (s_m^2).

For any set of data ($X_1, X_2 \ldots X_n$) the mean is calculated by:

$$\overline{X} = \frac{X_1 + X_2 \ldots + X_n}{n}$$

and the variance is calculated by:

$$s^2 = \frac{(X_1 - \overline{X})^2 + (X_2 - \overline{X})^2 \ldots + (X_n - \overline{X})^2}{n-1}$$

where "n" denotes the number of observations in the set of data.

The t-test uses these data summary measures to calculate a t-statistic (t*) and a comparison t-statistic (t_c). The t* value is compared to the t_c value and a conclusion reached as to whether there has been a statistically significant change in any indicator parameter.

The t-statistic for all parameters except pH and similar monitoring parameters is:

$$t^* = \frac{X_m - \overline{X}_B}{\sqrt{\frac{s_m^2}{n_m} + \frac{s_B^2}{n_B}}}$$

If the value of this t-statistic is negative then there is no significant difference between the monitoring data and background data. It should be noted that significantly small negative values may be indicative of a failure of the assumption made for test validity or errors have been made in collecting the background data.

The t-statistic (t_c), against which t* will be compared, necessitates finding t_B and t_m from standard (one-tailed) tables where,

t_B = t-tables with ($n_B - 1$) degrees of freedom, at the 0.05 level of significance.

t_m = t-tables with ($n_m - 1$) degrees of freedom, at the 0.05 level of significance.

Finally, the special weightings W_B and W_m are defined as:

$$W_B = \frac{s_B^2}{n_B} \quad \text{and} \quad W_m = \frac{s_m^2}{n_m}$$

and so the comparison t-statistic is:

$$t_c = \frac{W_B t_B + W_m t_m}{W_B + W_m}$$

The t-statistic (t*) is now compared with the comparison t-statistic (t_c) using the following decision-rule:

If *t* is equal to or larger than* t_c, then conclude that there most likely *has been a significant increase* in this specific parameter.

If *t* is less than* t_c, then conclude that most likely *there has not been a change* in this specific parameter.

The t-statistic for testing pH and similar monitoring parameters is constructed in the same manner as previously described except the negative sign (if any) is discarded and the caveat concerning the negative value is ignored. The standard (two-tailed) tables are used in the construction t_c for pH and similar monitoring parameters.

If t* is equal to or larger than t_c, then conclude that there most likely *has been o significant increase* (if the initial t* had been negative, this would imply a significant decrease). If t* is less than t_c, then conclude that there most likely has been no change.

A further discussion of the test may be found in *Statistical Methods* (6th Edition, Section 4.14) by G. W. Snedecor and W. G. Cochran, or *Principles and Procedures of Statistics* (1st Edition, Section 5.8) by R. G. D. Steel and J. H. Torrie.

STANDARD T-TABLES 0.05 LEVEL OF SIGNIFICANCE

Degrees of freedom	t-values (one-tail)	t-values (two-tail)
1	6.314	12.706
2	2.920	4.303
3	2.353	3.182
4	2.132	2.776
5	2.015	2.571
6	1.943	2.447
7	1.895	2.365
8	1.860	2.306
9	1.833	2.262
10	1.812	2.228
11	1.796	2.201
12	1.782	2.179
13	1.771	2.160
14	1.761	2.145
15	1.753	2.131
16	1.746	2.120
17	1.740	2.110
18	1.734	2.101
19	1.729	2.093
20	1.725	2.088
21	1.721	2.080
22	1.717	2.074
23	1.714	2.069
24	1.711	2.064
25	1.708	2.060
30	1.697	2.042
40	1.684	2.021

Adopted from Table III of *"Statistical Tables for Biological, Agricultural, and Medical Research"* (1947, R. A. Fisher and F. Yates).

PART 265—INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

14. The authority citation for Part 265 reads as follows:

Authority: Sections 1006, 2002(a), and 3004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), and 6924).

15. In 40 CFR 265, Subpart L, § 265.253 is amended by revising paragraph (a) and removing paragraph (c), and § 265.258 is added to read as follows:

§ 265.253 Containment.

If leachate or run-off from a pile is a hazardous waste, then either:

(a)(1) The pile must be placed on an impermeable base that is compatible with the waste under the conditions of treatment or storage;

(2) 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 pile during peak discharge from at least a 25-year storm;

(3) 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; and

(4) 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 to maintain design capacity of the system; or

* * * * *

§ 265.258 Closure and post-closure care.

(a) At closure, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste unless § 261.3(d) of this chapter applies; or

(b) If, after removing or decontaminating all residues and making all reasonable efforts to effect removal or decontamination of contaminated components, subsoils, structures, and equipment as required in paragraph (a) of this section, the owner or operator finds that not all contaminated subsoils can be practicably removed or decontaminated, he must close the facility and perform post-closure care in accordance with the closure and post-closure requirements that apply to landfills (§ 265.310).

16. In 40 CFR Part 265, Subpart M is amended by revising § 265.272 (b), (c), and (d), and adding paragraph (e), and by revising §§ 265.276(c)(2)(iv), 265.279, and 265.281 and in § 265.280 by revising paragraphs (c) and (d) and adding new paragraphs (e) and (f) to read as follows:

§ 265.272 General operating requirements.

* * * * *

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

(c) The owner or operator must design, construct, operate, and maintain a run-off management system capable of collecting and controlling a water volume at least equivalent to a 24-hour, 25-year storm.

(d) 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.

(e) If the treatment zone contains particulate matter which may be subject to wind dispersal, the owner or operator must manage the unit to control wind dispersal.

§ 265.276 Food chain crops.

* * * * *

(c) * * *

(2) * * *

(iv) Future property owners are notified by a stipulation in the land record or property deed which states that the property has received waste at high cadmium application rates and that food chain crops must not be grown except in compliance with paragraph (c)(2) of this section.

§ 265.279 Recordkeeping.

The owner or operator must include hazardous waste application dates and rates in the operating record required under § 265.73.

§ 265.280 Closure and post-closure care.

* * * * *

(c) The owner or operator must consider at least the following methods in addressing the closure and post-closure care objectives of paragraph (a) of this section:

(1) Removal of contaminated soils;

(2) Placement of a final cover, considering:

(i) Functions of the cover (e.g., infiltration control, erosion and run-off control, and wind erosion control); and

(ii) Characteristics of the cover, including material, final surface contours, thickness, porosity and permeability, slope, length of run of slope, and type of vegetation on the cover; and

(3) Monitoring of ground water.

(d) In addition to the requirements of Subpart G of this part, during the closure period the owner or operator of a land treatment facility must:

(1) Continue unsaturated zone monitoring in a manner and frequency specified in the closure plan, except that soil pore liquid monitoring may be terminated 90 days after the last application of waste to the treatment zone;

(2) Maintain the run-on control system required under § 265.272(b);

(3) Maintain the run-off management system required under § 265.272(c); and

(4) Control wind dispersal of particulate matter which may be subject to wind dispersal.

(e) For the purpose of complying with § 265.115, when closure is completed the owner or operator may submit to the Regional Administrator certification both by the owner or operator and by an independent qualified soil scientist, in lieu of an independent registered professional engineer, that the facility has been closed in accordance with the specifications in the approved closure plan.

(f) In addition to the requirements of § 265.117, during the post-closure care period the owner or operator of a land treatment unit must:

(1) Continue soil-core monitoring by collecting and analyzing samples in a manner and frequency specified in the post-closure plan;

(2) Restrict access to the unit as appropriate for its post-closure use;

(3) Assure that growth of food chain crops complies with § 265.276; and

(4) Control wind dispersal of hazardous waste.

§ 265.281 Special requirements for ignitable or reactive waste.

Ignitable or reactive waste must not be land treated unless:

(a) The waste is immediately incorporated into the soil so that:

(1) The resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under §§ 265.21 or 261.23 of this chapter; and

(2) Section 264.17(b) is complied with; or

(b) The waste is managed in such a way that it is protected from any material or conditions which may cause it to ignite or react.

17. In 40 CFR 265, Subpart N is amended by revising §§ 265.302 (a), (b) and (c), 265.312, and 265.314(a)(1), to read as follows:

§ 265.302 General operating requirements.

(a) 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.

(b) 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.

(c) 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.

* * * * *

§ 265.312 Special requirements for ignitable or reactive waste.

(a) Except as provided in paragraph (b) of this section, and in § 265.316, 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 or material no longer meets the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this chapter; and

(2) Section 265.17(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 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 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 in cells that contain or will contain other wastes which may generate heat sufficient to cause ignition of the waste.

§ 265.314 Special requirements for liquid waste.

(a) Bulk or non-containerized liquid waste or waste containing free liquids must not be placed in a landfill unless:

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

* * * * *

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

18. The authority citation for 40 CFR Part 122 is revised to read as follows:

Authority: Resource Conservation and Recovery Act, as amended, (RCRA), 42 U.S.C. § 6901 *et seq.;* the Safe Drinking Water Act, 42 U.S.C. § 300f *et seq.,* the Clean Water Act, 33 U.S.C. § 1251 *et seq.,* and the Clean Air Act, 42 U.S.C. § 1857 *et seq.*

19. In 40 CFR Part 122, § 122.10(b) is amended to read as follows:

§ 122.10 Schedules of compliance

* * * * *

(b) *Alternate schedules of compliance.* A RCRA, UIC, or NPDES permit applicant or permittee may cease conducting regulated activities (by receiving a terminal volume of hazardous waste and (1) for treatment and storage HWM facilities, closing pursuant to applicable requirements, and (2) for disposal HWM facilities, closing and conducting post-closure care pursuant to applicable requirements; by plugging and abandonment for UIC wells; or by termination of direct discharge for NPDES sources) rather than continue to operate and meet permit requirements as follows:

* * * * *

20. In 40 CFR Part 122, § 122.15(a)(7) is amended by adding new paragraphs (iv), (v), (vi), (vii), and (viii) to read as follows:

§ 122.15 Modification or revocation and reissuance of permits.

(a) * * *

(7) *For RCRA only,* the Director may modify a permit:

* * * * *

(iv) When the corrective action program specified in the permit under § 264.100 has not brought the regulated unit into compliance with the ground-water protection standard within a reasonable period of time.

