

US EPA ARCHIVE DOCUMENT

PK-1.

PENNSYLVANIA BULLETIN

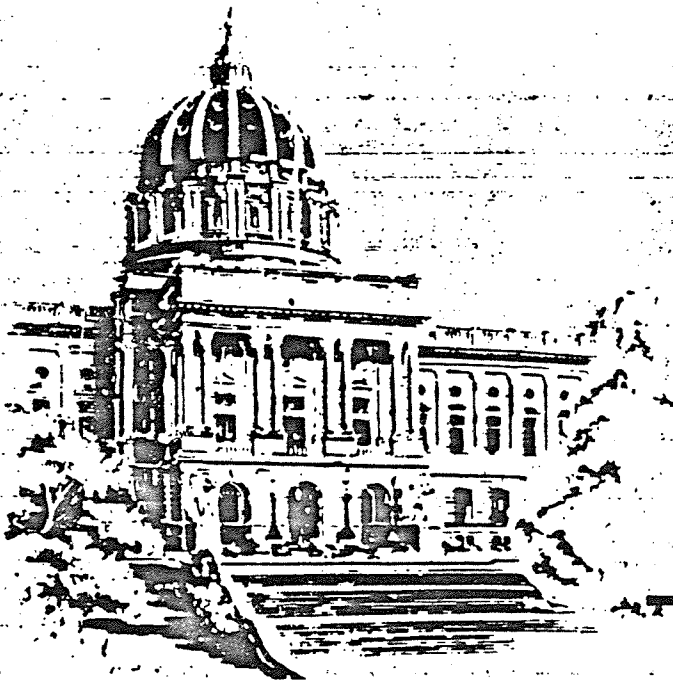
Volume 15

Number 22

Saturday, June 1, 1985 • Harrisburg, Pa.

Part III

This part contains the Department of Community Affairs'
Community Development Block
Grant Program



Rules and Regulations

Title 25— ENVIRONMENTAL RESOURCES

PART I. DEPARTMENT OF ENVIRONMENTAL RESOURCES ENVIRONMENTAL QUALITY BOARD

[25 PA. CODE CH. 75]

Hazardous Waste

The Environmental Quality Board (EQB) by this order amends 25 Pa. Code §§ 75.260, 75.263, 75.264, and 75.265 to conform Pennsylvania's regulations to mandated Federal requirements.

A. Effective Date

These amendments will go into effect upon publication in the *Pennsylvania Bulletin*.

B. Contact Person

For further information, contact Leon Kuchinski, Division of Hazardous Waste, 8th Floor, Fulton Building, P. O. Box 2063, Harrisburg, Pa. 17120 (telephone: (717) 787-7381) or Cathy Curran Myers, Assistant Counsel, Bureau of Regulatory Counsel, 505 Executive House, P. O. Box 2357, Harrisburg, Pa. 17120 (telephone: (717) 787-7060).

C. Statutory Authority

These amendments are adopted under the authority of the following acts: the Pennsylvania Solid Waste Man-

agement Act, act of July 7, 1980 (P. L. 380, No. 97), sections 104 and 105 (35 P. S. §§ 6018.104 and 6018.105); and section 1920-A of The Administrative Code, the act of April 9, 1929 (P. L. 177, No. 175) (71 P. S. § 510-20).

D. Background

These revisions further the process of promulgating regulations which are at least as stringent as those adopted by the United States Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act of 1976, 42 U.S.C. § 6901 *et seq.* Under this Federal statute, any state which has not put into effect a sufficiently stringent hazardous waste regulatory program and received EPA authorization for that program will eventually be deprived by operation of Federal preemption of its legal authority to regulate hazardous waste management activities. However, a state which has received authorization from EPA is empowered to take over the performance of EPA's regulatory duties and functions, including the issuance or denial of permits.

The EQB has already adopted other essential regulatory elements of the Department's hazardous waste management program. On August 2, 1980, the EQB adopted regulations identifying and listing hazardous wastes, and on November 18, 1980, the EQB adopted regulations governing the manifest system, notifications, generators, transporters, and operational requirements for new and existing facilities. On the basis of these regulations,

the Commonwealth was able to apply for and obtain Federal Phase I Interim Authorization giving Pennsylvania the authority to conduct those elements of the regulatory program covered by the regulations.

On February 16, 1982, the EQB adopted final regulations establishing the design, construction and permitting requirements for hazardous waste storage, treatment and disposal facilities. On the basis of these regulations, the Commonwealth has begun to apply for EPA authorization to conduct all aspects of the hazardous waste regulatory program, including the permitting of hazardous waste storage, treatment and disposal facilities. The Commonwealth's application satisfies Federal authorization requirements, except for the requirements that states have in effect standards for proof of financial responsibility and for amendments to existing rules and regulations which would conform them to new Federal regulations. The necessary financial responsibility regulations were adopted by the EQB on December 18, 1984 and published at 15 Pa. B. 895 (March 9, 1985).

During the course of review of the Commonwealth's applications for program authorization, the EPA identified those Federal regulations for which equivalent State regulations do not exist. The regulations adopted herein are equivalent Pennsylvania rules for those Federal regulations identified by EPA not previously included in the Commonwealth's hazardous waste program. Further changes

Section 612 of The Administrative Code of 1929 (71 P. S. § 232) requires that the Office of Budget prepare a fiscal note for regulatory actions and administrative procedures of the administrative departments, boards, commissions or authorities receiving money from the State Treasury stating whether the proposed action or procedure causes a loss of revenue or an increase in the cost of programs for the Commonwealth or its political subdivisions; that the fiscal note be published in the *Pennsylvania Bulletin* at the same time as the proposed change is advertised; and that the fiscal note shall provide the following information: (1) the designation of the fund out of which the appropriation providing for expenditures under the action or procedure shall be made; (2) the probable cost for the fiscal year the program is implemented; (3) projected cost estimate of the program for each of the five succeeding fiscal years; (4) fiscal history of the program for which expenditures are to be made; (5) probable loss of revenue for the fiscal year of its implementation; (6) projected loss of revenue from the program for each of the five succeeding fiscal years; (7) line item, if any, of the General Appropriation Act or other appropriation act out of which expenditures or losses of Commonwealth funds shall occur as a result of the action or procedures; (8) recommendation, if any, of the Secretary of the Budget and the reasons therefor.

The required information is published in the foregoing order immediately following the proposed change to which it relates; the omission of an item indicates that the agency text of the fiscal note states that there is no information available with respect thereto. In items (3) and (6) information is set forth for the first through fifth fiscal years, in that order, following the year the program is implemented, which is stated. In item (4) information is set forth for the current and two immediately preceding years, in that order. In item (8) the recommendation, if any, made by the Secretary of Budget is published with the fiscal note. See 4 Pa. Code § 7.231 *et seq.* Where "no fiscal impact" is published, the statement means no additional cost or revenue loss to the Commonwealth or its local political subdivision is intended.

to conform the State regulations to Federal requirements enacted after the proposal of these regulations were adopted by the EQB as proposed regulations on December 18, 1984. Upon final adoption of the second set of conforming regulations Pennsylvania will be eligible for final authorization.

The regulations amend the Commonwealth's hazardous waste regulations regarding (1) definitions, (2) transporter standards for manifest and hazardous waste discharges or spills, (3) facility standards for operating records, groundwater monitoring, closure and post-closure, use and management of containers, surface impoundments, waste piles, land treatment, landfills, incinerators, permits and certain appendices to existing regulations. These regulations conform Pennsylvania rules and regulations to Federal standards which would preempt Pennsylvania rules in the event those rules were less stringent.

Section 75.260(a), is revised to add definitions for "certification", "existing portion", "hazardous waste constituent" and "treatment zone". The definition for "identification number" is revised to identify EPA as the issuing agency, and the definition of "constituent" has been deleted.

Section 75.263, was proposed to be changed to add specific manifest signature requirements for the exchange of hazardous waste shipments between rail and nonrail transporters and water and nonwater transporters. This language is being deleted as a revision because the package of conforming amendments approved as proposed rulemaking by the EQB on December 18, 1984 contains revised transporter manifest requirements to comply with more recent uniform manifest system requirements. For the same reason, the proposal for requiring that the transportation of hazardous waste out of the United States be indicated on the manifest as to when the shipment left the country and a requirement to have the manifest signed and returned to the generator by the transporter is also deleted from these amendments. The revision to require the reporting to appropriate authorities of hazardous waste discharges by bulk transporters will be retained.

The majority of the conforming amendments are revisions to § 75.264. These revisions are made to eight subsections in response to Federal regulatory changes.

Section 75.264(k) is revised to add recordkeeping requirements for incin-

erators and for retention of additional records by other facilities.

Section 75.264(n) now requires groundwater monitoring for waste piles and contains specific requirements for location and construction of wells. Revisions have also been made to the standards for sampling and analysis plans, methods and conditions under which background water quality is determined, tests for statistical significance, and response times for notifying the Department if a significant change has occurred, as well as other actions which must be taken if a change has occurred.

Statistical comparisons of the groundwater quality parameters will now have to be made against upgradient well data, rather than against fluctuations in the well itself. This requirement is consistent with comparisons made at interim status facilities. If a statistically significant change is noted, the entire Appendix VIII list of hazard constituents in § 75.261 will now have to be sampled and analyzed as required by EPA. The groundwater contamination abatement plan has more specificity in its requirements than in prior regulations. According to the revised schedule, the abatement plan will have to be submitted within 30 days after approval of the assessment report and implemented 30 days after approval. The plan must include an engineering feasibility report and ensure that the abatement program is reducing the level of contaminants. Progress and success of the abatement program will have to be reported on a quarterly basis to the Department, and the groundwater flow rate and direction will have to be determined annually.

Section 75.264(q) is revised to add a condition requiring that ignitable or reactive wastes shall be set back 50 feet from the facility property line.

Section 75.264(s) is revised to allow only synthetic liners to be constructed in surface impoundments used for disposal. Under these regulations, a registered professional engineer certification that the impoundment design is structurally sound is required before permit issuance.

Section 75.264(t) has been reorganized to achieve greater continuity. It has also been revised to include groundwater monitoring unless the waste pile is completely enclosed or underlain by two liners, or the waste pile is lined and the waste is removed periodically for inspections. All lined waste piles must be equipped with a leachate collection system meeting certain requirements. Secondary liners

must meet specifications similar to those of primary liners. Surface water structures at waste pile facilities must now be capable of handling runoff from a storm to be expected once in 25 years, rather than a storm once in 10 years. The revisions also require that if there is evidence of a possible liner failure, the waste pile is to be removed from service, the Department is to be notified and those waste piles otherwise exempt from groundwater monitoring are to be monitored.

Section 75.264(u) was not only revised but also completely reorganized by Federal rulemaking and is, therefore, substantially revised to reflect the Federal changes. The Commonwealth's regulations relative to land treatment will, however, continue to differ from Federal regulations in four major respects. First, the application rates, where relevant, are based on already established Department guidelines for sewage sludge disposal or other Department criteria, and not solely on cadmium loading rates as required by EPA. Second, the wastes may be applied only to soil having a minimum depth of forty inches, and the soil must meet certain textural classification requirements. Third, specific isolation distances from water supplies, bedrock outcrops, property lines and sinkholes have been set in the Commonwealth's regulations. Fourth, neither tobacco nor crops intended for direct human consumption are allowed to be grown on a land treatment facility. These four requirements have, for many years, governed the land application of sewage sludge in Pennsylvania, and are more stringent than Federal requirements. These requirements have proved to be both reasonable and necessary, and it would have been inconsistent to waive these well established standards for the hazardous waste land application program while continuing to impose them on land application of wastes which are classified as nonhazardous.

Section 75.264(v) is revised to limit primary liners to synthetic materials. Each landfill cap must now have a permeability rate at least as slow as that of the liner. Surface water runoff structures for landfills are required to handle runoff from a 25 year storm. Quality control provisions relating to liner installation already contained in the regulations were revised to satisfy Federal requirements.

