POST-CLOSURE PERMIT APPLICATION CHECKLIST

SUBJECT REQUIREMENT: Virginia Hazardous Waste Management Regulations
9 VAC 20-60 et seq and 40 CFR Parts 124, 260-266, 268, 270, 273, and 279 by reference

A. PART A APPLICATION: 9VAC20-60-270, 40 CFR 270.13

Submit a Part A application including all required information specified in 40 CFR 270.13.

B. FACILITY DESCRIPTION: 9VAC20-60-264, 9VAC20-60-270

B-1 General Description: 9VAC20-60-270, 9VAC20-60-270. B.9., 40 CFR 270.14(b)(1)

Provide a brief description of the facility, including the nature of the business. Off-site facilities should identify the types of industries served; on-site facilities should briefly describe the process(es) involved in the generation of hazardous waste.

B-2 Topographic Map

B-2a General Requirements: 9VAC20-60-270, 40 CFR 270.14(b)(19)

Submit a topographic map which shows the facility and a distance of 1,000 feet around it at a scale of 1 inch equal to not more than 200 feet. The map must include: contours sufficient to show surface water flow in the vicinity of and from each operational unit (e.g., contours of 5 feet if relief is greater than 20 feet, 2 foot intervals if relief is less than 20 feet); map scale and date; 100-year floodplain area; surface waters, surrounding land uses, a wind rose, map orientation, and legal boundaries of facility site. The map must also indicate the location of access control, injection and withdrawal wells both on-site and off-site, buildings, structures, sewers (storm, sanitary, and process), loading and unloading areas used during operations, flood control or drainage barriers, run-off control systems, and existing hazardous waste management units and solid waste management units. Note: Multiple maps may be submitted, but all must be at a scale of 1 inch equal to not more than 200 feet.

B-2b Additional Requirements for Land Disposal Facilities: 9VAC20-60-270, 40 CFR 270.14(c)

For facilities with a surface impoundment, waste pile, land treatment unit, or landfill, indicate on the topographic map the waste management area boundaries, the property boundaries, the proposed point of compliance, the proposed groundwater monitoring well locations, and, to the extent possible, the locations of the uppermost aquifer and aquifers hydraulically interconnected beneath the facility (including flow direction and rate) and the basis for such identification. If present, indicate also the extent of the plume of contamination that has entered the groundwater from a regulated unit. Note: Multiple maps may be submitted, but all must be at a scale of 1 inch equal to not more than 200 feet.

B-3 Floodplain Standard: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(b)(11)(iv), and 40 CFR 264.18(b)

Document whether or not the closed facility is located within a 100-year floodplain and include the source of data (Federal Insurance Administration Map or equivalent maps and calculations).

B-3a Flood Proofing and Flood Protection Measures: 9VAC20-60-270, 40 CFR 270.14(b)(11)(iv)(A) and (B)

For facilities located within the 100-year floodplain, provide an engineering analysis indicating the various hydrodynamic and hydrostatic forces expected in a 100-year flood. Provide also a structural or other engineering study showing how the design of the closed hazardous waste units and the flood proofing and protection devices at the closed units will prevent washout.

B-3b Plan for Future Compliance with Floodplain Standard: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(b)(11)(v) and 40 CFR 264.18(b)

For existing facilities located within the 100-year floodplain that do not comply with the floodplain standard and did not apply for a waiver under 40 CFR 264.18(b)., specify how and when the facility will be brought into compliance.

B-3c Waiver for Land Storage and Disposal Facilities: 9VAC20-60-264, 40 CFR 264.18(b).

If a waiver from the floodplain standard is requested, the owner or operator of a facility with a surface impoundment, waste pile, land treatment unit, landfill, or miscellaneous unit must demonstrate that there will be no adverse effects on human health or the environment if washout occurs. The following factors must be considered in this demonstration: the volume and physical and chemical characteristics of the waste; the concentration of hazardous constituents that would potentially affect surface waters; the impact of such concentrations on the current or potential uses of and water quality standards established for the affected surface waters; and the impact of hazardous constituents on the sediments of affected surface waters or the soils of the 100-year floodplain.

C. WASTE CHARACTERISTICS: 9VAC20-60-264, 9VAC20-60-268, 9VAC20-60-270, 40 CFR 270.14(b)(2), and 40 CFR 264.13

C-1 Chemical and Physical Analyses: 9VAC20-60-264, 9VAC20-60-270, 40 CFR 264.13 and 40 CFR 270.14(b)(2).

For each hazardous waste stored, treated or disposed at the facility, describe the waste, the hazard characteristics, the basis for hazard designation, and provide a laboratory report detailing the chemical and physical analyses of representative samples. In addition, provide the above-listed information for non-hazardous wastes managed after final receipt of hazardous wastes in accordance with 40 CFR 264.13.