(v) To include a detection monitoring program meeting the requirements of § 264.98, when the owner or operator has been conducting a compliance monitoring program under § 264.99 or a corrective action program under § 264.100 and the compliance period ends before the end of the post-closure care period for the unit.

(vi) When a permit requires a compliance monitoring program under § 264.99, but monitoring data collected prior to permit issuance indicate that the facility is exceeding the ground-water protection standard.

(vii) To include conditions applicable to units at a facility that were not previously included in the facility's permit.

(viii) When a land treatment unit is not achieving complete treatment of hazardous constituents under its current permit conditions.

* * * * *

21. In 40 CFR Part 122, § 122.17 is amended by adding new paragraphs (e)(6), (7) and (8) to read as follows:

§ 122.17 Minor modifications of permits.

* * * * *

(e) * * *

(6) Change the treatment program requirements for land treatment units under § 264.271 to improve treatment of hazardous constituents, provided that the change is minor.

(7) Change any conditions specified in the permit for land treatment units to reflect the results of field tests or laboratory analyses used in making a treatment demonstration in accordance with § 122.27(c), provided that the change is minor.

(8) Allow a second treatment demonstration for land treatment to be conducted when the results of the first demonstration have not shown the conditions under which the waste or wastes can be treated completely as required by § 264.272(a), provided the conditions for the second demonstration are substantially the same as the conditions for the first demonstration.

* * * * *

22. In 40 CFR Part 122, § 122.21(d) is amended by adding a third sentence to the introductory text preceding paragraph (1), and adding a new paragraph (4) to read as follows:

§ 122.21 Purpose and scope of Subpart B.

* * * * *

(d) * * *

Owners and operators of hazardous waste management units must have permits during the active life (including the closure period) of the unit, and, for any unit which closes after [insert date 6 months after date of promulgation], during any post-closure care period required under § 264.117 and during any compliance period specified under § 264.96, including any extension of that compliance period under § 264.96(c).

* * * * *

(4) *Permits for less than an entire facility.* EPA may issue or deny a permit for one or more units at a facility without simultaneously issuing or denying a permit to all of the units at the facility. The interim status of any unit for which a permit has not been issued or denied is not affected by the issuance or denial of a permit to any other unit at the facility.

* * * * *

23. In 40 CFR Part 122, § 122.25 is amended by revising paragraphs (a)(5), (a)(13), (b)(3) and (b)(4), and by adding new paragraphs (b)(6), (b)(7) and (c) to read as follows:

§ 122.25 Contents of Part B.

* * * * *

(a) * * *

(5) A copy of the general inspection schedule required by § 264.15(b). Include, where applicable, as part of the inspection schedule, specific requirements in §§ 264.174, 264.194, 264.226, 264.254, 264.273, and 264.303.

* * * * *

(13) A copy of the closure plan and, where applicable, the post-closure plan required by §§ 264.112 and 264.118. Include where applicable, as part of the plans, specific requirements in §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, and 264.351.

* * * * *

(b) * * *

(3) For facilities that store, treat, or dispose of hazardous waste in *surface impoundments,* except as otherwise provided in § 264.1:

(i) A list of the hazardous wastes placed or to be placed in each surface impoundment;

(ii) Detailed plans and an engineering report describing how the surface impoundment is or will be designed, constructed, operated, and maintained to meet the requirements of § 264.221. This submission must address the following items as specified in § 264.221:

(A) The liner system (except for an existing portion of a surface impoundment). If an exemption from the requirement for a liner is sought as provided by § 264.221(b), submit detailed plans and engineering and hydrogeologic reports as appropriate, describing alternate design and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous constituents into the ground water or surface water at any future time;

(B) Prevention of overtopping; and

(C) Structural intergrity of dikes;

(iii) If an exemption from Subpart F of Part 264 is sought, as provided by § 264.222(a), detailed plans and an engineering report explaining the location of the saturated zone in relation to the surface impoundment, and the design of a double-liner system that incorporates a leak detection system between the liners;

(iv) A description of how each surface impoundment, including the liner and cover systems and appurtenances for control of overtopping, will be inspected in order to meet the requirements of § 264.226 (a) and (b). This information should be included in the inspection plan submitted under paragraph (a)(5) of this section;

(v) A certification by a qualified engineer which attests to the structural integrity of each dike, as required under § 264.226(c). For new units, the owner or operator must submit a statement by a qualified engineer that he will provide such a certification upon completion of construction in accordance with the plans and specifications;

(vi) A description of the procedure to be used for removing a surface impoundment from service, as required under § 264.227 (b) and (c). This information should be included in the contingency plan submitted under paragraph (a)(7) of this section;

(vii) A description of how hazardous waste residues and contaminated materials will be removed from the unit at closure, as required under § 264.228(a)(1). For any wastes not to be removed from the unit upon closure, the owner or operator must submit detailed plans and an engineering report describing how § 264.228 (a)(2) and (b) will be complied with. This information should be included in the closure plan and, where applicable, the post-closure plan submitted under paragraph (a)(13) of this section;

(viii) If ignitable or reactive wastes are to be placed in a surface impoundment, an explanation of how § 264.229 will be complied with;

(ix) If incompatible wastes, or incompatible wastes and materials will be placed in a surface impoundment, an explanation of how § 264.230 will be complied with.

(4) For facilities that store or treat hazardous waste in *waste piles,* except as otherwise provided in § 264.1:

(i) A list of hazardous wastes placed or to be placed in each waste pile;

(ii) If an exemption is sought to § 264.251 and Subpart F of Part 264 as provided by § 264.250(c), an explanation of how the requirements of § 264.250(c) will be complied with;

(iii) Detailed plans and an engineering report describing how the pile is or will be designed, constructed, operated and maintained to meet the requirements of § 264.251. This submission must address the following items as specified in § 264.251:

(A) The liner system (except for an existing portion of a pile). If an exemption from the requirement for a liner is sought, as provided by § 264.251(b), the owner or operator must submit detailed plans and engineering and hydrogeologic reports as appropriate, describing alternate design and operating pratices that will, in conjunction with location aspects, prevent the migration of any hazardous constituents into the ground water or surface water at any future time;

(B) Control of run-on;

(C) Control of run-off;

(D) Management of collection and holding units associated with run-on and run-off control systems; and

(E) Control of wind dispersal of particulate matter, where applicable;

(iv) If an exemption from Subpart F of Part 264 is sought as provided by §§ 264.252 or 264.253, submit detailed plans and an engineering report describing how the requirements of §§ 264.252(a) or 264.253(a) will be complied with;

(v) A description of how each waste pile, including the liner and appurtenances for control of run-on and run-off, will be inspected in order to meet the requirements of § 264.254 (a) and (b). This information should be included in the inspection plan submitted under paragraph (a)(5) of this section. If an exemption is sought to Subpart F of Part 264 pursuant to § 264.253, describe in the inspection plan how the inspection requirements of § 264.253(a)(3) will be complied with;

(vi) If treatment is carried out on or in the pile, details of the process and equipment used, and the nature and quality of the residuals;

(vii) If ignitable or reactive wastes are to be placed in a waste pile, an explanation of how the requirements of § 264.256 will be complied with;

(viii) If incompatible wastes, or incompatible wastes and materials will be placed in a waste pile, an explanation of how § 264.257 will be complied with;

(ix) A description of how hazardous waste residues and contaminated materials will be removed from the waste pile at closure, as required under § 264.258(a). For any waste not to be removed from the waste pile upon closure, the owner or operator must submit detailed plans and an engineering report describing how § 264.310 (a) and (b) will be complied with. This information should be included in the closure plan and, where applicable, the post-closure plan submitted under paragraph (a)(13) of this section.

* * * * *

(6) For facilities that use *land treatment* to dispose of hazardous waste, except as otherwise provided in § 264.1:

(i) A description of plans to conduct a treatment demonstration as required under § 264.272. The description must include the following information:

(A) The wastes for which the demonstration will be made and the potential hazardous constituents in the wastes;

(B) The data sources to be used to make the demonstration (e.g., literature, laboratory data, field data, or operating data);

(C) Any specific laboratory or field test that will be conducted, including

(*1*) the type of test (e.g., column leaching, degradation);

(*2*) materials and methods, including analytical procedures;

(*3*) expected time for completion;

(*4*) characteristics of the unit that will be simulated in the demonstration, including treatment zone characteristics, climatic conditions, and operating practices;

(ii) A description of a land treatment program, as required under § 264.271. This information must be submitted with the plans for the treatment demonstration, and updated following the treatment demonstration. The land treatment program must address the following items:

(A) The wastes to be land treated;

(B) Design measures and operating practices necessary to maximize treatment in accordance with § 264.273(a) including:

(*1*) Waste application method and rate;

(*2*) Measures to control soil pH;

(*3*) Enhancement of microbial or chemical reactions;

(*4*) Control of moisture content;

(C) Provisions for unsaturated zone monitoring, including:

(*1*) Sampling equipment, procedures, and frequency;

(*2*) Procedures for selecting sampling locations;

(*3*) Analytical procedures;

(*4*) Chain of custody control;

(*5*) Procedures for establishing background values;

(*6*) Statistical methods for interpreting results;

(*7*) The justification for any hazardous constituents recommended for selection as principal hazardous constituents, in accordance with the criteria for such selection in § 264.278(a);

(D) A list of hazardous constituents reasonably expected to be in, or derived from, the wastes to be land treated based on waste analysis performed pursuant to § 264.13;

(E) The proposed dimensions of the treatment zone;

(iii) A description of how the unit is or will be designed, constructed, operated, and maintained in order to meet the requirements of § 264.273. This submission must address the following items:

(A) Control of run-on;

(B) Collection and control of run-off;

(C) Minimization of run-off of hazardous constituents from the treatment zone;

(D) Management of collection and holding facilities associated with run-on and run-off control systems;

(E) Periodic inspection of the unit. This information should be included in the inspection plan submitted under paragraph (a)(5) of this section;

(F) Control of wind dispersal of particulate matter, if applicable;

(iv) If food-chain crops are to be grown in or on the treatment zone of the land treatment unit, a description of how the demonstration required under § 264.276(a) will be conducted including:

(A) Characteristics of the food-chain crop for which the demonstration will be made;

(B) Characteristics of the waste, treatment zone, and waste application method and rate to be used in the demonstration;

(C) Procedures for crop growth, sample collection, sample analysis, and data evaluation;

(D) Characteristics of the comparison crop including the location and conditions under which it was or will be grown.