Section 75.264(w) as proposed modified the procedure for Department approval of trial burns of hazardous waste in § 75.264(w)(2). However, because additional conforming amend-

ments to paragraph (2) were proposed by the EQB on December 18, 1984, no changes have been made to this paragraph in this regulation. In § 75.264(2)(5) language is being retained as proposed to allow the Department to base its decision regarding the burning of a particular waste on other data in addition to, or in lieu of, trial burn results. The revisions restrict incinerators burning hazardous wastes to certain particulate emission rates.

Section 75.265(z) has been revised to prohibit the location of a facility in the 100 year floodplain unless applicant demonstrates that he can satisfy certain conditions. Table III of Appendix V is revised to restrict the use of certain materials as primary liners in order to conform to Federal regulations. These materials include natural clays, soil asphalt, sprayed asphalt, natural remolded clays and bentonite.

E. Summary and Purpose of Regulations

These amendments conform existing State regulations to Federal hazardous waste management requirements. They will make Pennsylvania's standards equivalent to preemptive Federal standards now in effect and enable Pennsylvania to obtain EPA authorization under the Resource Conservation and Recovery Act for the Commonwealth's hazardous waste program. Many of these amendments are necessitated by recent changes in Federal requirements, and all have been identified by EPA as Federal regulations for which equivalent State regulations do not exist.

F. Public Comments

Notice of proposed rulemaking was published at 14 Pa. B. 3628 (October 6, 1984) and 14 Pa. B. 3761 (October 13, 1984), and included a 30-day period for public comment. Only one comment from the public was received by the Board during the comment period. The Comment recommended that the EQB adopt the Federal exemption of ignitable nontoxic hazardous wastes from certain requirements if the wastes are incinerated. The Department considered this approach and the EQB has proposed to amend § 75.264(w) in the conforming regulations adopted by the EQB on December 18, 1984. This comment is, therefore, not addressed in the present rulemaking.

Several changes have been made to the regulation as proposed based upon extensive internal review and comments from EPA on the proposal. The

most significant modifications include changes to:

§ 75.264(n)(12) — to require the owner or operator to establish background concentrations for upgradient monitoring wells only, while providing background data for both upgradient and downgradient wells;

§ 75.264(n)(20) — to require certification by a qualified geologist or engineer of a plan for a groundwater quality assessment program if potential effects on groundwater are indicated through monitoring;

§ 75.264(n)(21) — to reduce the time for submission to the Department of sample results where a groundwater quality assessment is required from 90 days to 60 days from time of implementation;

§ 75.264(s)(3) — to require a certification by a qualified registered professional engineer of the structural integrity of a dike after an impoundment is taken out of service for an extended period of time;

§ 75.264(t)(3) — to specify waste pile requirements in greater detail;

§ 75.264(u)(21)(viii) — to establish a standardized procedure and requirements for an owner or operator who intends to demonstrate to the Department that a source other than the facility caused a significant increase in groundwater contamination, rather than addressing this issue on a case-by-case basis;

§ 75.264(v)(3) — to clarify and elaborate upon liner requirements and cover systems;

§ 75.265(z)(22) — to specify the information which must be submitted by an owner or operator of a facility located in a 100 year floodplain; and

§ 75.265, Appendix V, Table 3 — to eliminate the use of hydraulic asphalt concrete for use as a primary liner or cap since it is no longer considered an acceptable liner by EPA.

In addition, minor modifications of language or organization have been made to the following paragraphs to clarify the intention of the regulations as proposed: § 75.264(n)(4), (6), (14), (15), and (18 — (29); and (t)(4), (18), (34), and (38).

G. Benefits and Costs

Executive Order 1982-2 requires a statement of the benefits of a proposal as well as the costs that may be imposed. This proposal is necessary to obtain authorization for the Commonwealth's hazardous waste control program. Without these amendments the

Commonwealth will lose approximately \$2.5 million annually in Federal funding. In addition, as long as the Commonwealth is unable to qualify for Federal authorization of its hazardous waste program, private entities which manage hazardous waste in Pennsylvania will be forced to pay the costs of obtaining permits from both State and Federal governments.

Benefits of these amendments will accrue to the Commonwealth, local government and the citizenry from increased protection of human health and the environment and decreased costs of abating pollution which would otherwise occur without State enforcement efforts against illegal or substandard activities. Benefits will also accrue to permit applicants and facility owners and operators whose compliance with legislative and regulatory requirements will be more expeditiously and economically achieved through State, rather than Federal, program administration.

Costs imposed by the amendments would be experienced by those preparing and submitting applications for permits for hazardous waste storage treatment and disposal facilities and to a lesser extent to those operating such facilities. Since these regulations represent conforming amendments to Federal standards in effect nationwide, such costs would be imposed upon facility owners and operators irrespective of promulgation of Pennsylvania's rules and regulations.

Executive Order 1982-2 also requires a statement of the need for, and a description of, any forms, reports, or other paperwork required as a result of this proposal. Because these are minimum Federal requirements, any paperwork required as a result of these amendments will be required regardless of Pennsylvania's rulemaking. In any case, these amendments impose no major new requirements in addition to those already in effect.

H. Sunset Date

Since these regulations will be evaluated on an ongoing basis as they are implemented by the Department, the EQB has proposed no sunset date. In addition, EPA will be formally reviewing the Pennsylvania hazardous waste management program and its adequacy and effectiveness in implementing the Federal Resource Conservation and Recovery Act. These review processes will disclose any problems which may arise and identify areas where revisions to these regulations might be needed.

1. Regulatory Review Act

The Regulatory Review Act of 1982 (71 P. S. § 745.5) establishes a procedure for review of proposed amendments by the Independent Regulatory Review Commission and the relevant standing committees in each house of the General Assembly. Under section 5(a) of that act, a copy of the proposal was submitted to the Independent Regulatory Review Commission, the Chairman of the Senate Environmental Resources Committee, and the House Conservation Committee for review and comment. In addition to the proposal, the Commission and the committees were provided with a copy of a detailed Regulatory Analysis form prepared by the Department in compliance with Executive Order 1982-2.

On October 3, 1984 the House Conservation Committee approved the proposal. Having received no comment from the Senate Committees by October 16, 1984, the proposal was deemed approved as provided by section 5(c) of the Regulatory Review Act. The Independent Regulatory Review Commission met on October 18, 1984, and approved the proposed rulemaking. The various oversight requirements of the Regulatory Review Act have been fulfilled by the review of the proposed rulemaking and no additional review of the final order adopting the proposal, and changes made to the document, is required by the Regulatory Review Act.

J. Findings of the Environmental Quality Board

The Environmental Quality Board finds:

(1) That public notice of the intention to amend the regulations of the Department of Environmental Resources was given under sections 201 and 202 of the act of July 31, 1968 (P. L. 769, No. 240) (45 P. S. §§ 1201 and 1202) and the regulations thereunder, 1 Pa. Code §§ 7.1 and 7.2.

(2) That a public comment period was provided as required by law, and that all comments received were considered.

(3) That modifications to the proposed text do not enlarge the original purposes or the scope of the proposal.

(4) That these amendments are necessary and appropriate to the administration and enforcement of the Solid Waste Management Act, act of July 7, 1980 (P. L. 390, No. 97) (35 P. S. § 6018.101 *et seq.*).

K. Order of the Board

The Environmental Quality Board,

acting under the authorizing statutes, orders:

(A) The rules and regulations of the Department of Environmental Resources, 25 Pa. Code Chapter 75, are hereby amended by amending § 75.260 to read as set forth at 14 Pa. B. 3628 (October 6, 1984) and by adding §§ 75.263 — 75.265 to read as set forth in Annex A. The ellipses refer to the existing text of the regulations.

(B) The Chairman of the Environmental Quality Board shall submit this order, 14 Pa. B. 3628 and Annex A hereto to the offices of General Counsel and the Attorney General for approval and review as to legality and form, as required by law.

(C) The Chairman of the Environmental Quality Board shall certify this order, 14 Pa. B. 3628 and Annex A hereto and deposit the same with the Legislative Reference Bureau, as required by law.

(D) This order shall take effect upon publication in the *Pennsylvania Bulletin*.

By the Environmental Quality Board

NICHOLAS DeBENEDICTIS,

Chairman

Fiscal Note: Fiscal Note 7-89 remains valid for the final adoption of the subject regulations.

INDEPENDENT REGULATORY REVIEW COMMISSION**Order**

On September 26, 1984, the Independent Regulatory Review Commission received these proposed amendments from the Environmental Quality Board. This would amend 25 Pa. Code §§ 75.260 and 75.263 — 75.265. They are proposed under the authority granted by the Pennsylvania Solid Waste Management Act, act of July 7, 1980 (P. L. 360, No. 97) sections 104 and 105. These regulations were published in the *Pennsylvania Bulletin* of October 6, 1984, with a 30-day comment period.

This proposal revises and amends the State's hazardous waste requirements and makes them at least as stringent as those adopted by the Federal Environmental Protection Agency (EPA). The purpose of the amendments is to make Pennsylvania's hazardous waste standards conform to preemptive EPA standards and to enable the State to obtain EPA authorization for primacy in the operation and enforcement of its hazardous waste program, including the issuance or denial of permits. These amendments ad-

dress a variety of hazardous waste program elements. Among the various changes are new standards for transporters of hazardous wastes, including standards for manifests when waste are transferred from one transporter to another and standards for hazardous waste discharges or spills. In addition, there are numerous revisions to facility standards, including the following: Groundwater monitoring for waste piles, use and management of containers, surface improvements, liners for waste piles, land treatment specifications, landfills, and incinerators burning hazardous wastes. In a few cases, involving land treatment standards, the State standards proposed would be more stringent than the Federal standards.

On October 3, 1984, the House Conservation Committee approved these proposed amendments.

We have reviewed these proposed amendments and find them to be in the public interest. Without these regulations, Pennsylvania will not qualify for Federal authorization of its hazardous waste program, and private entities, which manage hazardous wastes in the State, will be required to obtain permits from both the State and Federal governments. By enabling EPA to grant jurisdiction over the permit process to Pennsylvania, these amendments will reduce duplicative paperwork, reporting and other requirements now imposed on facility owners and operators by both Federal and State permit programs. Furthermore, Pennsylvania could lose approximately \$2.5 million per year in Federal funding if it does not receive EPA authorization for its hazardous waste program. While most of these proposed regulatory provisions are at least as stringent as the corresponding Federal requirements, those provisions dealing with the land application of sewage sludge are more stringent than Federal requirements. Therefore, we approve these proposed amendments as published at 14 Pa. B. 3628.

The Commission reserves the right to review these amendments if they are substantially amended prior to final publication.

IRVING G. ZIMMERMAN,
Chairman

Annex A**TITLE 25. ENVIRONMENTAL RESOURCES****PART I. DEPARTMENT OF ENVIRONMENTAL RESOURCES****Subpart C. PROTECTION OF NATURAL RESOURCES**

ARTICLE I. LAND RESOURCES CHAPTER 75. SOLID WASTE MANAGEMENT

Subchapter D. HAZARDOUS WASTE

§ 75.263. Transporters of hazardous waste.

(d) Manifest.

(1) For bulk shipment of hazardous waste designated for treatment, storage or disposal within this Commonwealth solely by railroad or water, the manifest shall be completed and routed as follows:

(v) The rail or water transporter shall carry, along with the shipment, either the transporter's copy of the manifest or the shipping paper containing the information required on the manifest in paragraph (1)(v) except the identification numbers, generator's certification, and signatures.

(vi) The delivering rail or water transporter shall obtain the signature, date of receipt of shipment, and certification of the authorized representative of the treatment, storage, or disposal facility on either the manifest or the shipping paper.

(g) Hazardous waste discharge or spills.

(5) Report in writing as required by 49 C.F.R. § 171.16 (relating to detailed hazardous materials incident reports) to the Chief, Information System Division, Transportation Programs Bureau, United States Department of Transportation, Washington, D.C., 20590, sending a copy of the report to the Department and a copy to the generator. A water — bulk shipment — transporter who has discharged hazardous waste shall give the same notice as required by 33 C.F.R. § 153.203 (relating to procedure for the notice of discharge) for oil and hazardous substances, sending a copy of the report to the Department, and a copy to the generator.

§ 75.264. New and existing hazardous waste management facilities applying for a permit.