C-2 Additional Requirements for Management of Multi-Source Leachate (F039) in Compliance with Land Disposal Restrictions: 9VAC20-60-264, 9VAC20-60-268, 40 CFR 264.13, and 40 CFR 268.7

If multi-source leachate (F039) (including multi-source leachate contained in groundwater) has been or will be managed at the unit for which the post-closure permit application is submitted, the following information must be submitted:

C-2a Chemical and Physical Analysis: 9VAC20-60-264, 9VAC20-60-268, 40 CFR 264.13, and 40 CFR 268.7

Provide a description of the multi-source leachate including the hazardous constituents present in the leachate. Provide a laboratory report detailing the chemical and physical analyses of representative samples. Provide analytical data necessary to determine whether the multi-source leachate is restricted and whether it is being managed properly under the requirements described below. Alternatively, use knowledge of the waste.

C-2b Notification and Certification Requirements: 9VAC-20-60-268, 40 CFR 268.7

If the multi-source leachate will be managed at an off-site treatment, storage, or disposal facility, the owner/operator must submit to the facility either:

1. A notification and certification that the multi-source leachate meets the treatment standards in 40 CFR 268.41 and 43, including the information specified in 40 CFR 268.7(a)(2); or

2. A notification that the multi-source leachate does not meet the treatment standards, including the information specified in 40 CFR 268.7(a)(1).; or

3. A notification that the multi-source leachate is subject to a case-by-case extension or a nationwide extension of the effective date, including the information specified in 40 CFR 268.7(a)(3).

C-3 Additional Requirements for Management of Single-Source Leachate Derived from Dioxin-Containing Wastes: 9VAC-20-60-268, 9VAC20-60-270, 40 CFR 270.14(b)(2), 40 CFR 268.41 and 42.

If single-source leachate derived exclusively from dioxin-containing wastes F020-F023 and F026-F028 has been or will be managed at the unit for which a post-closure permit application is submitted, provide the following information:

C-3a Chemical and Physical Analysis: 9VAC-20-60-268, 9VAC20-60-270, 40 CFR 270.14(b)(2) and 40 CFR 268.7

Provide a description of the multi-source leachate including the hazardous constituents present in the leachate. Provide a laboratory report detailing the chemical and physical analyses of representative samples. Provide analytical data necessary to determine whether the multi-source leachate is restricted and whether it is being managed properly under the requirements of 40 CFR 268 described below. Alternatively, use knowledge of the waste.

C-3b Notification and Certification Requirements: 9VAC20-60-268, 40 CFR 268.7.

If the multi-source leachate will be managed at an off-site treatment, storage, or disposal facility, the owner/operator must submit to the facility either:

1. A notification and certification that the multi-source leachate meets the treatment standards in 1470.B. and 1470.D., including the information specified in 40 CFR 268.7(a)(1).; or

2. A notification that the multi-source leachate does not meet the treatment standards, including the information specified in 40 CFR 268.7(a)(2).; or

3. A notification that the multi-source leachate is subject to a case-by-case extension or a nationwide extension of the effective date, including the information specified in 40 CFR 268.7(a)(3).

D. PROCESS INFORMATION: 9VAC20-60-264, 9VAC20-60-270

D-1 Container Storage Facilities: 9 VAC20-60-264, 40 CFR 264.178

Owners/operators of container storage facilities from which all contaminated soils cannot be practicably removed or decontaminated at closure must comply with the closure and post-closure requirements applicable to landfills (40 CFR 264.310).

Provide the following information:

D-1a List of Wastes: 9 VAC 20-60-270, 40 CFR 270.14(b)

Provide a list of all hazardous wastes placed in containers and the hazardous characteristics of these wastes.

D-1b Container Storage Containment System 9VAC20-60-264, 40 CFR 264.175

Provide a description of the containment system design, including material(s) of construction, slope, management of liquids, containment volume, run-on and run-off controls and sump or collection area design for collection of spilled or leaked waste or precipitation.

D-2 Tank Systems: 9VAC20-60-264, 40 CFR 264.197(b).

Owners/operators of tanks systems from which all contaminated soils cannot be practicably removed or decontaminated at closure must comply with the closure and post-closure requirements applicable to landfills (40 CFR 264.310).

Provide the following information.

D-2a List of Wastes: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.16(a)-(k), 40 CFR 264.191(b)(2), 40 CFR 264.192(a)(2)

Provide a list of all hazardous wastes placed in the tank system and the hazardous characteristics of these wastes. If any treatment was accomplished in the tank system during its active life, describe the nature and quantity of the wastes or waste constituents which may be present in the contaminated soil.

D-2b Tank Systems Description: 9VAC20-60-270, 40 CFR 270.16(a)-(k)

Provide a description of the type (i.e., aboveground, underground), materials of construction, dimensions, capacity, and number of tank systems.

D-3 Waste Piles: 9VAC20-60-264, 9VAC20-60-270, 40 CFR 264.258., 40 CFR 270.1(c), 40 CFR 270.18(h)

Owners/operators of waste piles from which all wastes or contaminated subsoils will not be removed at closure and which; 1) received waste after July 26, 1982; or 2) certified closure (according to 40 CFR 265.115) after January 26, 1983, must have a post-closure permit and are required to comply with the closure and post-closure requirements applicable to landfills (40 CFR 264.310).