(v) If food-chain crops are to be grown, and cadmium is present in the land-treated waste, a description of how the requirements of § 264.276(b) will be complied with;

(vi) A description of the vegetative cover to be applied to closed portions of the facility, and a plan for maintaining such cover during the post-closure care period, as required under § 264.280(a)(8) and § 264.280(c)(2). This information should be included in the closure plan and, where applicable, the post-closure care plan submitted under paragraph (a)(13) of this section;

(vii) If ignitable or reactive wastes will be placed in or on the treatment zone, an explanation of how the requirements of § 264.281 will be complied with;

(viii) If incompatible wastes, or incompatible wastes and materials, will be placed in or on the same treatment zone, an explanation of how § 264.282 will be complied with.

(7) For facilities that dispose of hazardous waste in *landfills,* except as otherwise provided in § 264.1:

(i) A list of the hazardous wastes placed or to be placed in each landfill or landfill cell;

(ii) Detailed plans and an engineering report describing how the landfill is or will be designed, constructed, operated, and maintained to comply with the requirements of § 264.301. This submission must address the following items as specified in § 264.301:

(A) The liner system and leachate collection and removal system (except for an existing portion of a landfill). If an exemption from the requirements for a liner and a leachate collection and removal system is sought as provided by § 264.301(b), submit detailed plans and engineering and hydrogeologic reports as appropriate, describing alternate design and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous constituent into the ground water or surface water at any future time;

(B) Control of run-on;

(C) Control of run-off;

(D) Management of collection and holding facilities associated with run-on and run-off control systems; and

(E) Control of wind dispersal of particulate matter, where applicable.

(iii) If an exemption from Subpart F of Part 264 is sought, as provided by § 264.302(a), the owner or operator must submit detailed plans and an engineering report explaining the location of the saturated zone in relation to the landfill, the design of a double-liner system that incorporates a leak detection system between the liners, and a leachate collection and removal system above the liners;

(iv) A description of how each landfill, including the liner and cover systems, will be inspected in order to meet the requirements of § 264.303 (a) and (b). This information should be included in the inspection plan submitted under paragraph (a)(5) of this section;

(v) Detailed plans and an engineering report describing the final cover which will be applied to each landfill or landfill cell at closure in accordance with § 264.310(a), and a description of how each landfill will be maintained and monitored after closure in accordance with § 264.310(b). This information should be included in the closure and post-closure plans submitted under paragraph (a)(13) of this section.

(vi) If ignitable or reactive wastes will be landfilled, an explanation of how the requirements of § 264.312 will be complied with;

(vii) If incompatible wastes, or incompatible wastes and materials will be landfilled, an explanation of how § 264.313 will be complied with;

(viii) If bulk or non-containerized liquid waste or waste containing free liquids is to be landfilled, an explanation of how the requirements of § 264.314 will be complied with;

(ix) If containers of hazardous waste are to be landfilled, an explanation of how the requirements of §§ 264.315 or 264.316, as applicable, will be complied with.

(c) *Additional information requirements.* The following additional information regarding protection of ground water is required from owners or operators of hazardous waste surface impoundments, piles, land treatment units, and landfills, except as otherwise provided in § 264.90(b):

(1) A summary of the ground-water monitoring data obtained during the interim status period under §§ 265.90–265.94, where applicable.

(2) Identification of the uppermost aquifer and aquifers hydraulically interconnected beneath the facility property, including ground-water flow direction and rate, and the basis for such identification (i.e., the information obtained from hydrogeologic investigations of the facility area).

(3) On the topographic map required under paragraph (a) (19) of this section, a delineation of the waste management area, the property boundary, the proposed "point of compliance" as defined under § 264.95, the proposed

location of ground-water monitoring wells as required under § 264.97 and, to the extent possible, the information required in paragraph (c)(2) of this section;

(4) A description of any plume of contamination that has entered the ground water from a regulated unit at the time that the application is submitted that:

(i) Delineates the extent of the plume on the topographic map required under paragraph (a)(19) of this section;

(ii) Identifies the concentration of each Appendix VIII of Part 261 of this chapter constituent throughout the plume or identifies the maximum concentrations of each Appendix VIII constituent in the plume.

(5) Detailed plans and an engineering report describing the proposed ground-water monitoring program to be implemented to meet the requirements of § 264.97;

(6) If the presence of hazardous constituents has *not* been detected in the ground water at the time of permit application, the owner or operator must submit sufficient information, supporting data, and analyses to establish a detection monitoring program which meets the requirements of § 264.98. This submission must address the following items as specific under § 264.98:

(i) A proposed list of indicator parameters, waste constituents, or reaction products that can provide a reliable indication of the presence of hazardous constituents in the ground water;

(ii) A proposed ground-water monitoring system;

(iii) Background values for each proposed monitoring parameter or constituent, or procedures to calculate such values; and

(iv) A description of proposed sampling, analysis and statistical comparison procedures to be utilized in evaluating ground-water monitoring data.

(7) If the presence of hazardous constituents *has* been detected in the ground water at the point of compliance at the time of permit application, the owner or operator must submit sufficient information, supporting data, and analyses to establish a compliance monitoring program which meets the requirements of § 264.99. The owner or operator must also submit an engineering feasibility plan for a corrective action program necessary to meet the requirements of § 264.100, except as provided in § 264.98(h)(5). To demonstrate compliance with § 264.99, the owner or operator must address the following items:

(i) A description of the wastes previously handled at the facility;

(ii) A characterization of the contaminated ground water, including concentrations of hazardous constituents;

(iii) A list of hazardous constituents for which compliance monitoring will be undertaken in accordance with §§ 264.97 and 264.99;

(iv) Proposed concentration limits for each hazardous constituent, based on the criteria set forth in § 264.94(a), including a justification for establishing any alternate concentration limits;

(v) Detailed plans and an engineering report describing the proposed ground-water monitoring system, in accordance with the requirements of § 264.97; and

(vi) A description of proposed sampling, analysis and statistical comparison procedures to be utilized in evaluating ground-water monitoring data.

(8) If hazardous constituents have been measured in the ground water which exceed the concentration limits established under § 264.94 Table 1, or if ground-water monitoring conducted at the time of permit application under §§ 265.90–265.94 at the waste boundary indicates the presence of hazardous constituents from the facility in ground water over background concentrations, the owner or operator must submit sufficient information, supporting data, and analyses to establish a corrective action program which meets the requirements of § 264.100. However, an owner or operator is not required to submit information to establish a corrective action program if he demonstrates to the Regional Administrator that alternate concentration limits will protect human health and the environment after considering the criteria listed in § 264.94(b). An owner or operator who is not required to establish a corrective action program for this reason must instead submit sufficient information to establish a compliance monitoring program which meets the requirements of § 264.99 and paragraph (c)(6) of this section. To demonstrate compliance with § 264.100, the owner or operator must address, at a minimum, the following items:

(i) A characterization of the contaminated ground water, including concentrations of hazardous constituents;

(ii) The concentration limit for each hazardous constituent found in the ground water as set forth in § 264.94;

(iii) Detailed plans and an engineering report describing the corrective action to be taken; and

(iv) A description of how the ground-water monitoring program will assess the adequacy of the corrective action.

24. In 40 CFR Part 122, § 122.27 is amended by revising the section title and adding new paragraph (c) to read as follows:

§ 122.27 Short term and phased permits.

* * * * *

(c) Permits for land treatment demonstrations using field tests or laboratory analyses.

(1) For the purpose of allowing an owner or operator to meet the treatment demonstration requirements of § 264.272 of this chapter, the Director may issue a treatment demonstration permit. The permit must contain only those requirements necessary to meet the standards in § 264.272(c). The permit may be issued either as a treatment or disposal permit covering only the field test or laboratory analyses, or as a two-phase facility permit covering the field tests, or laboratory analyses, and design, construction, operation and maintenance of the land treatment unit.

(i) The Director may issue a two-phase facility permit if he finds that, based on information submitted in Part B of the application, substantial, although incomplete or inconclusive, information already exists upon which to base the issuance of a facility permit.

(ii) If the Director finds that not enough information exists upon which he can establish permit conditions to attempt to provide for compliance with all of the requirements of Subpart M, he must issue a treatment demonstration permit covering only the field test or laboratory analyses.

(2) If the Director finds that a phased permit may be issued, he will establish, as requirements in the first phase of the facility permit, conditions for conducting the field tests or laboratory analyses. These permit conditions will include design and operating parameters (including the duration of the tests or analyses and, in the case of field tests, the horizontal and vertical dimensions of the treatment zone), monitoring procedures, post-demonstration clean-up activities, and any other conditions which the Director finds may be necessary under § 264.272(c). The Director will include conditions in the second phase of the facility permit to attempt to meet all Subpart M requirements pertaining to unit design, construction, operation, and maintenance. The Director will establish these conditions in the second phase of the permit based upon the substantial but incomplete or inconclusive

information contained in the Part B application.

(i) The first phase of the permit will be effective as provided in § 124.15(b) of this Chapter.

(ii) The second phase of the permit will be effective as provided in paragraph (c)(4) of this section.

(3) When the owner or operator who has been issued a two-phase permit has completed the treatment demonstration, he must submit to the Director a certification, signed by a person authorized to sign a permit application or report under § 122.6, that the field tests or laboratory analyses have been carried out in accordance with the conditions specified in phase one of the permit for conducting such tests or analyses. The owner or operator must also submit all data collected during the field tests or laboratory analyses within 90 days of completion of those tests or analyses unless the Director approves a later date.

(4) If the Director determines that the results of the field tests or laboratory analyses meet the requirements of § 264.272 of this Chapter, he will modify the second phase of the permit to incorporate any requirements necessary for operation of the facility in compliance with Part 264, Subpart M, of this Chapter, based upon the results of the field tests or laboratory analyses.

(i) This permit modification may proceed as a minor modification under § 122.17, provided any such change is minor, or otherwise will proceed as a modification under § 122.15(a)(2).