(k) Operating record.

(2) The following information shall

RULES AND REGULATIONS

be recorded as it becomes available and maintained in the operating record until closure of the facility:

(iii) Records and results of waste analyses and trial tests performed as specified in subsections (c), (g) and (w).

(v) Records and results of inspections as required by subsection (e).

(viii) Monitoring, testing, or analytical data where required by subsections (n) and (s) — (w).

(n) Groundwater monitoring.

(1) The owner or operator of a landfill, land treatment facility, waste pile — except as otherwise provided in subsection (t)(3) — or surface impoundment which is used to manage hazardous waste shall implement a groundwater monitoring program as required in this subsection capable of determining the facility's impact on the quality of a groundwater system which the facility has the potential for affecting, or as otherwise required in writing by the Department.

(2) The owner or operator shall install, operate, and maintain a groundwater monitoring system to detect the entry of hazardous waste, hazardous constituents or decomposition byproducts into the groundwater system. Hazardous constituents are constituents identified in Appendix VIII, § 75.261 (relating to criteria, identification and listing of hazardous waste), or as otherwise specified by the Department, that are reasonably expected to be in or derived from wastes contained at the regulated facility. This groundwater monitoring program shall be conducted during the active life of the facility, and during the post-closure care period.

(3) The owner or operator shall have an approved outline for a groundwater quality assessment program for the site. The outline shall describe a more comprehensive ground-water monitoring program capable of:

(i) Determining which hazardous waste, hazardous constituents or decomposition byproducts have entered the ground water.

(ii) Determining the rate and extent of migration of hazardous waste, hazardous constituents or decomposition byproducts in the ground water.

(iii) Determining the concentrations of hazardous waste, hazardous constituents

or decomposition byproducts in the ground water.

(4) A groundwater monitoring system shall be capable of yielding groundwater samples for analysis at all times and shall consist of:

(ii) Monitoring wells — at least three installed hydraulically downgradient — in the direction of decreasing static head — at or close to the perimeter of the waste management area. Their number, locations, and depths shall ensure that they immediately detect statistically significant amounts of hazardous waste, hazardous constituents or decomposition byproducts that migrate from the waste management area to the ground water.

(iii) The locations of the monitoring wells shall be approved in writing by the Department prior to construction and shall be located at a distance no greater than 200 feet from the perimeter of the waste management area, unless otherwise approved under paragraph (5).

(iv) The approved monitoring well locations, which include both upgradient and downgradient wells, shall be considered the points of compliance at which acceptable concentration levels of background groundwater constituents shall be maintained.

(5) Where site conditions preclude the installation of monitoring wells as specified in paragraph (4), the Department may, based on the submission of a detailed hydrogeologic analysis of existing and future conditions, approve the construction of an alternate and innovative monitoring system.

(6) A separate monitoring system for each waste management component of a facility is not required if provisions for sampling upgradient and downgradient groundwater quality will detect discharge from the waste management area. The waste management area is the area on which waste will be placed during the active life of the facility and includes area taken up by a liner, dike, or other barrier designed to contain waste.

(i) In the case of a facility consisting of only one waste management component, the waste management area is described by the waste boundary (perimeter).

(ii) In the case of a facility consisting of more than one waste management component, the waste management area is described by an imaginary boundary line which circumscribes the several waste management components.

(7) A monitoring well shall be cased in a manner that maintains the integrity of the monitoring well borehole. This casing shall be screened or perforated, and packed with gravel or sand where necessary, to enable sample collection at depths where appropriate aquifer flow zones exist. The annular space above the sampling depth shall be sealed with a suitable material to prevent contamination of samples and the ground water.

(8) A monitoring well shall be protected from damage by heavy equipment in the normal operations of the facility and from vandals. The protective installation shall include:

(i) A length of steel casing several inches larger in diameter and height than the monitoring well and at least 10 feet in length, installed around the monitoring well casing. The height of this protective steel casing shall be at least 1 foot above final grade and several inches above the monitoring well casing. This length of protective steel casing shall be grouted and placed into the ground to a depth of at least 3 feet and have a cement collar to hold it firmly in position. The steel casing shall be painted a highly visible color and be numbered.

(ii) The monitoring well casing shall have a cap which will allow the well to be locked and secured from acts of vandalism.

(9) The owner or operator shall obtain and analyze samples from the installed groundwater monitoring system. The owner or operator shall develop and submit to the Department for written approval a groundwater sampling and analysis plan, which shall be retained at the facility and followed. The plan shall include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide a reliable indication of groundwater quality upgradient, beneath and downgradient of the waste management area. At a minimum, the plan shall include procedures and techniques for:

- (i) Sample collection.
- (ii) Sample preservation and shipment.
- (iii) Analytical procedures.
- (iv) Chain of custody control.

(10) The groundwater sampling plan shall include detailed sampling and analytical methods, specific to the monitored facility, that are appropriate for groundwater sampling and that accurately measure hazardous waste, hazardous constituents or decomposi-

tion byproducts in groundwater samples.

(11) The owner or operator, at a minimum, shall determine the concentration or value of the following parameters in groundwater samples obtained from the monitoring wells:

- (i) pH.
- (ii) Total organic carbon.
- (iii) Total organic halogen.
- (iv) Specific conductance.

(v) Additional parameters as required by the Department in writing or by permit.

(12) The owner or operator shall establish initial background concentrations or values for parameters specified in paragraph (11) and other parameters as needed to meet the requirements of paragraph (20)(v)(C). Unless otherwise specified in paragraph (13), determination of these background concentrations shall be based on quarterly sampling of the upgradient wells for 1 year. For a new facility, background groundwater quality shall be established through a 1 year sampling program which shall be completed prior to the disposal of hazardous waste at the facility. This background data, as well as the as-built construction details and pump-test data for wells — both upgradient and downgradient — shall:

(i) Unless otherwise specified by the Department in the permit, be submitted to the Department within 1 year of permit issuance. For an interim status facility receiving a permit under this section, background data will be based on the initial year's sampling results obtained at the upgradient wells as specified in § 75.265(n)(10) (relating to interim status for hazardous waste management facilities and permit program for new and existing hazardous waste management facilities).

(ii) Account for measurement errors in sampling and analysis.

(iii) Account, to the extent possible, for a seasonal fluctuation in background groundwater quality if the fluctuation is expected to affect the concentration of hazardous constituents.

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

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

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

(14) For the parameters specified in paragraph (11) and additional parameters as specified by paragraph (20)(v)(C) the owner or operator shall establish initial background concentrations or values for an upgradient well. At least four replicate measurements shall be obtained for a sample and the initial background arithmetic mean and variance shall be determined by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained for an upgradient well during the first year.

(15) After the first year, the monitoring wells — both upgradient and downgradient — shall be sampled and the samples analyzed at least quarterly for the parameters in paragraph (11)(i) — (iv) and others specified by the Department under paragraph (11)(v) or as necessary to meet the requirements of paragraph (20). These additional parameters shall be analyzed at a frequency specified by the Department under paragraph (11)(v).

(16) The elevation of the groundwater surface at a monitoring well shall be determined each time a sample is obtained and shall be sent to the Department with the quarterly report required under subsection (m). Groundwater elevation measurements shall be recorded as a distance measurement from the reference elevation of the well head, and with respect to mean sea level based on U.S.G.S. or U.S.C. & G.S. datum.

(17) After the first year of background sampling, for a well in the monitoring system and for a parameter specified in paragraph (11), the owner or operator shall use the following statistical procedure in determining whether background values have been exceeded:

(i) If 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, then one of the following shall be used:

(A) The owner or operator shall take at least four portions from a sample at a well at the compliance point and determine whether the difference between the mean of the constituent at a well — using the 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 III. If the test indicates that the difference is significant, the owner or operator shall 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 shall conclude that a statistically significant change has occurred.

(B) The owner or operator may use an equivalent statistical procedure, if approved in writing by the Department, for determining whether a statistically significant change has occurred. Approval will require a demonstration that the alternative procedure reasonably balances the probability of falsely identifying a noncontaminating regulated facility and the probability of failing to identify a contaminating regulated facility in a manner that is comparable to that of the statistical procedure described in clause (A).

(iii) In other situations, the owner or operator shall use a statistical procedure that provides reasonable confidence that the migration of hazardous wastes, hazardous constituents or decomposition byproducts from a regulated facility into the ground water will be indicated. Department approval for an alternate statistical procedure will be based on the submission of data that demonstrates that the procedure proposed:

(A) Is appropriate for the distribution of the data used to establish background values or concentration limits.

(B) Provides a reasonable balance between the probability of falsely identifying a noncontaminating regulated facility and the probability of failing to identify a contaminating regulated facility.

(18) The owner or operator shall determine whether there is a statistically significant increase over background values for a parameter or constituent specified in the permit pursuant to paragraph (11) each time he determines groundwater quality at the compliance point both up gradient and downgradient, under paragraph (15).

(i) In determining whether a statistically significant increase has occurred, the owner or operator shall compare the groundwater quality at a monitoring well at the compliance point for a parameter or constituent to the background value for that parameter or constituent, according to the

statistical procedure specified under paragraph (17).

(ii) The owner or operator shall determine whether there has been a statistically significant increase at a monitoring well at the compliance point within 30 days after completion of sampling.

(19) If comparisons made under paragraph (18) for an upgradient well show a significant change, the owner or operator shall determine whether the facility has caused the significant change. If the facility is found to have caused the change, then the owner or operator shall submit to the Department for review a specific plan based on the outline required under paragraph (3) for a groundwater quality assessment program. If the change is shown to be unrelated to the facility and, instead, related to natural fluctuations in background quality, the background base data shall be revised after Department approval, or a new statistical procedure that allows for these natural changes shall be proposed.

(20) If the comparisons for a downgradient well made under paragraph (18) indicate a significant change, the owner or operator shall:

(i) Notify the Department within 7 days that the facility may be affecting the groundwater quality, identify those parameters or constituents that have shown statistically significant increases.

(ii) Unless otherwise approved in writing by the Department, immediately sample the groundwater in all monitoring wells and determine the concentrations of all Appendix VIII, § 75.261 constituents or other parameters the Department deems necessary. This sampling shall include a determination of the background concentrations of Appendix VIII constituents identified in the groundwater. Results of these analyses shall be submitted to the Department under paragraph (21).

(iii) Within 30 days or as otherwise approved in writing by the Department after the notification required under subsection (n)(20)(i), develop and submit to the Department for review and written approval a specific plan, based on the outline required under paragraph (3) and certified by a qualified geologist or geotechnical engineer, for a groundwater quality assessment program at the facility.

(iv) Include in the plan required under subparagraph (iii) as a minimum, the following information:

(A) The number, location, size, cas-

ing type, and depth of wells, borings or pits to be used.

(B) Sampling and analytical methods to be used to identify hazardous wastes, hazardous constituents or decomposition byproducts that are present in groundwater or in the facility and that were found during the sampling required by subparagraph (ii).

(C) The means to establish background values for the hazardous wastes, hazardous constituents or decomposition byproducts at the compliance-monitoring-points.

(D) Evaluation procedures, including use of previously gathered groundwater quality information, to be used.

(E) A schedule of implementation.

(v) Begin to implement the groundwater quality assessment program within 30 days of Department approval, and, at a minimum, determine:

(A) The rate and extent of migration of the hazardous waste, hazardous constituents or decomposition byproducts in the groundwater.

(B) Unless otherwise approved in writing by the Department, the concentrations of Appendix VIII, § 75.261 constituents, or other parameters the Department deems necessary.

(C) The background values for the hazardous wastes, hazardous constituents, or decomposition byproducts as defined in paragraph (2), that have been found at the monitoring points.

(vi) Make the determinations in subparagraph (v) as follows:

(A) Comply with paragraph (12)(i) and (iii), and (14) in developing the database used to determine background values and concentrations;

(B) Express background values as concentrations in a form necessary for the determination of statistically significant increases under paragraph (18).

(C) Use a groundwater monitoring system that complies with paragraphs (4) — (7) to take samples used in the determination of background values and concentrations.