Provide the following information.

D-3a List of Wastes: 9VAC20-60-270, 40 CFR 270.14(b)(2), and 40 CFR 270.18(a)

Provide a list of all hazardous wastes placed in the waste piles. If any waste treatment was accomplished on or in the waste pile during its active life, describe the process and equipment used, and the nature and quantity of the residuals remaining in the pile after treatment was completed.

D-3b Liner System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.18(h), 40 CFR 264.251(a)(1)

If the waste pile has a liner system that will be left in place at closure, provide a description of the liner system and its foundation.

D-3b (1) Liner System Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.18(c)(1), 40 CFR 264.251(a)(1)(i) and (iii)

For each liner within the system, describe the type of liner, its material and thickness, USCS data for soil liners, manufacturer and product name for synthetic liners, and limits of liner coverage.

D-3b (2) Liner System Foundation Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.18(c)(1) and 40 CFR 264.251(a)(1)(ii)

Describe the foundation for the liner system, including the foundation design and materials of construction.

D-3c Leachate Collection/Detection System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.18(c)(1)(iii), and 40 CFR 264.251(a)(2).

If the waste pile has a leachate collection/detection system that will be left in place at closure, provide a description of the design and operation of the leachate collection/detection system. Include information on the materials of construction and methods used for removal of liquids from the system.

D-3d Run-on Control System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.18(c)(2) and (4), and 40 CFR 264.251(g).

Describe the system and associated collection and holding facilities used to prevent run-on onto active portions of the waste pile during peak discharge from at least a 25-year storm. Indicate any major problems or failures associated with the run-on control system during the active life of the waste pile and discuss methods employed to resolve these problems. If there was a prior release, refer to Section G of the checklist.

D-3e Run-off Control System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.18(c)(3) and (4), and 40 CFR 264.251(h) and (i).

Describe the run-off control system and associated collection and holding facilities used to collect and control run-off from active portions of the waste pile resulting from a 24-hour, 25-year storm. Indicate any major problems or failures associated with the run-off control system during the active life of the waste pile that may have resulted in a release of hazardous waste or hazardous constituents. If there was a prior release, refer to Section G of the checklist.

D-3f Control of Wind Dispersal: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.18(c)(5) and 40 CFR 264.251(j).

If the active waste pile contained any particulate matter which may have been subject to wind dispersal, describe how the pile was covered or otherwise managed to control wind dispersal. If, during the active life of the waste pile, the wind dispersal of hazardous waste was not controlled, indicate whether any hazardous waste or hazardous constituents were released to the environment and refer to Section G of the checklist.

D-4 Surface Impoundments: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.1(c), 40 CFR 270.17(f) and 40 CFR 264.14 (b)(2) and 40 CFR 264.117 through 120.

Owners/operators of disposal impoundments and surface impoundments in which some waste residues or contaminated materials are left in place at closure and; 1) which received waste after July 26, 1982; or 2) certified closure (according to 40 CFR 265.115) after January 26, 1983, must have post-closure permits and must comply with the post-closure requirements of 40 CFR 264.228.

Provide the following information.

D-34 List of Wastes: 9VAC20-60-270, 40 CFR 270.17(a).

Provide a list of all hazardous wastes placed in the surface impoundment. In addition, provide a list of all non-hazardous wastes placed in the unit after final receipt of hazardous wastes in accordance with 40 CFR 264.113. If any treatment was accomplished in the surface impoundment during its active life, describe the nature and quantity of the wastes remaining in the impoundment after treatment was completed.

D-4b Liner System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.17(b), and 40 CFR 264.221.

If the surface impoundment has a liner system that will be left in place at closure, the post-closure permit application must include a description of the liner system and its foundation.

D-4b(1) Liner System Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.17(b), and 40 CFR 264.221(a).

For each liner within the system describe the type of liner, its material and thickness, USCS data for soil liners, manufacturer and product name for synthetics and limits of liner coverage.

D-4b(2) Liner System Foundation Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.17(b)(1), 40 CFR 264.221(a)(2)

Describe the foundation for the liner system, including the foundation design and materials of construction.

D-4c Leachate Collection/Detection System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.17(b), 40 CFR 264.221(c).

If the surface impoundment has a leachate collection/detection system that will be left in place at closure, provide a description of the design and operation of the leachate collection/detection system. Include information on the materials of construction and methods used for removal of liquids from the system.

D-4d Dike Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.17(b), 40 CFR 264.221(g) and (h).

Provide a description of dikes at the impoundment including dike design and materials of construction.