(ii) If no modifications of the second phase of the permit are necessary, or if only minor modifications are necessary and have been made, the Director will give notice of his final decision to the permit applicant and to each person who submitted written comments on the phased permit or who requested notice of final decision on the second phase of the permit. The second phase of the permit then will become effective as specified in § 124.15(b).

(iii) If modifications under § 122.15(a)(2) are necessary, the second phase of the permit will become effective only after those modifications have been made.

[FR Doc. 82-19469 Filed 7-23-82; 8:45 am]
BILLING CODE 6560-50-M

40 CFR Part 123

[SWH-FRL 2089-4]

Requirements for Authorization of State Hazardous Waste Programs

AGENCY: U.S. Environmental Protection Agency (EPA).

ACTION: Final rule and interim final rule with request for comments.

SUMMARY: On January 26, 1981, EPA published amendments to the schedule for authorization of State hazardous waste programs under the Resource Conservation and Recovery Act. Those amendments were published as an interim final rule with a request for comments. In response to comments, EPA is today changing the schedule for submission of State applications for interim authorization and the date by which State enabling legislation must be in place. These changes, which are promulgated as a final rule, will provide additional flexibility in the State application process but will not alter substantive environmental standards or create significant economic impacts. EPA is also today promulgating the remainder of the January 1981 amendments as a final rule.

In addition, EPA is today promulgating an interim final amendment to Section 123.129, providing a limited exception to the contents of Component A of Phase II interim authorization.

DATES: The amendments to Sections 123.122, 123.125, 123.128, and 123.137 published today are final rules effective July 26, 1982. (The interim final amendments published on January 26, 1981, were effective upon publication.)

The amendment to Section 123.129 published today is an interim final rule effective July 26, 1982. The Agency will accept comments on this amendment until September 24, 1982.

ADDRESSES: Comments on the amendment to Section 123.129 should be sent to Docket Clerk (Docket No. 3006), Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M St. S.W., Washington, D.C. 20460.

The public docket for these regulations is located at the U.S. Environmental Protection Agency, Room S-269C, 401 M St. S.W., Washington, D.C. 20460, and is available for viewing from 9:00 AM to 4:00 PM, Monday through Friday, excluding holidays.

FOR FURTHER INFORMATION CONTACT: Bruce R. Weddle, Deputy Director, State Programs and Resource Recovery Division, Office of Solid Waste (WH-563), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, (202) 755-9107.

SUPPLEMENTARY INFORMATION:

I. Background

On May 19, 1980 (45 FR 33384), EPA published as a final rule the requirements for interim authorization of State hazardous waste programs under Section 3006(c) of the Resource Conservation and Recovery Act (RCRA). These requirements, codified in 40 CFR Part 123, Subpart F, established among other things two phases of interim authorization and a schedule for State applications for these phases. The first phase (Phase I) authorizes States to administer a hazardous waste program, which includes the identification and listing of hazardous wastes; the regulation of generators and transporters of hazardous wastes; and the enforcement of preliminary standards for hazardous waste treatment, storage and disposal facilities. The second phase (Phase II) authorizes States to administer a permit program for treatment, storage and disposal facilities.

On January 26, 1981 (46 FR 8298), EPA published amendments to the schedule for State applications for Phase II of interim authorization. Those amendments were necessary to reconcile Phase II with changes in the schedule for promulgation of the Federal permitting standards for hazardous waste management facilities, codified in 40 CFR Part 264. As noted in the preamble to those amendments, "the substantive program requirements for Phase II for the most part have not been changed * * * Rather, these amendments implement needed changes in the schedule and related requirements for Phase II to keep the interim authorization program in correspondence with the underlying Federal program" (46 FR 8300).

In those amendments, EPA divided Phase II of interim authorization into "components". Each component corresponds to one or more specific categories of facilities requiring RCRA permits (e.g., incinerators, landfills, etc.). State programs can receive interim authorization to issue permits to the specific category or categories of facilities covered by each component. States may apply for authorization for each component as it becomes available and is announced in the Federal Register, or may wait until all components are announced and apply for all of Phase II authorization at that time. This approach gives States the

flexibility to adapt their Phase II application schedule to State needs.

II. Regulatory Changes Adopted Today

EPA received comments on the amendments to Part 123, Subpart F, from several State and local officials and members of the regulated community. In response to those comments, EPA is today changing a number of provisions dealing with the schedule for interim authorization.

Several commenters suggested that 40 CFR §§ 123.122 and 123.125, which establish the schedule for State applications for interim authorization and the deadline for State enabling legislation, be revised. After consideration of these comments, EPA has decided to modify these provisions to provide additional flexibility to the States. These changes are discussed in the following parts of this preamble. Section II.H. discusses an amendment to 40 CFR § 123.129, which provides a limited exception to the contents of Component A of Phase II interim authorization.

A. *Deadline for Interim Authorization Applications.* Section 123.122(c)(1), as amended on January 26, 1981, provides that the interim authorization application period closes six months after the effective date of the final component of Phase II. EPA believes that an application deadline is necessary to signal the end of the interim authorization application process and to encourage States to move on to final authorization. However, EPA recognizes that some States which are committed to administer an interim authorization program may come close but may still not be able to meet this deadline, due to scheduling problems created by State legislative and regulatory processes.

Therefore, today's amendments add a provision that "the Regional Administrator may extend the application period for good cause." EPA intends that this extension only be granted on a case-by-case basis to States which have made a good faith effort to meet the application deadline and which can submit a complete application within a reasonable period of time. States which will not be ready to apply for interim authorization within a reasonable period of time should turn their efforts to preparing a final authorization program. More than a brief extension of the interim authorization application period would be counter-productive, due to the limited duration of interim authorization (it expires 2 years after the effective date of the last component) and the need for States to obtain final authorization by the end of interim authorization (in order to avoid reversion of the program to EPA).

B. *Application Period for Phase I.* In the January 1981 amendments, § 123.122(c)(3) provided that States could apply for Phase I *alone* (without applying for any component of Phase II) until "six months after the effective date of the first component of Phase II." This deadline for applying for Phase I alone was January 13, 1982.

The purpose of this deadline was to ensure that State implementation of Phase II was not unreasonably delayed. Since the adoption of this deadline, however, there have been a number of delays and revisions in the Federal Phase II regulations. As a result, a number of States which desire to implement the RCRA Phase I program are not yet prepared to apply for Phase II.

Therefore, EPA has decided to extend the period during which States may apply for interim authorization for Phase I alone. Section 123.122(c)(3) is today removed from the State authorization requirements. A State may now apply for Phase I at any time prior to the expiration of the interim authorization application period. (This period is established in 40 CFR § 123.122(c)(1), as discussed above.)

C. *Application Period for Individual Phase II Components.* The January 1981 amendments also set time limits for State applications for individual components of Phase II. Sections 123.122 (c)(5) and (6) established a one year period during which a State could apply for a particular Phase II component without also applying for subsequent components. This provision created difficulties similar to those discussed above for the Phase I deadline. Comments received included the request that more time be provided for Phase II applications.

In response to comments, EPA has decided to extend the application period for each component of Phase II. Sections 123.122(c) (5) and (6) are today removed from the State authorization requirements. A State may now apply for an individual component of Phase II (without applying for any other component) at any time prior to the expiration of the interim authorization application period.

D. *Requirement to Apply for All Parts of Interim Authorization.* Section 123.122(c)(7), as amended on January 26, 1981, requires States which have received partial interim authorization (i.e., interim authorization for Phase I alone or Phase I and some components of Phase II) to apply for *all* of Phase II within 6 months of the effective date of the last component of Phase II. Section 123.137 contains the related stipulation that States with partial interim authorization which fail to submit an amended application for all of Phase II by the above deadline will terminate and responsibility for RCRA implementation will revert to EPA.

EPA recognizes, as noted above, that some States may come close but still not be able to meet this deadline. In addition, some States with partial interim authorization may not wish to apply for the remaining elements of interim authorization and may decide, instead, to prepare an application for final authorization. (States may apply for final authorization at any time after the announcement of the last component of Phase II. See § 123.31(c)(1), as amended on January 26, 1981.)

However, States with partial interim authorization may find that they are unable to apply for and receive final authorization by the deadline cited above in §§ 123.122(c)(7) and 123.137, particularly given the delays in the promulgation of the underlying Federal program. In those circumstances, such States would lose their partial interim authorization. This result would disrupt administration of the hazardous waste program and complicate the transition to State responsibility for RCRA implementation.

To avoid such a result, EPA has today added a provision to those sections that "the Regional Administrator may extend this deadline for good cause." EPA intends that this extension be granted to those States which are making a good faith effort to apply for and receive final authorization or the remainder of interim authorization within a reasonable period of time.

It should be noted that as a result of other amendments adopted today, several of the paragraphs in § 123.122(c) have been renumbered. The provision related to partially authorized States is now § 123.122(c)(4).

E. *Conditions for Phase II Application.* Section 123.122(d)(1) currently provides that a State may not apply for a component of Phase II unless it is already authorized for (or is simultaneously applying for) Phase I and previously announced components of Phase II. Several commenters pointed out that the ability of a State to administer a permit program for a particular Phase II component is not necessarily contingent on authorization for the other components. For example, a State may operate a competent permitting program under RCRA for the facilities covered in Component B (incinerators) without also operating a

permitting program for the facilities in Component A (tanks, containers, piles and surface impoundments).

Therefore, in response to comments, EPA has decided to remove the requirement in § 123.122(d)(1) that States must be authorized for (or simultaneously apply for) previously announced components of Phase II when applying for a particular individual component. In other words, application for components in order of their announcement is no longer required. States may now apply for Phase II components in any order (e.g., Component B, then Component A).

However, it continues to be essential that States obtain Phase I authorization before (or at the same time) they receive authorization for any component of Phase II. Phase I contains the basic framework of the hazardous waste program. A State cannot effectively implement the Phase II permitting program without these elements. Therefore, EPA will retain the requirement that States must apply for Phase I before (or at the same time) they apply for a component of Phase II.