(21) The owner or operator shall make his determination under paragraphs (20)(v) and (vi) within 180 days of plan implementation, or as otherwise required by the Department, and within 15 days after that determination, submit to the Department a written report containing an assessment of the groundwater quality. As a milestone in the partial fulfillment of the

provisions of this paragraph, the owner or operator shall submit the sample results required by paragraph (20)(ii) and (v)(B) and (C) within 60 days of plan implementations.

(22) If the owner operator believes that the statistically significant increase was caused by a source other than the HWM facility, or that the increase resulted from errors in sampling, analysis, or evaluation, the owner or operator may submit, as a part of the report described in paragraph (21), data to support such a demonstration. While the owner or operator may submit data as part of the groundwater assessment report, he is not relieved of the requirements of paragraphs (20) and (21) unless otherwise approved in writing by the Department.

(23) If in reviewing the groundwater quality assessment report, the owner or operator or the Department determines that hazardous waste, hazardous constituents or decomposition byproducts have entered the groundwater, then the owner or operator shall submit to the Department a plan for the abatement of groundwater contamination. This abatement plan shall:

(i) Be submitted to the Department within 30 days after submission of the assessment report described in paragraph (21).

(ii) Include an engineering feasibility analysis.

(iii) Begin to be implemented within 30 days after Department approval.

(iv) Result in the abatement of groundwater contamination by the removal or treatment of hazardous wastes, hazardous constituents or decomposition byproducts in groundwater that are attributable to the facility.

(v) Establish and implement a groundwater monitoring program to demonstrate the effectiveness of the abatement program.

(vi) Ensure that the proposed abatement procedures will continue to the extent necessary to insure that the concentration levels of hazardous wastes, hazardous constituents or decomposition byproducts are being reduced.

(vii) Include the submission of a written quarterly report to the Department that describes the effectiveness of the abatement program and the results of the groundwater monitoring program.

(viii) Be modified when the Department determines that the abatement program is ineffective.

(ix) Be terminated when it can be demonstrated, from the groundwater monitoring data submitted under paragraph (23)(vii), that the concentration levels of hazardous wastes, hazardous constituents or decomposition byproducts in monitoring points have remained at background levels for a period of 3 consecutive years.

(x) Be extended beyond the 30 year postclosure period, under subsection (o)(12), if the conditions of subparagraph (ix) cannot be demonstrated.

(24) If, after review of the groundwater quality assessment report the Department determines that no hazardous waste, hazardous constituents or decomposition byproducts have entered the groundwater, then the owner or operator shall:

(i) Notify the Department of proposed modifications to the facility's groundwater monitoring program.

(ii) Reinstate the original or an approved modified groundwater monitoring program for the facility.

(iii) Begin the implementation of proposed modifications to the facility's groundwater monitoring program within 30 days of Department approval.

(25) At least annually by January 31, the owner or operator shall evaluate the data on groundwater elevations obtained under paragraph (16) to determine whether the requirements under paragraph (4) for locating the monitoring wells continues to be satisfied. If the evaluation shows that paragraph (4) is no longer satisfied or the Department determines that paragraph (4) is no longer satisfied, the owner or operator shall immediately modify the number, location, or depth of the monitoring wells to bring the groundwater monitoring system into compliance with this requirement. These modifications will be approved in writing by the Department before construction begins.

(26) At least annually by January 31, the owner operator shall determine the groundwater flow rate and direction and report the determinations to the Department. The initial determination shall be based on in situ testing, but subsequent determinations may be based on the analysis of those water level elevations obtained in response to paragraph (16) and application of Darcy's Law.

(27) The owner or operator shall keep records of analyses and evaluations of groundwater quality, surface elevations, and flow rate and direction

determinations required under subsection (n).

(28) The owner or operator shall report the following information in writing to the Department:

(i) During the first year when initial background concentrations are being established for the facility: concentrations or values of the parameters listed in paragraph (11) for an upgradient groundwater monitoring well within 15 days after completing a quarterly analysis and no later than 30 days after the end of a quarter.

(ii) Quarterly after the first year: concentrations or values of the parameters in paragraph (11)(i) — (iv) and required under paragraph (11)(v) for each groundwater monitoring well, along with the required evaluations for these parameters under paragraph (16) within 15 days after completing a quarterly analysis and no later than 30 days after the end of a quarter.

(iii) Annually: concentrations or values of those parameters for each well which are specified by the facility's permit within 15 days of completing the annual analysis.

(iv) Annually: those determinations for the groundwater flow rate and direction specified in paragraph (26).

(29) The owner or operator shall report the groundwater quality at a monitoring point, under paragraph (28) in a form necessary for the determination of statistically significant increases under paragraph (18).

(o) *Closure and postclosure.*

* * * * *

(20) The owner of the property on which a disposal facility is located shall record a notation on the deed to the facility property — or on some other instrument which is normally examined during title search — that will in perpetuity notify a potential purchaser of the property that:

* * * * *

(ii) Its use is restricted under paragraph (14).

* * * * *

(q) *Use and management of containers.*

* * * * *

(8) Hazardous waste shall not be placed in an unwashed container that previously held an incompatible waste or material — See Appendix IV of § 75.265.

* * * * *

RULES AND REGULATIONS

2073

(15) Containers holding ignitable or reactive waste shall be set back at least 50 feet — 15 meters — from the facility's property line.

(b) *Surface impoundments.*

(3) The following are the minimum general design standards required:

(xvii) Hazardous waste treated, stored or disposed of in a surface impoundment shall be underlain by a liner system. The surface impoundment liner system shall be designed with the following components, starting from the bottom of the system:

(D) A top liner (primary) meeting the requirements specified in Table 3 Appendix V of § 75.265. A liner shall be constructed of materials that prevent wastes from migrating into the liner during the active life of the facility. If the surface impoundment is used for treatment or storage, then 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. For surface impoundments used for disposal, this liner shall be capable of diverting to a collection sump or point liquids or leachate passing through or generated within the hazardous wastes, where it can be collected for proper treatment, storage, or disposal with sufficient frequency to prevent backup into the surface impoundment.

(F) A cap which is capable of preventing the infiltration of liquid into closed portions of the surface impoundment. The cap shall have a permeability less than or equal to the permeability of the primary liner. The cap shall meet the minimum requirements specified in Table 3, Appendix V of § 75.265. It shall be placed on a stable 1 foot thick layer of intermediate cover material which has been compacted and graded to prevent damage to the cap. This requirement may be altered or waived if it is determined by the Department that capping is not necessary.

(xxiv) For a surface impoundment used for disposal, the conveyance system and storage system for the leachate from the leachate collection zone and runoff shall meet, as a mini-

mum, the following design standards when required by the Department:

(B) The minimum storage capacity for runoff shall be based on the 24-hour rainfall in inches expected once in 25 years per acre of active portions of the surface impoundment.

(xxx) For surface impoundments used for disposal, the closure and post-closure care shall conform to subsection (o) and the following specific requirements:

(A) A final layer of cover material compacted to a minimum uniform depth of 2 feet shall be placed over the entire surface of the surface impoundment. The final cover shall be soils that fall within the United States Department of Agriculture (USDA) textural classes of sandy loam, loam, sandy clay loam, silty clay loam, and silt loam. Other final cover materials shall be approved in writing by the Department. The soil shall compact well, not crack excessively when dry, and support a vegetative cover. The coarse fragment content — fragments not passing the No. 10 mesh sieve, 2 mm. — shall not exceed 50% by volume, and the combustible and coal content, or both, shall not exceed 12% by volume. Boulders and stones as classified by USDA shall be excluded from soils used for cover material. The source and volume of final cover necessary and available shall be specified and supported by calculations.

(xxxi) Closure of surface impoundments used for treatment or storage, shall conform to the closure requirements of subsection (o), and, at closure, hazardous waste, hazardous waste residues and contaminated subsoils shall be removed from the impoundment. A component of the impoundment, a component of the liner system, or appurtenant structures or equipment — such as discharge platforms, pipes, baffles, skimmers, aerators, or other equipment — containing or contaminated with hazardous waste or hazardous waste residues shall be decontaminated or removed. The wastes shall be subject to applicable regulations.

(xxxii) Prior to the issuance of a surface impoundment permit and after an extended period of time — at least 6 months — during which the impoundment was not in service, the owner or operator shall obtain a certification

from a registered professional engineer qualified to make a certification that the impoundment's dike, including that portion of a dike which provides freeboard, has structural integrity. The certification shall establish, in particular, that the dike:

(A) Will withstand the stress of the pressure exerted by the types and amount of wastes to be placed in the impoundment.

(B) Will not fail due to scouring or piping, without dependence on a liner system included in the surface impoundment construction.

(t) *Waste piles.* Waste piles shall conform with the following:

(1) This subsection applies to an owner or operator of a facility that stores or treats hazardous waste in piles except under subsection (a). A waste pile used as a disposal facility is a landfill and shall meet the requirements of subsection (v).

(2) A waste pile shall be designed to prevent discharge into the land, surface water, or groundwater during the life of the pile.

(3) An owner or operator of a waste pile complying with subparagraph (i) is not subject to the ground-water requirements of subsection (n), or the liner and collection and treatment requirements of paragraph (4). An owner or operator of a waste pile complying with subparagraph (ii) or (iii) is not subject to the ground-water requirements of subsection (n).

(i) The waste pile is inside or under a completely enclosed structure that provides protection from precipitation so that neither runoff nor leachate is generated.

(A) A liquid or material containing free liquids is not placed in the pile.

(B) The pile is designed and operated to control dispersal of the waste by wind, where necessary, means other than wetting.

(C) The pile will not generate leachate through decomposition or other reactions.

(D) The waste is underlain by an impermeable membrane of sufficient strength and thickness to prevent failure due to the stress of installation, puncture, cracking, tearing, or other physical damage from equipment used to place the waste in or on the pile, or to remove the waste from the pile, or to clean the membrane. The membrane shall be compatible and nonreactive with the waste to be placed on it.

RULES AND REGULATIONS

(E) The pile is protected from surface water run-on by the structure or in another manner.

(ii) The waste pile is underlain by a liner system composed of two liners and conditions of paragraph (4) are complied with.

(iii) The waste in the pile is removed periodically and the liner is inspected for deterioration, cracks, or other conditions that may result in leaks. The frequency of inspection shall be specified in the inspection schedule under subsection (e) and shall be based on the potential for the liner-base to crack or otherwise deteriorate under the conditions of operation such as waste type, rainfall, loading rates, sub-surface stability and conditions of paragraph (4) are complied with.

(4) The liner system for the waste pile shall consist of:

(i) A leachate and runoff collection system immediately above the liner that is designed, constructed, maintained and operated to collect and remove leachate from the pile. The leachate collection system shall be:

(A) Constructed of materials that are:

(I) Chemically resistant to the waste managed in the pile and the leachate to be generated.

(II) Of sufficient strength and thickness to prevent collapse under the pressures exerted by overlaying waste, waste cover material, and by equipment used at the pile.

(B) Designed, constructed, and operated to function without clogging through the scheduled closure of the waste pile.

(C) Designed, constructed, operated and maintained so that no standing liquid may accumulate.

(iii) A liner underlying and in contact with the waste pile which will prevent discharge into the land, surface water, or groundwater during the life of the pile, including the closure period. The liner type and design will be based on the required liner's thickness, the required permeability of the liners, and the characteristics of the waste or leachate to which the liners will be exposed. The liner system shall be 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 condi-

tions, the stress of installation or other physical damage from equipment used to place the waste in or on the pile, or to remove waste from the pile, or to clean and expose the liner surface for inspection. The liner permeability shall not exceed 1×10^{-7} cm/sec.

(iii) Where necessary under paragraph (3)(ii), a secondary liner designed, constructed, maintained and operated in a manner that prevents the migration of liquid out of the space between the liners and that meets the specifications of subparagraph (iii).

(iv) Where necessary under paragraph (3)(ii), a leak detection system between the liners designed, constructed, maintained and operated to detect migration of liquid into the space between the liners.

(v) A subbase underlying the liners 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.

(5) A liner system shall have an effective life equal to or greater than the life of the pile.

(6) A liner system shall be protected from plant growth which could damage a component of the system.