D-5 Landfills: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.1(c), 40 CFR 264.310

Owners/operators of landfills that received waste after July 26, 1982, or that certified closure (according to 265.115) after July 26, 1983 must have post-closure permits. Provide the following information:

D-5a List of Wastes: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.21(a), 40 CFR 264.113(d)

Provide a list of all hazardous wastes placed in the landfill. In addition, provide a list of non-hazardous wastes placed in the unit after final receipt of hazardous wastes in accordance with 40 CFR Subpart G. If any treatment was accomplished in the landfill during its active life, describe the nature and quantity of the wastes remaining in the landfill after treatment was completed.

D-5b Liner System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.21(b)(1)(i) and 40 CFR 264.301(a).

If the landfill has a liner system that will be left in place at closure, the post-closure permit application must provide a description of the liner system and its foundation.

D-5b(1) Liner System Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.21(b)(1), 40 CFR 264.301(a)(1)(i) and (ii)

For each liner within the system, describe the type of liner, its material and thickness, USCS data for soil liners, manufacturer and product name for synthetic liners and the limits of liner coverage.

D-5b(2) Liner System Foundation Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.21(b)(1)(i) and 40 CFR 264.301(a)(1)(i) and (ii)

Describe the foundation for the liner system, including the foundation design and materials of construction.

D-5c Leachate Collection/Detection System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.21(b)(1)(ii) and (iii), 40 CFR 264.301(a)(2).

If the landfill has a leachate collection/detection system that will be left in place at closure, provide a description of the design and operation of the leachate collection/detection system. Include information on the materials of construction and methods used for removal of liquids from the containment system.

D-5d Run-on Control System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.21(b)(2) and (4), 40 CFR 264.301(g) and (i).

Describe the system and associated collection and holding facilities used to prevent run-on onto active portions of the landfill during peak discharge from at least a 25-year storm. Indicate any major problems or failures associated with the run-on control system during the active life of the landfill and discuss methods employed to resolve these problems. If there was a prior release, refer to Section G of the checklist.

D-5e Run-off Control System: 9VAC20-60-270, 9VAC20-60-264, 40 CR 270.21(b)(3) and (4), and 40 CFR 264.301(h) and (i).

Describe the run-off control system and associated collection and holding facilities used to collect and control run-off from active portions of the landfill resulting from a 24-hour, 25-year storm. Indicate any major problems or failures associated with the run-off control system during the active life of the landfill that may have resulted in a release of hazardous waste or hazardous constituents. If there was a prior release, refer to Section G of the checklist.

D-5f Control of Wind Dispersal: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.21(b) (5) and 40 CFR 264.301(j)

If the active landfill contained any particulate matter which may have been subject to wind dispersal, describe how the landfill was covered or otherwise managed to control wind dispersal. If, during the active life of the landfill, the wind dispersal of hazardous waste was not controlled, indicate whether any hazardous waste or hazardous constituents were released to the environment and refer to Section G of the checklist.

D-6 Land Treatment: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.10(c), 40 CFR 270.20(f) and 40 CFR 264.280

Owners/operators of land treatment units that received wastes after July 26, 1982, or that certified closure after January 26,1983, and which are not exempt from post-closure and groundwater monitoring regulations in accordance with 40 CFR 264.280(d) and (e)., must have post-closure permits and must comply with the requirements of 40 CFR 264.117 through 119.

Provide the following information.

D-6a List of Wastes: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(1), and (b)(4), and 40 CFR 264.271(a).

Provide a list of all wastes that were placed in the land treatment unit(s). In addition, provide a list of all non-hazardous wastes placed in the unit after final receipt of hazardous wastes in accordance with 40 CFR 264.113. Include the amount of each waste that was applied to the unit(s). Provide also a list of hazardous constituents reasonably expected to be in, or derived from, the wastes placed in the units.

D-6b Treatment Zone Description: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(5), and 40 CFR 264.271(c).

Identify the dimensions including the depth of the treatment zone and the soil within the treatment zone. Identify the depth to the seasonal high water table and the source of the data.

D-6c Operating Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(2) and 40 CFR 264.273(a).

Describe the design measures and operating procedures that were used to assure uniform and complete degradation, transformation and immobilization of hazardous constituents.

D-6d Unsaturated Zone Monitoring Plan: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20 (b)(3), and 40 CFR 264.278.

Submit the Unsaturated Zone Monitoring Plan describing the measures used to determine whether hazardous constituents have migrated out of the treatment zone. The unsaturated zone monitoring plan must include programs for monitoring soil and soil-pore liquid.

D-6d(1) Sampling Location: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3)(ii), and 40 CFR 264.278(b) and (d).

Identify the sampling locations and provide the rationale used to select locations. Demonstrate that these sampling locations provide the capability to detect migration of hazardous constituents out of the treatment zone. Indicate that samples will be collected from immediately below the treatment zone.

D-6d(2) Sampling Frequency: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3)(i), and 40 CFR 264.278(d).

Provide the schedule used for sampling soils and soil-pore liquid.

D-6d (3) Sampling Equipment: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3)(i), and 40 CFR 264.278(e).

Identify and describe the equipment used to obtain soil core and soil-pore liquid samples.