F. *Changes in the Federal Regulations.* The January 1981 regulations required that States applying for Phase II authorization must amend their programs to bring them into conformance with the current Federal program (including adopting changes as necessary to conform with changes in the Federal regulations). This basic provision, in § 123.122(d)(2), is retained in today's promulgation, but is slightly modified to account for the change in § 123.122(d)(1) described above. Today's amendment allows States to apply for a particular Phase II component without addressing changes in the Federal regulations covered in *other* components, if the State is not authorized for or seeking authorization for those other components.

In addition, § 123.122(d)(2) has been reorganized and revised to more clearly explain this requirement and to separate the obligations of States already authorized for parts of the RCRA program from those States applying for authorization for the first time. The specific requirements which States must address when applying for a Phase II component are outlined in the **Federal Register** announcement of that component and in the *RCRA State Interim Authorization Guidance Manual.*

G. *Deadline for State Enabling Legislation.* RCRA Section 3006(c) provides that interim authorization may be granted to those States which have "in existence a hazardous waste program pursuant to State law" no more than 90 days after the "promulgation of regulations under Sections 3002, 3003, 3004, and 3005." EPA interprets this provision to mean that, at a minimum, a State must have basic enabling legislation for the program in place, i.e., basic statutory authority to regulate hazardous waste, in order to be eligible for interim authorization.

The application of the 90 day deadline has been a difficult issue, since the Federal program is being implemented in two phases and several components, with a number of separate regulatory promulgations. In the January 26, 1981, amendments, EPA applied the 90 day eligibility requirement for State enabling legislation to *each* component of Phase II, since each component is created by a promulgation under RCRA Section 3004. Section 123.125(a) of those amendments provided that the State enabling legislation for each component must be in existence within 90 days of the promulgation of the Federal regulations comprising that component.

Based on comments received regarding this interpretation, EPA has reconsidered the January 1981 amendment and has modified its interpretation of the 90 day deadline. We now agree that the 90 day requirement in RCRA Section 3006(c) probably was intended by Congress to provide a one-time test to identify those States with existing programs which could qualify for interim authorization. EPA's phased implementation of the hazardous waste program does not provide a convincing reason to establish additional 90 day deadlines or tests which States must meet in order to satisfy basic eligibility for interim authorization.

The remaining question is when the one-time eligibility test should occur. RCRA establishes the Federal hazardous waste program as both a model for the development of State programs and a minimum standard for their approval. EPA believes that States should have an opportunity to review all of the major elements of the Federal program before they are required to undergo an eligibility test based on the existence of statutory authority. Therefore, EPA has decided to tie the 90 day deadline to the announcement of the *final* component of Phase II. At that time, all of the major elements of the Federal program will have been established. The enabling legislation requirement in Section 123.125(a) has been revised to provide that: "The State Attorney General or independent legal counsel must certify that the enabling legislation for the State's program was in existence within 90 days of the announcement of the last component of Phase II."

Most States which have received interim authorization for Phase I will have already demonstrated adequate authority and thus satisfied the enabling legislation requirement. Unauthorized States can satisfy the requirement by certifying that the necessary legislation was in place at any time prior to the date 90 days after the announcement of the final component of Phase II.

The 90 day deadline for State enabling legislation is also mentioned in § 123.128(d) of these regulations, which provides for a limited exception from the generator, transporter, and related manifest requirements. The reference to the 90 day deadline in that paragraph is today changed in conjunction with EPA's modified interpretation of this requirement. States which have received Phase I interim authorization under the terms of that paragraph may now apply for interim authorization to implement the manifest system and other generator and transporter requirements "if the enabling legislation for that part of the program was in existence within 90 days of the announcement of the last component of Phase II."

H. *Interim Authorization to Permit Storage Surface Impoundments.* The contents of Components A and B of Phase II interim authorization were announced on January 26, 1981 (46 FR 7964). Component A covered tanks, container storage facilities, waste piles and storage surface impoundments. Component B covered incinerators. These components covered both new and existing facilities in those categories.

On October 20, 1981, EPA proposed to temporarily suspend the effective dates of its permitting standards for incinerators and storage surface impoundments, as applied to existing facilities, pending a reexamination of their appropriateness for existing facilities (46 FR 51407). In the preamble to the proposed suspension, EPA stated that the Agency's policy would be to postpone decisions on the authorization of State permitting programs for *existing* incinerators and *existing* storage surface impoundments until the Agency had resolved this issue.

In response to this policy, a few States informed EPA of their intent to submit draft applications for authorization of Component A, excluding existing storage surface impoundments.

Subsequently, EPA received negative comments on the postponement of State authorization for existing storage surface impoundments and existing incinerators, and decided to change this

policy. On February 24, 1982, EPA announced that its new policy would be to authorize State programs that meet the regulatory requirements for Components A and B to permit *both* new and existing incinerators and storage surface impoundments, as well as the other facilities in those components (47 FR 8010).

This change in policy raises questions about the status of those States which planned to apply for Component A without addressing existing storage surface impoundments. Those States relied on the Agency's then-current policy of postponing authorization for such facilities and prepared applications based on this understanding. Furthermore, some States are understandably reluctant to adopt regulations corresponding to EPA's current permitting standards for storage surface impoundments, while EPA is reexamining those standards.

Therefore, EPA today is amending § 123.129 to allow interim authorization for Component A without storage surface impoundments. States will thus have the choice of either (1) including new and existing surface impoundments in Component A, as allowed by the January 26, 1981 announcement and the February 24, 1982 policy statement, or (2) taking advantage of today's amendment by excluding new and existing surface impoundments from Component A.

Today's amendment requires that a State authorized for Component A under this exception must commit in its Memorandum of Agreement with EPA to adopt State permit standards for storage surface impoundments which are substantially equivalent to 40 CFR Part 264 no later than the State's application for the component of Phase II which will correspond to the Federal land disposal standards. This provision ensures that the duration of the exception will be limited.

This exception applies to *all* storage surface impoundments, both new and existing. EPA has decided that the exception should not be directed only at existing storage surface impoundments, as that would create confusion for the public and the regulated community. Instead, States must choose to either apply for *all* of Component A, including both new and existing impoundments, or to apply for Component A under this exception, without being authorized to permit *any* storage surface impoundments, existing or new.

EPA's permit standards for storage surface impoundments (40 CFR Part 264 Subpart K) will remain in effect in States which are authorized for Component A under this exception. EPA will follow the policy announced on October 20, 1981, for not calling in Part B permit applications for existing surface impoundments, pending a final decision on the proposed suspension. However, the Agency will process voluntarily submitted permit applications for these facilities, including applications from new facilities.

III. Other Actions on the January 1981 Amendments to Part 123

EPA received other comments on the January 1981 amendments to Part 123 which are not discussed in the preceding section of this preamble. EPA's written response to these comments on the January 1981 promulgation is available for public inspection at the RCRA Docket Room, Room S–269C, 401 M Street S.W., Washington, D.C. 20460.

Today, EPA is promulgating the January 1981 amendments to Part 123, Subpart F, including the additional changes in §§ 123.122, 123.125, 123,128, and 123.137, as a final rule. Also, EPA is today promulgating the additional change in § 123.129 as an interim final rule, with a request for comments. EPA printed the entire Subpart F of Part 123, as amended, in the January 1981 promulgation. Today EPA is publishing only the changes discussed in the preceding section of this preamble.

On January 26, 1981, EPA also published two minor amendments to 40 CFR Part 123, Subpart B, the requirements for final authorization of State hazardous waste programs. Those amendments changed the application and effective dates for final authorization, in conjunction with the changes in the schedule for interim authorization. (See 46 FR 8300.) EPA received no comments on those changes in the final authorization dates. Those changes to Part 123, Subpart B, are also today promulgated as a final rule.

IV. Interim Final Promulgation

EPA believes that use of advance notice and comment procedures for the amendment to § 123.129 would be impracticable and contrary to the public interest, and therefore finds that good cause exists for adopting this change in interim final form (see 5 U.S.C. 553(b)(B)). As discussed in Section II.H. above, without this amendment, States which relied on EPA's policy statement of October 20, 1981, in preparing their applications for interim authorization might not be able to receive interim authorization in an orderly and timely fashion.

V. Effective Date

RCRA does not specify when EPA's regulations governing the authorization of State programs are to take effect (see Section 3010(b) of RCRA, 42 U.S.C. 6930(b)). The Administrative Procedure Act (see 5 U.S.C. 553(d)) requires that the effective date for a regulation be not less than 30 days from the date of publication, unless there is good cause for an earlier date.

EPA finds that good cause exists for making these amendments effective upon publication. Most of the amendments were promulgated as interim final rules on January 26, 1981, in substantially the same form, and have been in effect since that date. The additional interim final amendment to § 123.129 is being promulgated to ensure that States which relied on EPA policy statements in preparing applications can receive interim authorization in an orderly and timely fashion. This is a rule that recognizes an exemption and thus may be made immediately effective (see 5 U.S.C. 553(d)(1)).

The process for Phase II interim authorization of State programs has begun and is continuing. A delayed effective date would confuse and disrupt the ongoing process. Furthermore, these amendments provide additional flexibility to the States by simplifying and relaxing the schedule for interim authorization applications. Persons affected by these amendments will therefore not need lead time to comply with new regulatory requirements. Accordingly, EPA is making all of these rules effective upon publication.

VI. Compliance With Executive Order 12291

Under Executive Order 12291, EPA must judge whether a regulation is "major" and therefore subject to the requirement of a Regulatory Impact Analysis. The amendments promulgated here are not major because they will not result in an effect on the economy of $100 million or more and will not result in an increase in costs or prices. These amendments will not result in any of the other significant adverse effects addressed in the Executive Order. These amendments merely simplify and add flexibility to requirements related to the schedule for interim authorization of State hazardous waste programs.

These amendments were submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291.

VII. Regulatory Flexibility Act

Under the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq.*, EPA is required to determine whether a regulation will have a significant impact on a substantial number of small entities so

as to require a regulatory flexibility analysis. No regulatory flexibility analysis is required where the head of the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

The amendments promulgated here merely simplify and add flexibility to requirements related to the schedule for interim authorization of State hazardous waste programs and do not affect the compliance burdens of the regulated community. Therefore, pursuant to 5 U.S.C. 605(b), I hereby certify that these regulations will not have a significant impact on a substantial number of small entities.