(7) For a waste pile, a minimum distance of 20 inches between the top of the subbase and seasonal high groundwater table shall be maintained without the use of artificial or man-made groundwater drainage or dewatering systems. Soil mottling shall indicate the presence of a seasonal high groundwater table.

(8) Surface water runoff from active areas of the permitted site shall be collected. It shall then be managed as a hazardous waste unless it has been determined not to be a hazardous waste. Necessary measures and structures shall be designed to handle water quantities based on 24 hour rainfall in inches to be expected once in 25 years. Supporting calculations shall be provided.

(9) The conveyance system and storage system for conveying and storing the leachate from the leachate and runoff collection system shall meet as a minimum the following design standards:

* * * * *

(ii) The minimum storage capacity for runoff shall be based on 24 hour rainfall in inches expected once in 25 years per acre of the waste pile.

* * * * *

(iv) The piping system conveying the leachate or runoff from the waste pile to the collection point (tank or surface impoundment) shall be: sized for the anticipated leachate and runoff flow, chemically compatible with the leachate, of sufficient strength to withstand anticipated loads, equipped with cleanouts where necessary or as required by the Department, and sealed to prevent loss of leachate.

(10) Design of a treatment facility to receive the leachate and run-off from storage, if the facility is needed or required in writing by the Department, shall be submitted to the Department for written approval prior to issuance of a permit. The treatment facility shall be constructed prior to the acceptance of hazardous waste at the facility.

(11) The design flow rate for the treatment facility shall be a minimum of 15,000 gallons per day for an acre of active portion. The design standards for the treatment facilities shall meet the requirements of § 75.265(y) (relating to interim status for hazardous waste management facilities and permit program for new and existing hazardous waste management facilities).

(12) The treatment facility shall be compatible with and capable of treating the waste constituents expected to be present in the leachate and run-off and the anticipated volumes of waste.

(13) Run-on shall be diverted away from the site, with the necessary measures and structures designed to handle water quantities based on the 24-hour rainfall in inches expected once in 100 years and supported by calculations.

(14) A collection and holding facility — such as a tank or basin — associated with run-on and run-off control systems shall be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.

(15) The best engineering construction practices shall be employed during construction.

(16) Quality control measures and tests shall be specified and employed to ensure that construction conforms to design, materials, and construction specifications.

(17) A registered professional engineer shall certify in writing for each phase of installation or construction, under penalty of law, that he has personally examined the construction of the phase and it is constructed and prepared in accordance with the documents, statements, designs, and plans submitted as part of the application as

RULES AND REGULATIONS

2075

approved by the Department.

(18) During construction or installation, the liner system and cover system shall be inspected for uniformity, damage, and imperfections — such as, holes, cracks, thin spots, and foreign material — and manufactured liner materials — such as, membranes, sheets, and coatings — shall be inspected to ensure tight seams and joints and the absence of a tear or blister.

(19) A waste pile shall be designed, constructed, operated and maintained to control dispersal of the waste by wind or water erosion.

(20) The Department may specify in writing control practices — such as cover or frequent wetting — when necessary to ensure that wind dispersal of hazardous waste from a pile is controlled.

(21) While a waste pile is in operation, it shall be inspected by the owner or operator weekly and after storms to detect evidence of the following:

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

(ii) The presence of liquid in leak detection systems, where applicable.

(iii) Proper functioning of wind dispersal control systems, where present.

(iv) The presence of leachate in and proper functioning of the leachate collection and removal systems, where present.

(22) Whenever there is indication of a possible failure of the liner system, that system shall be inspected under the Waste Pile Evaluation and Repair (WPER) Plan required by paragraph (25).

(23) Whenever there is evidence of a failure of the liner system, including evidence of liquid in the detection system between the liners, deterioration, cracking, or other condition identified that is causing or could cause a leak:

(i) The owner or operator shall notify the Department in writing within 7 days detecting the failure.

(ii) For waste piles exempt from ground-water monitoring under paragraph (3), the Department may require that the waste pile shall comply with the ground-water monitoring requirements of subsection (n) within a specified time.

(24) If the waste pile is removed from service as required by paragraph (23) the owner or operator shall:

(i) Immediately stop adding wastes to the pile.

(ii) Immediately contain leakage which has or is occurring.

(iii) Immediately take measures which shall stop the leak.

(iv) If the leak cannot be stopped by other means, remove the waste from the liner.

(v) For waste piles with detection systems, remove accumulated liquid within a period of time or frequency specified by the Department.

(25) As part of the contingency plan required in subsection (i), the owner or operator shall specify:

(i) A procedure for complying with the requirements of paragraph (23).

* * *

(26) No waste pile that has been removed from service under paragraph (23) may be restored to service unless:

* * *

(27) A waste pile that has been removed from service under paragraph (23) and that is not being repaired shall be closed.

(28) Weighing or measuring facilities, if necessary or when required by the Department, shall be provided for weighing all hazardous wastes brought to the TSD facility, except for captive facilities that handle liquids or flowable wastes — less than 20% solids — which are amenable to accurate flow measurements, or captive facilities that possess other waste inventory controls — volume controls. All weighing facilities shall be capable of weighing the maximum anticipated load plus the weight of the transport vehicle. The precision of weighing devices shall be certified by the Pennsylvania Department of Agriculture.

(29) For off-site facilities or on-site facilities receiving waste from off-site sources, hours of operations for the site shall be prominently displayed on a sign at the entrance. The lettering shall be a minimum of 4 inches in height and of a color contrasting with its background.

(30) Access roads shall be paved or surfaced with materials such as asphalt or concrete or other materials approved in writing by the Department. Access roads shall be suitable for use in all types of weather by loaded transport vehicles and emergency vehicles and equipment. These roads shall have a base capable of withstanding anticipated load limits. The minimum cartway width for two-way traffic shall be 22 feet; for one-way traffic, separate roads with a minimum cartway width of 12 feet shall be provided; or if the

HWM facility is a captive facility or a noncommercial off-site facility and the access is restricted to company personnel with minimal traffic volume, then the minimum cartway width for two-way traffic shall be 12 feet, if the entire length of the roadway is visible to the driver or passing points are provided at appropriate intervals so as to not impede access. The maximum sustained grade shall not exceed 12%.

(31) Unless otherwise approved in writing by the Department, a buffer zone of a minimum of 50 feet shall be maintained between the property line and the permitted facility, within which no solid waste treatment, storage, or disposal activity shall occur.

(32) Surface water management measures on the site shall, as a minimum, be in conformance with Chapter 102 (relating to erosion control). More stringent design standards may be required in writing by the Department based on the best engineering practices and methods outlined in "Engineering Field Manual for Conservation Practices" published by USDA-SCS.

(33) The site shall be designed and operated in a manner which prevents or minimizes surface water percolation into the hazardous waste deposits.

(34) At closure, all hazardous waste and hazardous waste residues, contaminated containment or liner system components, contaminated subsoils and structures and equipment contaminated with waste and leachate shall be removed and managed as a hazardous waste. A component of the waste pile containing or contaminated with hazardous waste or hazardous waste residues shall be decontaminated or removed. If, after removing or decontaminating all residues and making all reasonable efforts to effect removal or decontamination of contaminated components, subsoils, structures, and equipment, the owner or operator finds that not all contaminated subsoils can be practicably removed or decontaminated, the owner shall close the facility and perform post-closure care under the closure or post-closure care requirements that apply to landfills — subsection (v).

(35) After removing all contaminated materials and liner during closure, the site shall be graded and vegetated as required in writing by the Department.

(36) At all times, the perimeter of the waste pile shall remain at least 10 feet from the outer edge of the liner.

(37) Ignitable or reactive waste may not be placed in a pile, unless one of the following occurs:

RULES AND REGULATIONS

(i) The waste is treated, rendered, or mixed before or immediately after placement in the pile so that:

(A) The resulting waste, mixture, or dissolution of material no longer meeting the definition of ignitable or reactive waste under § 75.261 (relating to criteria, identification, and listing of hazardous waste).

(B) The operator complies with subsection (g)(2).

(38) Incompatible wastes, or incompatible wastes and materials — see Appendix IV of § 75.265 — may not be placed in the same pile, unless subsection (g)(2) is complied with. A pile of hazardous waste that is incompatible with waste or other material stored nearby in other containers, piles, open tanks, or a surface impoundment shall be separated or protected from the other materials by means of a dike, berm, wall, or other device.

(39) Hazardous waste may 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 subsection (g)(2).

(40) Vector, odor, and noise control procedures shall be employed when necessary or when required in writing by the Department to prevent health hazards or nuisances. The applicant shall submit a Vector, Odor, and Noise Control (VONC) Plan for approval by the Department.

(41) Equipment provided for operation of the facility shall be maintained in operable condition, and of adequate capacity and performance capability to ensure that the facility operation will not be interrupted during normal working periods and that operation of the facility is in accordance with this subchapter.

(42) Standby equipment shall be on-site or readily available for use in the event of major equipment breakdown.

(43) Unloading areas shall be specified and shall permit vehicles to unload promptly.

(44) Provisions shall be made to prevent dust from hampering site operations or from causing health or safety hazards or nuisances.

(45) The site shall be operated so that the tracking of waste within and outside the site by equipment and machinery is eliminated or minimized.

(a) *Land treatment.*

(2) Hazardous waste shall be placed in or on a land treatment facility only if the waste constituents are amenable to land treatment, the waste can be degraded, transformed or immobilized within the treatment zone, and the waste will not cause adverse environmental or human health problems.

(3) The applicant shall submit for written Department approval a plan that, as a minimum, specifies the following:

(i) The wastes that are capable of being treated at the facility based on a demonstration under paragraph (7).

(ii) Design measures and operating practices necessary to maximize the success of degradation, transformation, and immobilization processes in the treatment zone under paragraph (9)

(iii) Run-on and runoff control measures meeting the requirement of paragraphs (10) — (14).

(iv) Unsaturated zone monitoring provisions meeting the requirements of paragraph (21).

(4) The applicant shall submit for written Department approval the waste constituents that shall be degraded, transformed, or immobilized under this subsection. The waste constituents are constituents identified in Appendix VIII of § 75.261 (relating to criteria, identification and listing of hazardous waste) that are reasonably expected to be in, or derived from, waste placed in or on the treatment zone, and other waste constituents the Department deems necessary.

(5) The applicant shall submit for written Department approval the vertical and horizontal dimensions of the treatment zone. The treatment zone is the portion of the soil in 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 waste constituents. The maximum depth of the treatment zone shall be:

(i) No more than 1.5 meters — 5 feet — from the initial soil surface.

(ii) More than 1 meter — 3 feet — above any seasonal high or permanent groundwater table. The presence of mottling shall be an indication of a seasonal high groundwater table.

(6) For each waste that will be applied to the treatment zone, the owner or operator shall determine, prior to application of the waste, whether the waste constituents can be

completely degraded, transformed, or immobilized within the treatment zone.

(7) In making this determination, the owner or operator shall use field tests, laboratory analyses, available data, or, in the case of existing facilities, operating data. If the owner or operator intends to conduct field tests or laboratory analyses in order to make the determination required under paragraph (6), the Department's permit shall be conditioned to allow the determination to be conducted for a limited area and for a limited period not to exceed 1 acre in size, and not to exceed 1 year in time, unless the Department agrees that a larger area and period is required to adequately make the determination. In no event will the Department approve an application for a permit unless the applicant demonstrates the financial ability to remove the waste, contaminated soils, materials, and equipment, and to clean-up any contaminated surface water or ground water. If the owner or operator is successful in making this determination to the Department's satisfaction, the facility will be allowed to operate according to the approved permit application or as subsequently modified by the Department. If the owner or operator is unsuccessful in making the determination to the Department's satisfaction, the area affected by this determination shall be closed in accordance with the facility's closure and post-closure plans, all permit conditions, and other Department requirements placed on the facility. The applicant shall submit for written Department approval 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 (8).

(8) A field test or laboratory analysis conducted in order to make the determination under paragraph (6) shall:

(i) Accurately simulate the characteristics and operating conditions for the proposed land treatment facility including:

(A) The characteristics of the waste and waste constituents, including the presence of constituents listed in Appendix VIII, § 75.261 (relating to criteria, identification and listing of hazardous waste).