D-6d (4) Sampling Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3)(i), and 40 CFR 264.278(e)(2) and (4).

Describe soil core and soil-pore liquid sampling procedures including methods for sample preparation, preservation, and shipment.

D-6d (5) Analytical Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3)(iii), and 40 CFR 264.278(e)(3).

Identify the analytical methods used to determine the concentration of hazardous constituents in soil core and soil-pore liquid samples.

D-6d (6) Chain-of-Custody: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3)(iv) and 40 CFR 264.278(e)(4).

Provide a description of the methods to be utilized to assure sample integrity throughout sampling, transportation, analysis, and reporting.

D-6d (7) Background Values: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3)(v), and 40 CFR 264.278(c).

Describe the sampling and analytical program used to establish background soil and soil-pore liquid concentrations of hazardous constituents. Identify sampling locations and depths, verifying that the area used is representative of the active site soil that has not been affected by leakage from the treatment zone. Specify the frequency of background sampling. Provide background data.

D-6d (8) Statistical Methods: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(b)(3) (vi) and 40 CFR 264.278(f).
Describe the statistical methods used to determine whether significant differences exist between background and treatment zone concentrations of hazardous constituents in soils and soil-pore liquids. Provide the results of analyses which demonstrate statistically significant increases over background values for concentrations of hazardous constituents in the soils or soil-pore liquids.

D-6d (9) Monitoring of Principal Hazardous Constituents: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20 (b)(4), and 40 CFR 264.278(a)(2).

Provide a list of Appendix VIII to 40 CFR Part 261 hazardous constituents that have been monitored for in soils and soil-pore liquids, along with a demonstration that the selected constituents are more difficult to treat than all other Appendix VIII to Part 261 constituents in the waste.

D-6e Run-on Control System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(c)(1) and (4) and 40 CFR 264.273(c) and (e) and 40 CFR and 264.280(a) (3).

Describe the system and associated collection and holding facilities used to prevent run-on onto the land treatment unit during peak discharge from at least a 25-year storm. Indicate any major problems or failures associated with the run-on control system during the active life of the land treatment unit which may have resulted in a release of hazardous constituents and discuss methods employed to resolve these problems. If there was a prior release, refer to Section G of the checklist.

D-6f Run-off Control System: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(c)(2), (3) and (4) and 40 CFR 264.273(d) and (e) and 40 CFR 264.280(a) (4).

Describe the run-off control system and associated collection and holding facilities used to collect and control run-off from the land treatment unit resulting from a 24-hour, 24-year storm and to minimize run-off of hazardous constituents from the treatment zone. Indicate any major problems or failures associated with the run-off control system during the active life of the land treatment unit that may have resulted in a release of hazardous waste or hazardous constituents. If there was a prior release, refer to Section G of the checklist.

D-6g Control of Wind Dispersal: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.20(c)(6) and 40 CFR 264.280(a)(5).
If the active land treatment unit contained any hazardous waste which may have been subject to wind dispersal, describe the methods used to control wind dispersal of particulate matter from the treatment zone. If, during the active life of the unit, the wind dispersal of hazardous waste was not controlled, indicate whether any hazardous waste or hazardous constituents were released to the environment and refer to Section G of the checklist.

D-7 Miscellaneous Units: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.23, and 40 CFR 264.601 and 603.

Owners/operators of miscellaneous units in which some wastes, waste residues, or contaminated materials are left in place at closure must obtain a post-closure permit. Provide the following information.

D-7a List of Wastes: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.23(a), and 40 CFR 264.601(a)(1), (b)(1), and (c)(1).

Provide a list of all hazardous wastes and hazardous constituents, including waste volumes, placed in miscellaneous units. If any treatment was accomplished in the miscellaneous unit during its active life, describe the nature and quantity of the wastes remaining in the unit after treatment was completed.

D-7b Miscellaneous Unit Description: 9VAC20-60-270, 40 CFR 270.23(a)

Provide a description of the miscellaneous unit including physical characteristics, materials of construction, unit dimensions, and location.

D-7c Containment or Liner System: 9VAC20-60-270, 40 CFR 270.23(a)

If the miscellaneous unit has a containment or liner system that will be left in place at closure, provide a description of the system including materials of construction, thickness, and limits of liner coverage. Describe any foundation present.

D-7d Release Prevention Measures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.23(a)(2), and 40 CFR 264.602

Provide a description of devices and procedures used to prevent releases to human health or the environment (e.g., leachate collection/detection system, run-on control system, run-off control system, control of wind dispersal).

D-7e Monitoring Programs: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.23(a)(2), 40 CFR 264.602.

Provide information on any groundwater, surface water, soils, or air monitoring performed at the miscellaneous unit. Describe procedures used for sampling, analysis, and evaluation of data, response procedures, and monitoring frequency. Provide any data indicating potential releases of hazardous constituents to the environment.