VIII. Paperwork Reduction Act

Under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.*, EPA must estimate the paperwork burden created by any information collection requests contained in a proposed or final rule. Because there are no information collection activities created by this rulemaking, the requirements of the Paperwork Reduction Act do not apply.

Information collection requirements contained elsewhere in 40 CFR Part 123 have been approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act and have been assigned OMB control number 2000-0387.

List of Subjects in 40 CFR Part 123

Hazardous materials, Indians—lands, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control, Water supply, Intergovernmental relations, Penalties, Confidential business information.

Dated: July 9, 1982.

Anne M. Gorsuch,

Administrator.

Title 40 CFR, Part 123, Subpart F, is amended as follows:

PART 123—STATE PROGRAM REQUIREMENTS

1. The authority citation for Part 123, Subpart F, reads as follows:

(Secs. 1006, 2002(a) and 3006 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. 6905, 6912(a) and 6926)

2. The interim final rules amending Part 123 which were published on January 26, 1981 (46 FR 8298) are adopted as final rules and further amended as follows:

a. Section 123.122 is amended by revising paragraphs (c) and (d) to read as follows:

§ 123.122 Schedule.

* * * * *

(c)(1) A State may apply for interim authorization at any time prior to expiration of the 6th month of the 24-month period beginning with the effective date of the last component of Phase II. The Regional Administrator may extend the application period for good cause.

(2) A State applying for interim authorization prior to the announcement of the first component of Phase II shall apply only for interim authorization for Phase I.

(3) A State may apply for interim authorization for a component of Phase II upon the announcement of that component, provided that the State meets the requirements of paragraph (d) of this section.

(4) A State which has received interim authorization for Phase I (or interim authorization for Phase I and for some but not all of the components of Phase II) shall amend its original submission to include all of the components of Phase II not later than 6 months after the effective date of the last component of Phase II. The Regional Administrator may extend this deadline for good cause.

(d)(1) No State may apply for interim authorization for a component of Phase II unless it: (i) has received interim authorization for Phase I; or (ii) is simultaneously applying for interim authorization for that component of Phase II and for Phase I.

(2) When a State applies for interim authorization for a particular component of Phase II, it shall demonstrate that its interim authorization program for Phase I (and, if applicable, its program for any other components of Phase II) is substantially equivalent to the Federal program, including modification to the Federal program, as follows:

(i) Any State already authorized for parts of the Federal program shall amend its original submission to include any additional requirements for Phase I (and any additional requirements for other Phase II components for which the State is authorized) which were promulgated on or before the announcement date of the particular Phase II component being applied for.

(ii) Any State not yet authorized for any of the Federal program shall include in its submission those Phase I requirements which were promulgated on or before the announcement date of the particular Phase II component being applied for. Any new State program which is applying for more than one component of Phase II shall include in its submission the additional requirements for such other components which were promulgated on or before the announcement date of the particular Phase II component being applied for.

(b) Section 123.125 is amended by revising paragraph (a) to read as follows:

§ 123.125 Attorney General's statement.

(a) Any State seeking to administer a program under this subpart shall submit a statement from the State Attorney General (or the attorney for those State or interstate agencies which have independent legal counsel) that the laws, of the State, or the interstate compact, provide adequate authority to carry out the program described under § 123.124 and to meet the applicable requirements of this subpart. This statement shall include citations to the specific statutes, administrative regulations, and, where appropriate, judicial decisions which demonstrate adequate authority. Except as provided in § 123.128(d), the State Attorney General or independent legal counsel must certify that the enabling legislation for the State's program was in existence within 90 days of the announcement of the last component of Phase II. State statutes and regulations cited by the State Attorney General or independent legal counsel shall be lawfully adopted at the time the statement is signed and shall be fully effective by the time the program is approved. To qualify as "independent legal counsel" the attorney signing the statement required by this section must have full authority to independently represent the State agency in court on all matters pertaining to the State program. In the case of a State applying only for interim authorization for a component of Phase II, the Attorney General's statement submitted for interim authorization for Phase I (or for Phase I and other components of Phase II) shall be amended and recertified to demonstrate adequate authority to carry out all requirements of that component.

* * * * *

c. Section 123.128 paragraph (d) is amended by inserting the following words in the twenty-first line after the phrase "within 90 days" and by removing the words "of the promulgation of Phase I":

§ 123.128 Program requirements for interim authorization for Phase I.

* * * * *

(d) Limited exceptions from generator, transporter, and related manifest requirements.

* * * of the announcement of the last component of Phase II. * * *

* * * * *

d. Section 123.137 is amended by revising paragraph (a) to read as follows:

§ 123.137 Revision of State programs.

(a) A State program approved for interim authorization for Phase I or for Phase I and for some but not all components of Phase II shall terminate on the last day of the 6th month after the effective date of the last component of Phase II and EPA shall administer and enforce the Federal program in the State commencing on that date, if the State has failed to submit by that date an amended submission pursuant to § 123.122(c)(4). The Regional Administrator may extend this deadline for good cause.

* * * * *

e. Section 123.137 paragraph (b) is amended by inserting the following words in the tenth line after the phrase "pursuant to" and by removing the words "§ 123.122(c)(7)":

§ 123.137 Reversion of State programs.

* * * * *

(b) * * * § 123.122(c)(4) * * *

3. Section 123.129(a) is amended as an interim final rule by adding new paragraphs (a)(4) and (a)(5) to read as follows:

§ 123.129 Additional program requirements for interim authorization for Phase II.

(a) * * *

(4) The Administrator may authorize a State program for Phase II Component A, even though the State program does not have standards corresponding to 40 CFR Part 264 Subpart K (Surface Impoundments), if the State commits in its Memorandum of Agreement to adopt State standards substantially equivalent to 40 CFR Part 264 Subpart K no later than the State's application for the Phase II component corresponding to the Federal land disposal standards.

(5) Any State which receives interim authorization for Component A without surface impoundment standards, pursuant to paragraph (a)(4) of this section, may not receive interim authorization for the Phase II component corresponding to the Federal land disposal standards unless it has standards substantially equivalent to 40 CFR Part 264 Subpart K in effect.

* * * * *

[FR Doc. 82-19473 Filed 7-23-82; 8:45 am]

BILLING CODE 6560-50-M

40 CFR Part 123

[SWH-FRL 2173-2]

Authorization of State Hazardous Waste Programs

AGENCY: U.S. Environmental Protection Agency (EPA).

ACTION: Announcement of Component C of Phase II Interim Authorization, and Beginning of Final Authorization.

SUMMARY: The regulations governing authorization of State hazardous waste programs under the Resource Conservation and Recovery Act provide that EPA will announce each of the components of Phase II interim authorization in the **Federal Register.** This notice describes the content, application requirements, and effective date of the last component of Phase II (Component C), which corresponds to the Federal permitting standards for land disposal facilities. States may commence the application process for Phase II Component C with this announcement.

The announcement of the last component of Phase II enables the final authorization process to begin, because the major elements of the Federal hazardous waste program are now in place. States may commence the application process for final authorization with today's announcement.

This notice also describes several important deadlines in the interim authorization process which are created by today's announcement.

FOR FURTHER INFORMATION CONTACT: Bruce R. Weddle, Deputy Director, State Programs and Resource Recovery Division, Office of Solid Waste (WH-563), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, (202) 755-9107.

FOR FURTHER INFORMATION ON IMPLEMENTATION CONTACT:

Region I, Dennis Huebner, Chief, Waste Management Branch, John F. Kennedy Building, Boston, Massachusetts 02203, (617) 223-5775.

Region II, Dr. Ernest Regna, Chief, Solid Waste Branch, 26 Federal Plaza, New York, New York 10278, (212) 264-0504/5.

Region III, Robert L. Allen, Chief, Hazardous Materials Branch, 6th and Walnut Streets, Philadelphia, Pennsylvania 19106, (215) 597-0980.

Region IV, James Scarbrough, Chief, Residuals Management Branch, 345 Courtland Street, N.E., Atlanta, Georgia 30365, (404) 881-3016.

Region V, Karl J. Klepitsch, Jr., Chief, Waste Management Branch, 111 West Jackson Street, Chicago, Illinois 60604, (312) 886-7435.

Region VI, R. Stan Jorgensen, Chief, Solid Waste Branch, 1201 Elm Street, First International Building, Dallas, Texas 75270, (214) 767-2645.

Region VII, Robert L. Morby, Chief, Hazardous Materials Branch, 324 East 11th Street, Kansas City, Missouri 64106, (816) 374-3307.

Region VIII, Louis W. Johnson, Chief, Waste Management Branch, 1860 Lincoln Street, Denver, Colorado 80295, (303) 327-2221.

Region IX, Philip Bobel, Chief, Hazardous Materials Branch, 217 Freemont Street, San Francisco, California 94105, (415) 974-8165.

Region X, Kenneth D. Feigner, Chief, Waste Management Branch, 1200 6th Avenue, Seattle, Washington 98101, (206) 442-1260.

SUPPLEMENTARY INFORMATION:

I. Background

Section 3006 of the Resource Conservation and Recovery Act (RCRA) provides for two types of EPA approval of State hazardous waste programs to operate in lieu of the Federal program:

1. State programs which are "substantially equivalent" to the Federal program may receive a temporary "interim authorization"; and

2. State programs which are "equivalent" to and "consistent" with the Federal program and "provide adequate enforcement" may receive a "final authorization".

The final authorization process has not been available to States up to now, because the major elements of the Federal hazardous waste program were not in place. Instead, State programs have been granted interim authorization in phases and components corresponding to the phased development of the Federal program.

On May 19, 1980, EPA published the requirements for interim authorization of State hazardous waste programs (see 45 FR 33384). These requirements, codified in 40 CFR Part 123, Subpart F, established, among other things, the two phases of interim authorization and a schedule for State applications for these phases. The first phase (Phase I) authorizes States to administer a hazardous waste program, which includes the identification and listing of hazardous wastes; the regulation of generators and transporters of hazardous wastes; and the enforcement of preliminary standards for hazardous waste treatment, storage and disposal facilities. The second phase (Phase II) authorizes States to administer a permit

program for treatment, storage and disposal facilities.