(B) The climate in the area.

(C) The topography of the surrounding area.

(D) The characteristics of the soil in the treatment zone, including depth.

(E) The operating practices to be used at the facility.

(ii) Be likely to show that the waste constituents in the waste to be tested will be completely degraded, transformed, or immobilized in the treatment zone of the proposed land treatment facility.

(iii) Be conducted in a manner that protects human health and the environment considering:

(A) The characteristics of the waste to be tested.

(B) The operating and monitoring measures taken during the course of the test.

(C) The duration of the test.

(D) The volume of waste used in the test.

(E) In the case of field tests, the potential for migration of waste constituents to ground water or surface water.

(9) The owner or operator shall design, construct, operate, and maintain the land treatment facility to maximize the degradation, transformation, and immobilization of waste constituents in the treatment zone. The owner or operator shall design, construct, operate, and maintain the facility in accord with all design and operating conditions that were used in the treatment determination under paragraph (6). At a minimum, the following requirements shall be met for all hazardous waste land treatment facilities, unless otherwise approved in writing by the Department, and shall be specified in the plan as required by paragraph (3).

(i) The pH of the soil affected by the waste shall be maintained between 6.5 and 8.0 during the operating life of the facility and as required in the closure and post-closure plans approved by the Department or as otherwise specified by the Department. The method of pH control shall be described in detail.

(ii) The application rates shall be consistent, where applicable, with the Department's guidelines for *Sewage, Septic Tank, and Holding Tank Waste Use on Agricultural Land*. Otherwise, the Department may approve application rates based on the determination made under paragraph (6) and other information required of the applicant by the Department or available in the literature or both. In no case shall the

application rates for cadmium through December 31, 1986 exceed an annual application rate of one pound per acre (lb/acre), and beginning January 1, 1987 the annual application rate shall not exceed 0.45 lbs/acre. The cumulative-lifetime maximum-loading for cadmium shall not exceed 3 lbs/acre. The method of waste application shall be described in detail.

(iii) Methods to enhance microbial or chemical reactions shall be described in detail.

(iv) Methods to control the moisture content of the treatment zone shall be described in detail.

(v) The hazardous waste shall be mixed into or turned under the soil surface within 24 hours of application, unless it is spray irrigated and the spray irrigated hazardous waste:

(A) Is used for top dressing.

(B) Has plant nutrient value.

(C) Is applied with proper spray irrigation equipment and through proper spray irrigation methods.

(D) Is not transported off-site by aerosol transport while being spray irrigated.

(vi) Hazardous waste shall be spread or sprayed in thin layers to prevent ponding and standing accumulations of liquids or sludges.

(vii) Hazardous waste may not be applied when the ground is saturated, covered with snow, frozen, or during periods of rain.

(viii) Hazardous waste may not be applied in quantities which will result in vector or odor problems:

(ix) Hazardous waste shall only be applied to those soils which fall within the United States Department of Agriculture (USDA) textural classes of sandy loam, loam, sandy clay loam, silty clay loam, and silt loam.

(x) The soils shall have sola with a minimum depth of 20 inches and at least 40 inches of soil depth.

(xi) The site may not have closed depressions present.

(xii) The existing slopes on the site may not exceed 12%.

(xiii) The site may not be used as pasture land.

(xiv) Hazardous wastes may not be applied within:

(A) One hundred feet of intermittent or perennial streams.

(B) Three hundred feet of public or private water supplies.

(C) Twenty-five feet of bedrock outcrops.

(D) Fifty feet of property lines.

(E) One hundred feet from sinkholes or a closed depression.

(10) The owner or operator shall 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. The design and operation of this run-on control system shall comply with Chapter 102 (relating to erosion control), and shall comply with all other applicable State and Federal statutes.

(11) The owner or operator shall design, construct, operate, and maintain the treatment zone to minimize runoff of waste constituents during the active life of the land treatment facility.

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

(13) The design and operation of the runoff control system shall be based on requirements specified in Chapter 102 (relating to erosion control), and shall comply with other applicable State and Federal statutes. The design and operation of this system shall reflect a consideration of:

(i) The volume of contaminated runoff produced at the facility.

(ii) The capacity of any runoff collection device at the facility.

(iii) Climatic conditions in the area.

(iv) The quality of the runoff produced and the available options for managing any contaminated runoff from the facility.

(v) The physical and chemical characteristics of the waste in the facility.

(14) Collection and holding facilities, such as tanks or basins, associated with run-on and runoff control systems shall be emptied or otherwise managed expeditiously after storms to maintain the design capacity of the system.

(15) If the treatment zone contains particulate matter which may be subject to wind dispersal, the owner or operator shall manage the facility to control wind dispersal.

(16) The owner or operator shall inspect the facility weekly and after storms to detect evidence of:

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

(ii) Improper functioning of wind dispersal control measures.

(17) Tobacco and crops intended for direct human consumption may not be grown on hazardous waste land treatment facilities.

(18) Food chain crops may not be grown on a hazardous waste land treatment facility unless the owner or operator can verify, based on testing, that arsenic, lead, mercury, cadmium, or other waste constituents present:

(i) Will not present a substantial risk to human health caused by the growth of the crops in or on the treatment zone by determining, prior to the planting of crops, that waste constituents will not do one of the following:

(A) 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, such as by grazing.

(B) 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.

(ii) The owner or operator shall make the determination required under this paragraph prior to the planting of crops at the facility for all constituents identified in Appendix VIII of § 75.261 (relating to criteria, identification and listing of hazardous waste) and other waste constituents the Department deems necessary and that are reasonably expected to be in, or derived from, waste placed in or on the treatment zone.

(iii) In making a determination under this paragraph, the owner or operator may use field tests, greenhouse studies, available data, or, in the case of existing facilities, operating data, and shall:

(A) Base the determination on conditions similar to those present in the treatment zone, including soil characteristics, such as pH, cation exchange capacity, specific waste, application rates, application methods, and crops to be grown.

(B) Include plant tissue analysis, soil profile descriptions from test pits dug in representative areas of all soil series mapped on the facility by the United States Department of Agriculture Soil Conservation Service or a qualified soil scientist, soil chemical

analysis, sample selection criteria, sample size determination, analytical methods, and statistical procedures.

(C) Describe the procedures used in conducting tests, including the sample selection criteria, sample size, analytical methods, and statistical procedures.

(iv) If the owner or operator intends to conduct field tests or greenhouse studies in order to make the determination required under this paragraph, the Department's permit will be conditioned to allow the determination to be conducted for a limited area and for a limited period not to exceed 1 acre in size, and not to exceed 1 year in time, unless the Department agrees that a larger area or period is required to adequately make the determination. In no event, will the Department approve an application for a permit, unless the applicant demonstrates the financial ability to remove the waste, contaminated soils, materials and equipment, and to clean up contaminated surface water or ground water. If the owner or operator is successful in making this demonstration to the Department's satisfaction, the facility will be allowed to operate as per the approved permit application or as subsequently modified by the Department. If the owner or operator is unsuccessful in making the determination to the Department's satisfaction, the area affected by this determination shall be closed in accordance with the facility's closure and post-closure plans, all permit conditions, and other Department requirements placed on the facility.

(19) The owner or operator of a hazardous waste land treatment facility who intends to grow food chain crops shall comply with the following additional requirements:

(i) Animal feed shall be the only food-chain crop produced.

(ii) An operating plan shall be submitted for written Department approval which describes how the animal feed will be distributed to preclude ingestion by humans. The operating plan shall describe the measures to be taken to safeguard against possible health hazards from waste constituents entering the food chain, which may result from alternative land uses.

(20) The applicant shall submit a detailed plan for crop management through and including the post-closure care period. The plan shall include a schedule and sequence for planting, crop rotation, harvesting, and ultimate disposition of crops. Harvested crops and harvested crop residues not intended for use in the food chain shall

be managed as hazardous waste subject to this title and Federal law, unless otherwise approved in writing by the Department.

(21) The applicant, in addition to requirements listed in subsection (n) shall submit for written Department approval an Unsaturated Zone Monitoring Plan. In this plan, the applicant shall provide for:

(i) Monitoring the soil and soil-pore liquid to determine whether waste constituents migrate out of the treatment zone.

(A) The applicant shall submit for written Department approval the waste constituents to be monitored. The waste constituents to be monitored are those specified in paragraph (4).

(B) The Department may require monitoring for principal waste constituent (PWC's) in lieu of the constituents specified in paragraph (4). PWC's are waste constituents contained in the wastes to be applied at the facility that are the most difficult to treat, considering the combined effects of degradation, transformation, and immobilization. The Department will establish PWC's if it finds, based on waste analyses, treatment determinations, or other data, that effective degradation, transformation, or immobilization of the PWC's will assure treatment to at least equivalent levels of the other waste constituents in the wastes.

(ii) Installing 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 shall consist of a sufficient number of sampling points at appropriate locations and depths to yield samples that:

(A) Represent the quality of background soil-pore liquid and the chemical make-up of soil that has not been affected by leakage from the treatment zone.

(B) Indicate the quality of soil-pore liquid and the chemical make-up of the soil below the treatment zone.

(iii) Establishing a background value for each waste constituent to be monitored under this paragraph. The applicant shall submit for written Department approval the background values for each constituent or specify the procedures to be used to calculate the background values.

(A) Background soil values may be based on a one-time sampling at an on-

site background plot having characteristics similar to those of the treatment zone.

(B) Background soil-pore liquid values shall be based on at least quarterly sampling for 1 year at an on-site background plot having characteristics similar to those of the treatment zone.

(C) The owner or operator shall express all background values in a form necessary for the determination of statistically significant increases as set forth in paragraph (21)(vi).

(D) In taking samples used in the determination of all background values, the owner or operator shall use an unsaturated zone monitoring system that complies with paragraph (21)(iii)(A).

(iv) Conducting soil monitoring and soil-pore liquid monitoring immediately below the treatment zone. The applicant shall submit for written Department approval the frequency and timing of soil and soil-pore liquid monitoring and the reporting of the data to the Department after considering the frequency, timing, and rate of waste application, and the soil permeability. The owner or operator shall express the results of soil and soil-pore liquid monitoring in a form necessary for the determination of statistically significant increases as set forth in paragraph (21)(vi).

(v) Using consistent sampling and analysis procedures that are designated 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 shall implement procedures and techniques for:

- (A) Sample collection.
- (B) Sample preservation and shipment.
- (C) Analytical procedures.
- (D) Chain of custody control.

(vi) Determining whether there is a statistically significant change over background values for any waste constituent to be monitored under paragraph (21)(i) below the treatment zone each time he conducts soil monitoring and soil-pore liquid monitoring under paragraph (21)(iv).

(A) In determining whether a statistically significant increase has occurred, the owner or operator shall compare the value of each constituent, as determined under paragraph (21)(iv), to the background value for the constituent according to the statis-

tical procedure approved in writing by the Department under this paragraph.

(B) The owner or operator shall, within a reasonable period of time after completion of sampling, determine whether there has been a statistically significant increase below the treatment zone. The time period shall be based on a consideration of the complexity of the statistical test and the availability of laboratory facilities to perform the analysis of soil and soil-pore liquid samples, and will be approved in writing by the Department.

(C) The owner or operator shall 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 statistical procedure shall meet Departmental approval and it shall:

(I) Be appropriate for the distribution of the data used to establish background values.

(II) Provide 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.

(vii) Notifying the Department in writing within 7 days after the owner or operator determines, under paragraph (21)(vi), that there is a statistically significant increase of waste constituents below the treatment zone. The notification shall include the chemical analyses used, and shall specify which constituents have shown statistically significant increases. Following the notification, and dependent on the results of the analyses, the Department may require cleanup, closure, or both.

(viii) Demonstrating, if desired by the owner or operator, in the determination made under paragraph (21)(vi) that a source other than the facility caused the increase or that the increase resulted from error in sampling, analysis, or evaluation. In making a demonstration under this subparagraph the owner or operator shall:

(A) Notify the Department in writing within 7 days of determining a statistically significant increase below the treatment zone that he intends to make a demonstration.