E. GROUNDWATER MONITORING: 9VAC20-60-264, 9VAC20-60-265, 9VAC20-60-270

Owners or operators of surface impoundments, waste piles, land treatment units, and landfills must comply with the requirements of this section. Owners or operators of tanks closing as landfills must comply with the requirements of this section during the post-closure period.

Section E is not applicable to the following units during the periods listed:

- Surface impoundments, waste piles, land treatment units or landfills that meet the criteria of 40 CFR 264.90(b)(2) and 9VAC-20-60-264.B.35 additional requirements for waste piles: exempt from Section E requirements during active life (including the closure period) and post-closure care period.

- Land treatment units receiving an exemption from vegetative cover and post-closure requirements in accordance with 40 CFR 264.280(d). and 40 CFR 264.90(b)(3).: exempt from Section E requirements during the post-closure care period.

- Units for which a demonstration has been made, in accordance with 40 CFR 264.90(b)(4), that there is no potential for migration of liquid from the unit to the uppermost aquifer during the active life of the unit (including the closure period) and the post-closure care period: exempt from Section E requirements during the post-closure care period.

- Waste piles designed and operated in compliance with 40 CFR 264.90(b)(5) and 9VAC20-60-264.B.35: exempt from Section E requirements during active life of the waste pile (including the closure period) and post-closure care period.

- Interim status waste piles: exempt from Section E requirements during active life of the waste pile (including the closure period).

E-1 Interim Status Period Groundwater Monitoring Data (if applicable): 9VAC20-60-270, 9VAC20-60-265, 40 CFR 270.14(c) and 40 CFR 265.90.

Provide a summary of the groundwater monitoring data obtained during the interim status period. Include the following information.

E-1a Description of Wells: 9VAC20-60-265, 9VAC20-60-265.B.7., 40 CFR 265.91

Provide a description of the design and construction of upgradient and downgradient wells including number of wells; locations; depths; screened intervals; casing description; any water level changes within 24 hours; filter pack and sealing materials placement; dates of construction; boring logs; etc. Provide also a copy of the topographic map on which the location and identification of each interim status monitoring well is indicated.

E-1b Description of Sampling/Analysis Procedures: 9VAC20-60-270, 9VAC20-60-265, 40 CFR 265.92 and 40 CFR 270.14(c).

Provide a copy of the facility's groundwater sampling and analysis plan that includes the procedures used and the protocol followed in:

- Sample collection.
- Sample preservation and shipment.
- Analytical procedures; and
- Chain of custody control.

E-1c Monitoring Data: 9VAC20-60-270, 9VAC20-60-265, 40 CFR 270.14(c) and 40 CFR 265.93

Provide all interim status monitoring results and include the following:

- Copies of quarterly analytical results (from first year) for each well.

- Copies of subsequent (annual or semi-annual) analytical results for each well.

- Copies of any notifications of significant change in water analysis parameter values made to the Regional Administrator (or State Director) pursuant to 40 CFR 265.93., and 40 CFR 270.14(c).

- Results of groundwater surface elevation measurements for each sampling event (40 CFR 270.14(c)(2)); and

- Initial background arithmetic mean and variance for each indicator parameter based on replicate measurements from upgradient wells during the first year. 40 CFR 270.14(c)(1).

E-1d Statistical Procedures: 9VAC20-60-270, 9VAC20-60-265, 40 CFR 270.14(c), 40 CFR 265.93(b) and (c).
Provide a description of the statistical procedures used to compare sampling results (as in the use of the student's t-test and the level of significance used).

Provide also the results of statistical comparisons between upgradient and downgradient well sampling results and first year background values for each indicator parameter.

E-1e Groundwater Assessment Plan: 9VAC20-60-265, 40 CFR 265.93(c) and (d)

If required, based on statistical comparison results, provide the specific plan for a groundwater quality assessment program in addition to the results of implementing such a plan. Include results of the following determinations based, at a minimum, on hazardous constituents listed in 40 CFR Part 261, Appendix VIII:

- Whether hazardous waste or hazardous waste constituents have entered the groundwater.

- The rate and extent of migration of hazardous waste or hazardous waste constituents in the groundwater; and

- The concentrations of hazardous waste or hazardous waste constituents in the groundwater.

E-2 General Hydrogeologic Information: 9VAC20-60-270, 40 CFR 270.14(c)(2) through (4).

Identify the uppermost aquifer and any hydraulically interconnected underlying aquifers (i.e., all likely subsurface flowpaths for hazardous constituents which may leak from the facility), and describe their hydrogeologic properties (e.g., hydraulic gradient, groundwater flow, rate and direction); provide the supporting data used to identify this information (i.e., the information obtained from hydrogeologic investigations of the facility area). This identification must include a report written by a qualified hydrogeologist on the hydrogeologic characteristics of the facility property supported by at least the drilling logs of on-site borings and wells and the available professional literature. Include a description of the regional geologic and hydrogeologic setting. In addition, include the following site-specific data:

- An analysis of topographic or geomorphic features that might influence the groundwater flow system.