Phase II of interim authorization, in turn, is divided into three "components" corresponding to the major Federal permitting standards for hazardous waste management facilities, codified in 40 CFR Part 264. Each component corresponds to one or more specific categories of facilities requiring RCRA permits (e.g., incinerators, landfills). State programs can receive interim authorization to issue permits to the specific category or categories of facilities covered by each component. States may apply for authorization for each component as it becomes available and is announced in the **Federal Register**, or may wait until all three components are announced and apply for all of Phase II authorization at that time. This approach gives States the flexibility to adapt their Phase II application schedule to State needs. States with interim authorization must, however, apply for all of Phase II within six months of the effective date of the last component. (See amendments to Part 123 published on January 26, 1981, 46 FR 8298, and elsewhere in today's **Federal Register**.)

EPA has to date announced the first two components of Phase II. The contents of Components A and B of Phase II interim authorization were announced on January 26, 1981 (46 FR 7964). Component A covers tanks, container storage facilities, waste piles and storage surface impoundments. Component B covers incinerators. The remaining component of the Phase II program, Component C, covers land disposal facilities.

Final authorization can begin once the major elements of the Federal program are in place, which occurs when the Phase II permit program is complete. Section 123.31(c) provides that States may apply for final authorization "at any time after the promulgation of the last component of Phase II."

Today's promulgation of standards for land disposal facilities elsewhere in the **Federal Register** completes the establishment of the basic Federal hazardous waste program. This event has a number of significant effects on the State authorization process, which are described in this notice.

Today, EPA:

- Announces the contents, application requirements, and effective date of Component C of Phase II, corresponding to the Federal permitting standards for land disposal facilities. Component C will be the last Phase II component.
- Announces the beginning of the final authorization process.
- Announces several important deadlines in the interim authorization process, which are created by the above events.

The remainder of this notice discusses these actions in more detail.

II. Component C of Phase II, Interim Authorization

A. Content of Component C

Component C corresponds to the Federal standards for issuing permits to four types of land disposal facilities: landfills, land treatment units, waste piles, and surface impoundments. Component C also includes the new options for storage surface impoundments and waste piles added by today's promulgation. The Federal technical regulations for land disposal are codified in 40 CFR Part 264, Subparts F, K, L, M, and N. A State receiving interim authorization for Phase II, Component C, will be authorized to administer a State permit program under RCRA for the above categories of facilities, in lieu of the Federal permit program for these facilities.

B. Relationship Between Components A and C

Subparts K and L of Part 264 (Surface Impoundments and Waste Piles) were originally promulgated on January 12, 1981 (see 46 FR 2802). Those regulations addressed storage and treatment in certain classes of surface impoundments and waste piles, and were included in Component A (see 46 FR 7964, January 26, 1981). Subparts K and L are today being amended as part of the land disposal promulgation, and these amendments will replace the January 12, 1981 versions of those Subparts when the amendments become effective on January 26, 1983. Given this situation, States may apply for interim authorization for Subparts K and L in the following manner:

1. States which submit a complete application for Component A to EPA and for which EPA has published a notice of public hearing prior to the effective date of today's amendments to Subparts K and L may apply for Component A based upon the original announcement of Component A, including the January 12, 1981 provisions of Subparts K and L.[1] A number of States are currently preparing to apply for Component A based on the original EPA announcement, and this policy enables such States to proceed to complete application without a sudden change in the application requirements. States which receive interim authorization for Component A based on the January 12, 1981 provisions of Subparts K and L, will be authorized to issue RCRA permits to the categories of facilities covered in those provisions, but will not be authorized to issue RCRA permits to other types of surface impoundments or waste piles. (A State will still be able to apply for Component A under the exception clause at § 123.129(a)(4), without covering surface impoundments at all.)

2. After the effective date of today's amendments to Subparts K and L, States will be able to apply for interim authorization to permit surface impoundments and waste piles by applying for Component C, which corresponds to the amended provisions of Subparts K and L. After that point, the contents of Component A will be limited to storage and treatment in containers and tanks. This is because the January 12, 1981 provisions of Subparts K and L originally included in Component A will have been replaced by today's amendments. Therefore, States will need to address these amendments by applying for Component C in order to receive interim authorization to permit surface impoundments and waste piles. This change in the content of Component A does not affect any State that receives authorization for Component A based on a complete application submitted before the effective date of today's amendments to Subparts K and L.

3. States with interim authorization must apply for *all* of Phase II within one year of today's announcement (see § 123.122(c)(4)). Therefore, States will have to apply for Component C, including today's amendments to Subparts K and L, by that date or face reversion of the RCRA program to EPA. (See discussion of "States with Partial Interim Authorization" in Section IV of this preamble.)

[1] Prior to the effective date of today's amendments to Subparts K and L, EPA will review such applications for Component A based upon the original announcement of Component A, including the January 12, 1981 provisions of Subparts K and L. After the effective date of today's amendments to Subparts K and L, EPA will review such applications for Component A based upon the portions of the amended Subparts K and L, corresponding to the January 12 provisions, since those amendments replace the previous language of those Subparts. EPA anticipates that any State program which adopts the January 12, 1981 standards for permitting double-lined storage surface impoundments and waste piles with liners will be found substantially equivalent to the amended provisions of Subparts K and L for those limited categories of facilities.

C. Requirements for State Applications for Component C

In order to receive interim authorization for Phase II, Component C, a State must demonstrate that:

1. Its land disposal permit program provides "substantially the same degree of human health and environmental protection" as the Federal permitting standards for land disposal facilities (see § 123.129(a)(1)). These Federal standards include the administrative permit standards (40 CFR Part 264, Subparts A–E, G–H), as they apply to land disposal facilities, and the technical land disposal standards (40 CFR Part 264, Subparts F, K, L, M, and N).

2. Its permitting requirements and procedures are substantially equivalent to the Federal regulations cited in §§ 123.7 (a) and (b). Those regulations are the applicable Federal procedures from 40 CFR Parts 122 and 124 (see § 123.129(d)).

3. It has received interim authorization for Phase I or is simultaneously applying for interim authorization for Phase II (see § 123.122(d)(1), as amended elsewhere in today's **Federal Register**).

4. Its interim authorization program (for any phase or component) is substantially equivalent to applicable modifications to the Federal program (see § 123.122(d)(2)). Some of the Federal regulations have been revised since their original promulgation. A State applying for Component C must demonstrate that its program is substantially equivalent to all applicable requirements, including regulatory amendments, which have been promulgated *on or before* the date of this notice. Amendments to the regulations cited above in items (1), (2), and (3) would have to be addressed, if such amendments make the Federal program more stringent. For example, a State authorized for Phase I based on the May 19, 1980 regulations and applying for Component C would have to address additions to the regulated universe of hazardous waste and the establishment of the financial responsibility requirements for facilities with interim status. In addition, a State authorized for or seeking authorization for Phase II Components A and/or B and applying for Component C would have to address amendments to the Federal regulations corresponding to Components A and/or B, if such amendments make the Federal program more stringent.

States applying for Component C (or other Phase II components) will not be required to address changes to the Federal program adopted *after* today's date. Such changes, including amendments to Part 264 covering new processes not currently subject to standards (e.g., underground tanks which cannot be entered for inspection), would be addressed as part of the final authorization process established in § 123.13(e). Since Component C is the last Phase II component, interim authorization will not be available for permitting such new processes, and EPA will retain permitting responsibility until the State receives final authorization for the relevant program element. (See discussion below under Final Authorization.)

EPA will soon distribute to the States and other interested persons an addendum to the *RCRA State Interim Authorization Guidance Manual* which will specify the application process and requirements for Component C in more detail. This Manual will contain checklists outlining the requirements contained in the various regulations mentioned above, including a list of specific amendments to the Federal regulations which must be addressed in the State application for Component C.

D. States Authorized for Components A or B Under Exception Clauses

Recent amendments to § 123.129(a) allow States to receive interim authorization for Phase II Components A and/or B without coverage of certain requirements if specific conditions are met (see 47 FR 16552, April 16, 1982, and amendments promulgated elsewhere in today's **Federal Register**). A State authorized under these exception clauses must take the following actions in order to receive interim authorization for Phase II Component C:

1. A State which received interim authorization for Phase II Component A or B, or both, pursuant to § 123.129(a)(2) must adopt State liability coverage requirements by the time of its application for Component C. The State liability coverage requirements must be in effect before such a State can receive interim authorization for Component C.

2. A State which received interim authorization for Phase II Component A pursuant to § 123.129(a)(4) must adopt State standards substantially equivalent to today's amendments to 40 CFR Part 264 Subpart K (Surface Impoundments) by the time of its application for Component C. These State standards must be in effect before such a State can receive interim authorization for Component C.

E. Effective Date of Component C

States may apply for interim authorization for Phase II, Component C commencing with this announcement. State interim authorization for Phase II, Component C can take effect on or after January 26, 1983.

III. Final Authorization of State Hazardous Waste Programs

A. Final Authorization Program

As noted earlier, a State may apply for final authorization at any time after the announcement of the last component of Phase II, which completes the establishment of the basic elements of the Federal hazardous waste program. Today's announcement of Component C notes that it is the last Phase II component. Therefore, the application process for final authorization may begin commencing with this announcement.

Section 123.31(c)(2) provides that State programs under final authorization may take effect on the effective date of the last component of Phase II. Therefore, State final authorization can take effect on or after January 26, 1983.

Unlike interim authorization, final authorization does not expire after a limited period of time; likewise, the application period for final authorization does not close at a set time. States must satisfy the requirements of 40 CFR Part 123 Subparts A and B to receive final authorization, regardless of their interim authorization status. States need not have received interim authorization in order to qualify for final authorization.

EPA will soon distribute to the States and other interested persons a *RCRA State Final Authorization Guidance Manual* which will specify the application process and requirements for final authorization. This Manual will contain checklists outlining the requirements contained in 40 CFR Part 123 Subparts A and B.