(B) Within 90 days of determining a significant increase occurred, submit a report to the Department demonstrating whether or not a source other than the facility caused the increase or whether the increase resulted from

error in sampling, analysis or evaluation.

(C) Within 90 days of determining a significant increase occurred, submit to the Department an application for a permit modification to make appropriate changes to the unsaturated zone monitoring program at the facility. The permit modification shall be submitted only if a source other than the facility caused the increase or if the increase resulted from error in sampling, analysis, or evaluation. If the Department does not concur with the results of the report submitted under paragraph (21)(viii)(B) the Department may require facility cleanup, closure or both under paragraph (21)(vii).

(D) Continue to monitor in accordance with the unsaturated zone monitoring program established under this subsection.

(22) The owner or operator shall retain the Unsaturated Zone Monitoring Plan at the facility.

(23) The owner or operator of a land treatment facility shall maintain records of the application dates, application rates, quantities, and location of each hazardous waste placed in the facility. This information shall be part of the operating record required in subsection (k).

(24) In addition to the closure care requirements of subsection (o), the owner or operator shall, during the closure period:

(i) Continue all operations — including pH control — necessary to maximize degradation, transformation or immobilization of waste constituents within the treatment zone as required by paragraph (9), except to the extent the measures are inconsistent with paragraph (24)(viii).

(ii) Continue all operations in the treatment zone to minimize runoff of waste constituents as required by paragraph (11).

(iii) Maintain the run-on control system required by paragraph (10).

(iv) Maintain the runoff management system required by paragraphs (12) and (13).

(v) Control wind dispersal of hazardous waste if required under paragraph (15).

(vi) Continue to comply with prohibitions or conditions concerning growth of food-chain crops under paragraphs (18) and (19).

(vii) Continue unsaturated zone monitoring in compliance with paragraph (21), except that soil-pore liquid

monitoring may be terminated 90 days after the last application of waste to the treatment zone if approved in writing by the Department.

(viii) 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 waste constituents in the treatment zone. The vegetative cover shall be capable of maintaining growth without extensive maintenance.

(25) In addition to the post-closure care requirements of subsection (c), the owner or operator shall during the post-closure period:

(i) Continue all operations — including pH control — necessary to enhance degradation and transformation, and sustain immobilization of waste constituents in the treatment zone to the extent that the measures are consistent with other post-closure care activities.

(ii) Maintain a vegetative cover over closed portions of the facility.

(iii) Maintain the run-on control system required by paragraph (10).

(iv) Maintain the runoff management system required by paragraph (12) and (13).

(v) Control wind dispersal of waste constituents if required by paragraph (15).

(vi) Continue to comply with prohibitions or conditions concerning growth of food-chain crops under paragraph (18) and (19).

(vii) Continue unsaturated zone monitoring in compliance with paragraph (21), except that soil-pore liquid monitoring may be terminated 90 days after the last application of waste to the treatment zone if approved in writing by the Department.

(26) The owner or operator is not subject to paragraphs (24)(viii) and (25) if the Department finds that the level of waste constituents in the treatment zone does not exceed the background value of those constituents by an amount that is statistically significant when using the test specified in paragraph (26)(iii). The owner or operator may submit the results of the analysis made under paragraph (26)(iii) to the Department at any time during the closure or post-closure care periods. For the purposes of this paragraph:

(i) The owner or operator shall establish background soil values and determine whether there is a statistically significant increase over those values

for all waste constituents specified in paragraph (4).

(A) Background soil values may be based on a one-time sampling of an on-site background plot having characteristics similar to those of the treatment zone.

(B) The owner or operator shall express background values and values for waste constituents in the treatment zone in a form necessary for the determination of statistically significant increases under paragraph (26)(iii).

(ii) In taking soil samples used in the determination of background and treatment zone values, the owner or operator shall 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.

(iii) In determining whether a statistically significant increase has occurred, the owner or operator shall compare the value of each constituent in the treatment zone to the background value for the constituent using a statistical procedure that provides reasonable confidence that the constituent's presence in the treatment zone will be identified. The owner or operator shall use a statistical procedure that:

(A) Is appropriate for the distribution of the data used to establish background values.

(B) Provides a reasonable balance between the probability of falsely identifying a waste constituent's presence in the treatment zone and the probability of failing to identify real presence in the treatment zone.

(27) The owner or operator may not be subject to subsection (n) if he is in compliance with that subsection and if the Department finds that the owner or operator complies with paragraph (26) and if unsaturated zone monitoring under paragraph (21) indicates that waste constituents have not migrated beyond the treatment zone.

(28) The owner or operator may not apply ignitable or reactive waste to the treatment zone unless one of the following occurs:

(i) The waste is immediately incorporated into the soil so that:

(A) The resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under § 75.261(g) (relating to

criteria, identification and listing of hazardous waste).

(i) Subsection (g)(2) is complied with.

(ii) The waste is managed so it is protected from material or conditions which may cause it to ignite or react.

(29) The owner or operator may not place incompatible wastes, or incompatible wastes and materials — see Appendix V of § 75.265 for examples — in or on the same treatment zone, unless subsection (g)(2) is complied with.

(30) Equipment provided for operation of the land treatment facility shall be maintained in operable condition, and be of adequate capacity and performance capability to ensure that the facility operation will not be interrupted during normal working periods and that the operation of the facility is in accordance with this section.

(31) Standby equipment shall be on-site or readily available for use in the event of major equipment breakdown.

(32) Unloading areas shall be specified and restricted to the proximity of the working face and shall permit collection vehicles to unload promptly.

(33) An attendant shall direct vehicles to the unloading area or clearly marked signs shall be located prominently to direct vehicles to the unloading area.

(34) The facility shall be operated so that the tracking of waste within and outside the site by equipment and machinery is eliminated or minimized.

(35) Provisions shall be made to prevent dust from hampering facility operations or from causing health or safety hazards or nuisances.

(36) Access roads shall be paved or surfaced with materials such as asphalt or concrete or other materials approved in writing by the Department. Access roads shall be suitable for use in all types of weather by loaded transport vehicles and emergency vehicles and equipment. These roads shall have a base capable of withstanding anticipated load limits. The minimum cartway width for two-way traffic shall be 22 feet. For one-way traffic, separate roads with a minimum cartway width of 12 feet shall be provided. If the HWM facility is a captive facility or a noncommercial offsite facility, and the access is restricted to company personnel with minimal traffic volume, then the minimum cartway width for two-way traffic shall be 12 feet, if the entire length of the roadway is visible to the

driver or passing points are provided at appropriate intervals so as to not impede access. The maximum sustained grade may not exceed 12%.

(37) Weighing or measuring facilities if necessary, or when required by the Department, shall be provided for weighing all hazardous wastes brought to the TSD facility, except for captive facilities that handle liquids or flowable wastes — less than 20% solids — which are amenable to accurate flow measurements, or captive facilities that possess other waste inventory controls — volume controls. Weighing facilities shall be capable of weighing the maximum anticipated load plus the weight of the transport vehicle. The precision of weighing devices shall be certified by the Department of Agriculture.

(38) For offsite facilities or on-site facilities receiving waste from offsite sources, hours of operation for the site shall be prominently displayed on a sign at the entrance. The lettering shall be a minimum of 4 inches in height and of a color contrasting with its background.

(39) Vector, odor, and noise control procedures shall be employed when necessary, or, when required by the Department, to prevent health hazards or nuisances. The applicant shall submit a Vector, Odor, and Noise Control (VONC) Plan for approval by the Department.

(40) Future property owners shall be notified by a stipulation in the land record and property deed which states that the property has received hazardous waste and that food chain crops may not be grown due to a possible health hazard, unless otherwise approved in writing by the Department.

(v) *Landfills.*

(3) The following are the minimum general design standards required:

(viii) Surface water runoff from active areas of the site shall be collected. It shall then be managed as hazardous waste unless it has been determined not to be a hazardous waste. Necessary measures and structures shall be designed to handle water quantities based on the 24 hour rainfall in inches to be expected once in 25 years. Supporting calculations shall be provided.

(xiv) Hazardous waste disposed of in a landfill shall be completely underlain by a liner system during its active

life and completely enclosed by a liner and cap system at closure. The liner shall be installed to cover all surrounding earth likely to be in contact with the waste or leachate. The landfill liner and cap system shall be 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 operations. The landfill liner and cap system shall also be designed and constructed with the following components, starting from the bottom of the system.

(D) A top liner — primary — which meets the requirements specified in Table 3, Appendix V of § 75.265. Liners shall be constructed of materials that prevent wastes from migrating into the liner during the active life of the facility and shall be capable of diverting to a collection sump or point, all liquids or leachate passing through or generated within the hazardous waste, where it can be collected for proper treatment, storage, or disposal with sufficient frequency to prevent backup into the landfill.

(F) A cap which is capable of preventing the infiltration of liquid into closed portions of the landfill. The cap shall have a permeability less than or equal to the permeability of the primary liner. The cap shall meet the minimum requirements specified in Appendix V Table 3 of § 75.265. It shall be placed on a stable 1 foot thick layer of intermediate cover material which has been compacted and graded to prevent damage to the cap. This requirement may be altered or waived if it is determined by the Department that capping is not necessary.

(xviii) The conveyance system and storage system for the leachate from the leachate collection zone and runoff shall meet the following design standards:

(B) The minimum storage capacity for runoff shall be based on the 24 hour rainfall in inches expected once in 25 years per acre of active portions of the landfill.

(xxi) Quality control measures and

tests shall be specified and employed to ensure that construction conforms to all design materials and construction specifications. In addition during and after construction or installation, liner systems and cover systems shall be inspected for uniformity, damage, and imperfections such as holes, cracks, thin spots, and foreign materials. Earth material liner systems shall be inspected for imperfections including lenses, cracks, channels, root holes, or other structural nonuniformities and shall be tested for compaction density, moisture content, and permeability after placement. Manufactured liner materials shall be inspected to ensure tight seams and joints and the absence of tears or blisters.

(xxvii) Collection and holding facilities associated with run-on and runoff control systems shall be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.

(4) The following are the minimum general operating standards required:

(ii) Incompatible wastes, or incompatible wastes and materials — see Appendix IV of § 75.265 — may not be placed in the same landfill unless paragraph (g)(2) is complied with and written approval from the Department is obtained. Incompatible wastes may not be mixed together in a landfill unless approved in writing by the Department.

(iii) Ignitable or reactive waste may not be placed in a landfill unless the waste is treated, rendered, or mixed before or immediately after placement in a landfill so that the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under § 75.261(g) (relating to criteria, identification and listing of hazardous waste).

(vi) An empty container shall be crushed flat, shredded, or similarly reduced in volume; otherwise, the container shall be at least 90% full before it is buried in the landfill.

(w) *Incinerators.* Incinerators shall comply with the following:

(1) This subsection applies to owners or operators of facilities that incinerate or trial burn hazardous waste except as otherwise provided in subsection (a).

(2) A permit shall be required for the

construction and operation of an incinerator and related appurtenances and written Department approval shall be required for incineration for a trial burn of a hazardous waste.

(5) The owner or operator of a hazardous waste incinerator shall burn only wastes specified in his permit and only under operating conditions specified for those wastes. Other hazardous wastes shall be burned only after operating conditions have been specified in a new permit or a permit modification. Operating requirements for new wastes shall be based on the analyses required in paragraph (3) and trial burn results. In lieu of actual trial burn of the waste to be incinerated, alternative data from operational or other trial burns in which similar waste has been incinerated under similar conditions may be substituted to support the contention that a trial burn is not needed. The data shall demonstrate that the wastes and the incinerator units are sufficiently similar and shall include:

(iii) A description of the results submitted from previously conducted trial burns, including:

(6) An incinerator burning hazardous waste shall be designed, constructed, and maintained so that, when operated under paragraph (7), it will meet the following performance standards:

(iii) An incinerator burning hazardous waste may not emit particulate matter in excess of the most stringent of the following requirements:

(A) One hundred eighty milligrams per dry standard cubic meter — 0.08 grains per dry standard cubic foot — corrected to 12% CO₂ when stack tested in accordance with Chapter 139 (relating to sampling and testing).