- A classification and description of the hydrogeologic properties (hydraulic conductivity, porosity, texture, thickness, etc.) of all of the hydrogeologic units found at the site (i.e., the aquifers and any intervening saturated and unsaturated units);

- Using the topographic map as a base, isopath and structural contour maps and/or geologic cross sections showing the extent of the hydrologic units contained in the uppermost aquifer, and any intervening aquitards or other units within the facility boundary; and

- A description of the field methods used in the study, and a summary of which data were collected by each method.

E-3 Topographic Map Requirements: 9VAC20-60-270, 40 CFR 270.14(b)(19), and 40 CFR 270.14(c)(3) and (4).

Include the following information on the topographic map:

- Delineation of the waste management area (40 CFR 270.14(c)(3)).

- Property boundaries (40 CFR 270.14(c)(3)).

- Point of compliance (40 CFR 270.14(c)(3)).

- Groundwater monitoring well locations (40 CFR 270.14(c)(3)); and

- The extent of any contaminant plume (40 CFR 270.14(c)(4))

The following required information may be incorporated into the topographic map if possible, or at least should be discussed in the text (40 CFR 270.14(c)(2):

- Groundwater flow direction and rate.

- Boundaries of uppermost aquifer; and

- Underlying interconnection between uppermost aquifer and lower aquifer.

(Although many of these items can be shown on a single map, it is allowable to use additional maps to display some of the information. Presentation of all of this information on a single map may sacrifice clarity.)

E-4 Contaminant Plume Description: 9VAC20-60-270, 40 CFR 270.14(c)(4).

Provide a description of any plume of contamination that has entered the groundwater from a regulated unit that:

- Delineates the extent of the plume on the topographic map of 40 CFR 270.14(c)(4)(i); or

- Identifies the concentration of each constituent listed in Appendix IX to Part 264 throughout the plume or identifies the maximum concentrations of each Appendix IX to Part 264 constituent in the plume.

This requirement is applicable to all existing facilities where interim status monitoring shows the presence of hazardous constituents downgradient from the regulated units, unless it can be proven that such constituents are coming from another source. In addition, this requirement may be applied to other existing facilities where interim status monitoring data are non-existent or deficient if these facilities are suspected of contaminating groundwater, or if the Regional Administrator determines that a facility's interim status monitoring program is incapable of determining whether hazardous constituents have entered the groundwater from a regulated unit. (Note: In some cases, contaminant plumes may be defined under groundwater quality assessment programs carried out during the interim status period as required by 40 CFR 270.14(c)(4). Normally, such assessment programs do not address the complete list of Appendix IX to Part 264 constituents as required under 40 CFR 270. 14. Additional monitoring will be required to identify the concentration of each Appendix IX constituent in the plume.)

E-5 Detection Monitoring Program: 9VAC20-60-270, 9VAC20-60-264, 40 CFR.270 14(c)(6) and 40 CFR 264.98.

Owners/operators who had not detected hazardous constituents in the groundwater at the time of permit application must provide sufficient information, supporting data, and analyses documenting the absence of hazardous constituents in the groundwater to support the implementation of a detection monitoring program. The following information must be included.

E-5a Indicator Parameters, Waste Constituents, Reaction Products to be Monitored: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(6)(i) and 40 CFR 264.98(a).

Supply a list of indicator parameters, waste constituents, or reaction products that can provide a reliable indication of the presence of hazardous constituents in the groundwater. Provide the following information:

- Type, quantity, and concentrations of constituents in the waste managed at the regulated unit(s); 40 CFR 264.98(a).
- Mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated one beneath the waste management area; and
- Detectability of indicator parameters, waste constituents, or their reaction products in the groundwater.

E-5b Description of Wells: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 264.97 and 40 CFR 270.14(c)(6)(ii).

Identify the number of wells and the depth and location of each well. Describe in detail the materials of construction. Provide a description of the well casing and screen. Provide an explanation supporting the representative nature of groundwater quality sampled from background monitoring wells and compliance point monitoring wells.

E-5c Sampling and Analysis Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 264.97(d). and 40 CFR 270.14(c)(6)(iv)

Submit the groundwater sampling and analysis plan including the following information.

E-5c(1) Sample Collection: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 264.97(d)(1) and 40 CFR 270.14(c)(6)(iv).

Describe the procedures and techniques used for sample collection.

E-5c(2) Sample Preservation and Shipment: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(6)(iv) and 40 CFR 264.97(d)(2).

Describe the procedures and techniques used for sample preservation and shipment.

E-5c(3) Analytical Procedures: 9VAC20-60-264, 40 CFR 264.97(d)(3).

Identify the analytical methods that will be used to analyze for each monitoring parameter. The methods specified in the most recent edition of "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (SW-846) must be used.

E-5c(4) Chain of Custody: 9VAC20-60-264, 40 CFR 264.97(d)(4).

Describe the procedures to be used to assure sample integrity throughout sampling, transportation, analysis and reporting.