B. Future Changes and Additions to the Federal Regulations

The promulgation of the land disposal permitting standards completes the establishment of the basic Federal hazardous waste program. However, EPA anticipates that there will be some future modifications to the Federal program, as new information is obtained regarding the characteristics of hazardous wastes, technologies for treatment, storage, and disposal, and implementation of the current regulations. EPA is conducting Regulatory Impact Analyses on the major hazardous waste regulations and is examining a "degree of hazard" approach to managing hazardous wastes. EPA also plans to add permitting standards for several

processes not currently covered by the Part 264 standards for owners and operators of hazardous waste management facilities. These new standards will address such processes as (1) treatment or storage in certain types of "underground tanks" not now covered by Part 264, (2) thermal treatment of hazardous wastes (in devices other than incinerators), and (3) treatment of hazardous wastes by chemical, physical or biological methods (in other than tanks, surface impoundments or land treatment facilities).

Despite these plans to revise and supplement the scope of the Federal permit standards, EPA believes that the basic elements of the RCRA permit program are now in place and that final authorization of State programs should commence. Permit standards have been promulgated for the hazardous waste facilities which handle the vast majority of wastes and generally represent the most serious environmental and public health concerns (i.e., landfills, surface impoundments, and incinerators). The future promulgation of the few remaining standards (e.g., thermal treatment), while important additions, will serve to "fill out" a large completed regulatory framework.

EPA announced on January 26, 1981, that it might "allow final authorization to begin . . . with one or two Part 264 Subparts unpromulgated. EPA may decide to do this if, for example, the standards for thermal treatment or chemical, physical and biological treatment have not been promulgated when the land disposal standards are promulgated" (46 FR 8300). The land disposal standards have been the major "missing piece" of the RCRA program, and their promulgation establishes a program which is sufficiently comprehensive for final authorization to begin. Furthermore, the interim authorization program is limited in duration by the language of RCRA. EPA does not believe that any further extension of interim authorization and the further postponement of final authorization are warranted. It was clearly the intent of Congress that once the major regulatory elements were in place, final authorization should be made available. Therefore, EPA will proceed with the final authorization process as described in today's notice.

This decision raises two questions concerning the future additions to the Federal regulatory program: (1) When will States that receive final authorization be required to adopt those new standards, and (2) what is the status of facilities for which EPA has not yet promulgated Part 264 standards but which are located in States with final authorization?

The final authorization regulations contain procedures for the revision of already approved State programs when Federal regulations are modified or supplemented. Section 123.13(e) provides that State programs approved for final authorization must make revisions required by changes to the Federal RCRA standards "within one year of the date of promulgation of such [new or modified] regulation, unless a State must amend or enact a statute in order to make the required revision in which case such revision shall take place within two years." This language provides a clear and orderly process for maintaining the "equivalence" of State programs that have received final authorization.

Owners and operators of facilities located in a State with final authorization are generally subject to that State's RCRA program, since the State program operates "in lieu of" the Federal program. However, such a State may not issue a RCRA permit to a facility before the appropriate facility standard (e.g., the standard for thermal treatment) has been promulgated by EPA and the State's program is judged equivalent to and consistent with the Federal program. This is because there would be no Federal program covering that group of facilities for the State to be "equivalent" to or to operate "in lieu of" prior to EPA's promulgation of such standards. A State may regulate and permit such facilities independently under the provisions of State law, but such State permits would not be considered RCRA permits. *After* the appropriate Federal facility standard has been promulgated, the authorized State would be required to modify its program according to the dates established in § 123.13(e).

Under current regulations, the affected facility would *not* be subject to the RCRA standards until the State adopted equivalent standards and those were approved by EPA. Section 264.1(f) provides that the Federal standards for owners and operators of hazardous waste facilities are not applicable in States with final authorization. Therefore, there could be a one (or two) year period during which the new RCRA standards would not apply in such a State, until the State adopted an equivalent and consistent standard. RCRA permits could not be issued to affected facilities during the one (or two) year period described above, and operation (and, in some cases, construction) of new facilities in the subject categories would not be allowed.

Such a de facto ban on construction and operation of the affected new facilities is clearly undesirable, given the general need for additional capacity for the treatment, storage and disposal of hazardous wastes and the prospect that new facilities in the categories under discussion would operate with a higher level of environmental protection than many older, more conventional facilities. To avoid this situation, EPA, elsewhere in today's Federal Register, is amending § 264.1(f) to make Part 264 permit standards for new categories of facilities applicable to facilities in States with final authorization until the State has adopted equivalent State standards. This will allow EPA to issue RCRA permits during the one (or two) year period when the authorized State lacks RCRA permitting authority for those new categories of facilities. This amendment is directed at the small number of new facilities in the designated categories which would otherwise be unable to conduct necessary activities during this period of State regulatory development. This amendment also clarifies the applicability of permit standards for new categories of facilities in States with Phase II interim authorization.

IV. Deadlines in the Interim Authorization Process

A number of important deadlines for interim authorization are triggered by the announcement of the final Phase II component. This section of the notice identifies these deadlines.

A. Expiration of Interim Authorization

RCRA § 3006(c) provides that interim authorization extends for 2½ years after the promulgation of the Federal hazardous waste regulations. Section 123.122(b) of the State authorization requirements interprets this provision to mean that interim authorization "may extend for a 24-month period from the effective date of the last component of Phase II." (This expiration date is 2½ years after the promulgation of the last major element of the Federal regulations.)

Since Component C is the last Phase II component, the two year prior begin on January 26, 1983. At the end of that period, "all interim authorizations automatically expire and EPA shall administer the Federal program in any State which has not received final authorization" (see § 123.122(b)(2)). EPA encourages all authorized States to prepare and apply for final authorization well in advance of this deadline, in

order to avoid reversion of the RCRA program to EPA.

B. End of Interim Authorization Application Period

Section 123.122(c)(1) provides that a State may apply for interim authorization until the end of the 6th month after the effective date of the last Phase II component. The interim authorization application period will close on July 26, 1983.

EPA is amending this provision elsewhere in today's Federal Register by adding that "the Regional Administrator may extend the application period for good cause." The preamble to this amendment notes that "EPA intends that this extension only be granted on a case-by-case basis to States which have made a good faith effort to meet the application deadline and which can submit a complete application within a reasonable period of time".

C. States With Partial Interim Authorization

Section 123.122(c)(4), as amended elsewhere in today's Federal Register, requires States which have received partial interim authorization (i.e., interim authorization for Phase I alone or Phase I and some components of Phase II) to apply for *all* of Phase II within 6 months of the effective date of the last component of Phase II. This deadline will occur on July 26, 1983. Section 123.137 contains the related stipulation that State programs with partial interim authorization which fail to submit an amended application for all of Phase II which meets the requirements of the Federal program by the above deadline will terminate and responsibility for RCRA implementation will revert to EPA.

Alternatively, State programs with partial interim authorization can avoid program reversion to EPA by applying for and receiving final authorization by the above deadline. In addition, today's amendments to these two sections provide that the Regional Administrator may extend the deadline for good cause. This extension is intended to be granted in the same amanner as the extension to the application deadline discussed earlier.

D. Deadline for State Enabling Legislation

RCRA Section 3006(c) provides that interim authorization may be granted to those States which have "in existence a hazardous waste program pursuant to State law" no more than 90 days after the "promulgation of regulations under Sections 3002, 3003, 3004, and 3005." EPA interprets this provision to mean that, at a minimum, a State must have basic enabling legislation for the program in place, i.e., basic statutory authority to regulate hazardous waste, in order to be eligible for interim authorization.

The deadline by which the State enabling legislation must be in place is found in § 123.125(a). This section is amended elsewhere in today's Federal Register to tie the deadline to the final Phase II component, which establishes the last major elements of the Federal program. This section is revised to provide that: "The State Attorney General or independent legal counsel must certify that the enabling legislation for the State's program was in existence within 90 days of the announcement of the last component of Phase II." This deadline will occur on October 25, 1982.

Most States which have received interim authorization for Phase I will have already demonstrated adequate authority and thus satisfied the enabling legislation requirement. Unauthorized States which desire to apply for interim authorization can satisfy the requirement by certifying that the necessary legislation was in place at any time prior to the date given above.

V. Compliance With Executive Order 12291

Under Executive Order 12291, EPA must judge whether a regulation is "major" and therefore subject to the requirement of a Regulatory Impact Analysis. The notice published today is not major because it will not result in an effect on the economy of $100 million or more and will not result in an increase in costs or prices. It will not result in any of the other significant adverse effects addressed in the Executive Order. The notice announces the last component of Phase II interim authorization, the beginning of final authorization, and several deadlines in the interim authorization process. These announcements are based on and carry out regulations promulgated under RCRA.

This notice was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291.

VI. Authority

Sections 1006, 2002(a) and 3006 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. 6905, 6912(a) and 6926.

List of Subjects in 40 CFR Part 123

Hazardous materials, Indians-lands, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control, Water supply, Intergovernmental relations, Penalties, Confidential business information.

Dated: July 9, 1982.

Anne M. Gorsuch,

Administrator.

[FR Doc. 82-19471 Filed 7-23-82; 8:45 am]

BILLING CODE 6560-50-M

40 CFR Part 264

[SW-FRL 2173-1]

Hazardous Waste Management System; Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Interim final rule.

SUMMARY: Elsewhere in today's Federal Register, EPA announces that States may commence the application process for final authorization. As described in that announcement, EPA plans to add permitting standards for several processes which are not currently covered by the Part 264 standards for owners and operators of hazardous waste management facilities. Section 123.13(e) requires States with final authorization to make revisions to their programs "within one year of the date of promulgation of such [Federal] regulations, unless a State must amend or enact a statute . . . in which case such revision shall take place within two years." Under the current regulations, until a State makes those revisions, neither EPA nor that State has the authority to issue RCRA permits to facilities covered by those new permitting standards, including new facilities which need a RCRA permit in order to commence operation (and, in some cases, construction).

To remedy this problem, EPA is today amending its hazardous waste management regulations to enable certain facilities located in States with final authorization to obtain a federally-issued RCRA permit during the time preceding the State's authorization for those new standards. EPA is also today clarifying the applicability of new permit standards in States with Phase II interim authorization.

The Agency expects that this amendment will result in savings to the regulated community by enabling new facilities subject to these post-authorization standards to obtain a RCRA permit and begin operation before the State adopts equivalent new