(B) One hundred eighty milligrams per dry standard cubic meter — 0.08 grains per dry standard cubic foot — when corrected for the amount of oxygen in the stack gas according to the formula:

$$P_c = P_m \frac{14}{21 - Y}$$

Where P_c is the corrected concentration of particulate matter, P_m is the measured concentration of particulate matter, and Y is the measured concentration of oxygen in the stack gas, using the Orsat method for oxygen analysis of dry flue gas, 40 CFR Part

60, Appendix A (Method 3) (relating to standards of performance for new stationary sources). This correction procedure is to be used by all hazardous waste incinerators except those operating under conditions of oxygen enrichment.

(C) An alternate emission standards which the Department may require under § 141.1 (relating to variances and alternate standards) should particulate emissions of metals be inadequate to protect public health or ambient air quality standards as specified in Chapter 131 (relating to ambient air quality standards).

(7) An incinerator shall be operated in accordance with operating requirements specified in the permit. These shall be specified on a case-by-case basis as those demonstrated to be sufficient to comply with the performance standards specified in paragraph (6), and shall include the following, unless otherwise specified in writing by the Department:

(i) Each set of operating requirements shall specify the composition of the waste feed — including acceptable variations in the physical or chemical properties of the waste feed which will not affect compliance with the performance requirements — to which operating requirements apply. For each waste feed, the permit shall specify acceptable operating limits, including the following conditions:

(D) An appropriate indicator of combustion gas velocity.

(iv) An incinerator shall be operated with a functioning system to automatically cut off waste feed to the incinerator when operating conditions deviate from limits established in a permit or upon the failure of:

§ 75.265. Interim status for hazardous waste management facilities and permit program for new and existing hazardous waste management facilities.

(n) Groundwater monitoring.

(15) If the analyses performed under paragraph (14)(ii) confirms the significant increase or decrease of pH or increase of other parameters, the owner or operator shall provide written notice to the Department within 7 days of the date of the confirmation that the facility may be affecting groundwater quality.

(i) Within 15 days after the notification required by this paragraph, the owner or operator shall develop and submit to the Department for written approval a specific plan, based on the outline required under paragraph (13) and certified by a qualified geologist or geotechnical engineer, for a groundwater quality assessment and abatement program at the facility.

(z) Hazardous waste management permit program.

(22) All facilities shall comply with the following:

(i) Be constructed, operated, and maintained according to the plans, design standards, and specifications approved by the Department, and the plans, design standards and specifications shall be incorporated as part of the permit.

(ii) If located in a 100-year floodplain, be designed, constructed, operated and maintained to prevent washout of hazardous waste by a 100-year flood unless the owner or operator can demonstrate to the Department that 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. The owner or operator of a facility located in a 100-year floodplain shall provide the following information:

(A) Engineering analysis to indicate the various hydrodynamic and hydrostatic forces expected to result at the site as consequence of a 100-year flood.

(B) Structural or other engineering studies showing the design of operational units such as tanks and incinerators and flood protection devices such as floodwalls and dikes at the facility and how these will prevent washout.

(C) If applicable, and in lieu of subparagraphs (ii)(A) and (B) a detailed description of procedures to be followed to remove hazardous waste to safety before the facility is flooded, including:

(I) Timing of the movement relative to flood levels, including estimated time to move the waste, to show that the movement can be completed before floodwaters reach the facility.

(II) A description of the locations to which the waste will be moved and demonstration that those facilities will be eligible to receive hazardous waste under §§ 75.260 — 75.267.

(III) The planned procedures, equipment, and personnel to be used and the

means to ensure that the resources shall be available in time for use.

(IV) The potential for accidental discharges of the waste during movement.

Appendix III — Tests for Significance

The owner or operator shall use Cochran's Approximation to the Behrens-Fisher Student's t-test to determine statistically significant changes in the concentration or value of an indicator parameter in periodic groundwater samples when compared to the initial background concentration or value of that indicator parameter. The comparison shall consider individually each of the wells in the monitoring system. For three of the indicator parameters — specific conductance, total organic carbon and total organic halogen — a single-tailed Student's t-test shall be used to test at the appropriate level of significance for significant increases over background. The difference test for pH shall be a two-tailed Student's t-test at the appropriate level of significance.

For those facilities regulated by § 75.265 (relating to interim status for hazardous waste management facilities and permit program for new and existing hazardous waste management facilities), the appropriate level of significance is 0.01. For those facilities regulated by § 75.264 (relating to new and existing hazardous waste management facilities applying for a permit), the appropriate level of significance is 0.05.

The Student's t-test involves calculations of the value of a t-statistic for each comparison of the mean-average-concentration or value-based on a minimum of four replicate measurements of an indicator parameter with its initial background concentration or value. The calculated value of the t-statistic shall then be compared to the value of the t-statistic found in a table for t-test of significance at the specified level of significance. A calculated value of "t" which exceeds the value of "t" found in the table indicates a statistically significant change in the concentration or value of the indicator parameter.

The Cochran's Approximation to the Behrens-Fisher Student's t-test is calculated as follows:

Using all the available background data (n_b readings), calculate the background mean (\bar{X}_B) and background

variance (S_B^2). For the single monitoring well under investigation (n_m readings), calculate the monitoring mean (\bar{X}_m) and monitoring variance (S_m^2).

For any set of data (X_1, X_2, \dots, X_n) the mean is calculated by:

$$\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{n}$$

and the variance is calculated by:

$$S^2 = \frac{(X_1 - \bar{X})^2 + (X_2 - \bar{X})^2 + \dots + (X_n - \bar{X})^2}{n-1}$$

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 is 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:

$$t^* = \frac{\bar{X}_m - \bar{X}_B}{\left[\frac{S_m^2}{n_m} + \frac{S_B^2}{n_B} \right]^{1/2}}$$

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 appropriate level of significance.

t_m = t-tables with $(n_m - 1)$ degrees of freedom, at the appropriate level of significance.

Finally, the special weightings W_B and W_m are defined as:

$$W_B = \frac{S_B^2}{n_B} \text{ and } W_m = \frac{S_m^2}{n_m}$$

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 a 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.

RULES AND REGULATIONS

Standard T-Tables 0.05 Level of
Significance under § 75.264 Facilities

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	2.086
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 Yates).

Standard T-Tables 0.01 Level of
Significance under § 75.265 Facilities

Degrees of Freedom	T-Values (One-Tail)	T-Values (Two-Tail)
1.....	31.821	63.657
2.....	6.965	9.925
3.....	4.541	5.841
4.....	3.747	4.604
5.....	3.365	4.032
6.....	3.143	3.707
7.....	2.998	3.499
8.....	2.896	3.355
9.....	2.821	3.250
10.....	2.764	3.169
11.....	2.718	3.106
12.....	2.681	3.055
13.....	2.650	3.012
14.....	2.624	2.977
15.....	2.602	2.927
16.....	2.583	2.921
17.....	2.567	2.898
18.....	2.552	2.878
19.....	2.539	2.861
20.....	2.528	2.845
21.....	2.518	2.831
22.....	2.508	2.819
23.....	2.500	2.807
24.....	2.492	2.797
25.....	2.485	2.787
30.....	2.457	2.750
40.....	2.423	2.704

Adopted from Table III of "Statistical Tables for Biological, Agricultural, and Medical Research" (1947, R. A. Fisher and F. Yates).

Appendix V, Table 3, Minimum Liner Design and Performance Standards

Liner Material*	Liner Function**	Field/Lab Liner Permeability (cm/sec)	Liner Thickness (minimum)	Liner Density # (test as noted)	Remarks***
Natural clays or in place confining layers	Primary	Not acceptable for primary liner			
	Secondary	$< 1 \times 10^{-7}$	4 ± 0.5 ft.	NA	Field verification of continuity of confining layer shall be evaluated through borings or backhoe pits. Also must have a minimum of 20% clay as classified by the USDA grain-size classification system.
	Cap	Not acceptable for cap			
Hydraulic Asphalt	Primary	Not acceptable for primary liner			
Concrete	Secondary	$< 1 \times 10^{-7}$	2 inches	> 96%	Minimum asphalt content shall be 6.5-9.0% by weight. All asphalt liners and joints shall be sealed with a seal coat of AC-20 or equivalent, applied in one or more applications for a total rate of at least 0.6 gallons/yd ² and applied with at least a one foot wide overlap. Sections of asphalt shall be joined to adjacent sections by cutting a new edge on the existing section, coating the new edge with AC-20 or equivalent, butting the new section of asphalt against the coated edge, and sealing with AC-20 or equivalent.
	Cap	Not acceptable for cap			
Soil Cement	Primary	$< 1 \times 10^{-7}$	12 inches	> 97%	Minimum cement content shall be 10% by weight. Wet-dry and freeze-thaw cycle tests (ASTM D559 and ASTM D560) shall be performed to determine optimum cement content. The type of cement used shall be the type best suited to the type of soil to be used. A seal coat of AC-20 or equivalent shall be applied.
	Secondary	$< 1 \times 10^{-7}$	6 inches	> 97%	
	Cap	$< 1 \times 10^{-7}$	12 inches	> 97% (standard Proctor method)	
Soil Asphalt	Primary	Not acceptable for primary liner			
	Secondary	$< 1 \times 10^{-7}$	6 inches	> 96%	A seal coat of AC-20 or equivalent shall be applied at a minimum total rate of 0.6 gal/yd ² in two applications of 0.3 gal/yd ² each. No cut back asphalt shall be used as a liner material. Sealer shall be applied with a minimum one foot overlap.
	Cap	Not acceptable for cap		(Marshall method)	
Sprayed Asphalt	Primary	Not acceptable for primary liner			
	Secondary	$< 1 \times 10^{-7}$	1.5 gal/yd ² (0.25 inch)	3 applications 0.5 gal/yd ² each	Liner shall be AC-20 or equivalent applied in at least 3 applications of 0.5 gal/yd ² , with two-foot overlap. MC-30 shall be applied to the subbase at a minimum rate of 0.5 gal/yd ² , with one-foot overlap.
	Cap	Not acceptable for cap			

Liner Material*	Liner Function**	Field/Lab Liner Permeability (cm/sec)	Liner Thickness (minimum)	Liner Density # (test as noted)	Remarks***
Fabric Asphalt Emulsion	Primary	Not acceptable for primary liner			MC-30 shall be applied to the subbase at a minimum rate of 0.5 gal/yd ² , with one-foot overlap. Must have a minimum of 25% clay as classified by the USDA grain-size classification system. No coarse fragments greater than 3/4 inch may be present. Soil material shall not have any coarse fragments greater than 3/4 inch present
	Secondary	$< 1 \times 10^{-7}$	0.3 inch	NA	
Natural Remolded Clay##	Cap	Not acceptable for cap			
	Primary	$< 1 \times 10^{-7}$	2 feet	> 95%	
	Secondary	$< 1 \times 10^{-7}$	1 foot	> 95%	
	Cap	$< 1 \times 10^{-7}$	2 feet	> 95% (standard Proctor method)	
Bentonite and Bentonite-like Materials##	Primary	$< 1 \times 10^{-7}$	12 inches	> 95%	
	Secondary	$< 1 \times 10^{-7}$	6 inches	> 95%	
	Cap	$< 1 \times 10^{-7}$	12 inches	> 95% (standard Proctor method)	
Flexible Synthetic Polymeric Materials	Primary	$< 1 \times 10^{-7}$	50 mil	NA	
	Secondary	$< 1 \times 10^{-7}$	20 mil	NA	
	Cap	$< 1 \times 10^{-7}$	50 mil	NA	

* All liner materials and liner construction shall meet manufacturer's specifications unless a more stringent specification is given in this table.

** Liner shall be compatible with waste it will contain.

*** Other tests relevant to the type of liner shall be performed if required by the Department.

Percentage is of maximum theoretical density when using Marshall method, and percentage of maximum density when using standard Proctor method.

Not acceptable for use as a primary liner or cap for landfills or surface impoundments used for disposal unless otherwise approved in writing by the Department.

NA Not Applicable

[Pa. B. Doc. No. 85-725 Filed May 31, 1985; 9:00 a.m.]