E-5c(5) Appropriate Sampling and Analytical Methods: 9VAC20-60-264, 40 CFR 264.97(e).

Demonstrate that sampling and analytical methods used are appropriate for groundwater sampling and accurate in the measurement of hazardous constituents in groundwater samples.

E-5c(6) Determination of Groundwater Elevation: 9VAC20-60-264, 40 CFR 264.97(f).

Describe procedures used for determining the groundwater surface elevation each time groundwater is sampled.

E-5c(7) Determination of Groundwater Flow Rate and Direction: 9VAC20-60-264, 40 CFR 264.98(e)

Describe procedures for the determination of the groundwater flow rate and direction in the uppermost aquifer on at least an annual basis.

E-5c(8) Sample Size and Statistical Analysis: 9VAC20-60-264, 40 CFR 264.97(g) and 264.98(d).

Provide the frequencies for collecting samples and the quantity of samples to be collected. Demonstrate that the number of samples chosen to be collected is large enough to reasonably ensure that a contaminant release to ground water will be detected. Note that at least four samples must be collected at least semi-annually from each background and compliance well unless an alternate sampling procedure has been approved by the Director.

E-5d Statistical Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(6)(iv), and 40 CFR 264.97(h).

The owner/operator must specify the statistical method to be used to evaluate groundwater monitoring data for each hazardous constituent. The method chosen must be one of those described in E-5d(1)-(5) and must be consistent with the following:

- Conduct the statistical test separately for each hazardous constituent in each well.
- Appropriate for distribution of chemical parameters or hazardous constituents. More than one statistical method may be needed if distributions differ.
- Account for data below the detection limit.
- Any practical quantification limit (PQL) shall be the lowest concentration level within levels of precision and accuracy for routine lab operations; and
- Procedures to control or correct for seasonal and spatial variability and temporal correlation in data.

E-5d(1) Parametric Analysis of Variance (ANOVA): 9VAC20-60-264, 40 CFR 264.97(h)(1)

ANOVA followed by multiple comparisons procedures:

- Include estimation and testing of contrasts between each compliance well's mean and the background mean levels for each constituent; and
- If using individual well comparison procedure, Type 1 error level of no less than 0.01 shall be maintained. If using multiple comparison procedure, Type 1 error level no less than 0.05 for each testing period must be used.

E-5d(2) Non-parametric ANOVA (Based on Ranks): 9VAC20-60-264, 40 CFR 264.97(h)(2).

ANOVA based on ranks followed by multiple comparisons procedures:

- Estimation and testing of each compliance well's median and background median levels for each constituent; or

- If using individual well comparison procedures, Type 1 error level of no less than 0.01 shall be maintained. If using multiple comparison procedure, Type 1 error level no less than 0.05 for each testing period must be used.

E-5d(3) Tolerance or Prediction Interval: 9VAC20-60-264, 40 CFR 264.97(h)(3).

- Establish interval for each constituent based on distribution of background data.
- Compare level of each constituent in each compliance well to the upper tolerance or prediction limit; and
- Prepare levels of confidence and/or percentage of the population that the interval must contain considering number of samples in the background data base, data distribution, and range of concentration values for each constituent of concern.

E-5d(4) Control Chart Approach: 9VAC20-60-264, 40 CFR 264.97(h)(4).

- Control limits for each constituent; and
- Specify type of control chart and associated parameter values.

E-5d(5) Alternative Approach: 9VAC20-60-264, 40 CFR 264.97(h)(5).

An alternative approach can be proposed which complies with all performance standards set in 40 CFR 264.97(h).

E-5e Background Groundwater Monitoring

E-5e(1) Background Groundwater Monitoring Wells Not Upgradient: 9VAC20-60-264, 40 CFR 264.97(a)(1)
For wells that are not hydraulically upgradient of the waste management area, demonstrate that (1) the hydrogeologic conditions do not allow determination of whether wells are upgradient, or (2) sampling at other wells will provide an indication of background groundwater quality that is at least as representative of background as upgradient wells.

E-5e(2) Upgradient Background Groundwater Monitoring Wells: 9VAC20-60-264, 40 CFR 264.97(a)(1).

Provide details for the groundwater monitoring system showing that it provides for a sufficient number of upgradient wells at appropriate locations and depths to yield ground-water samples from the uppermost aquifer that represents the quality of background water not affected by a regulated unit.

E-5e(3) Concentrations and Coefficients of Variation of Parameters: 9VAC20-60-264, 40 CFR 264.98(a)(4).

Specify the concentrations and coefficients of variation for each of the monitoring parameters or constituents in the background groundwater quality.

E-5e(4) Background Groundwater Monitoring Data: 9VAC20-60-264, 40 CFR 264.97(g) and 40 CFR 264.98(c).

Submit analytical data obtained from sampling the background groundwater monitoring wells. This must include background values for each monitoring parameter or constituent and must be in a form necessary for the determination of statistical significance under 40 CFR 264.97(h).

E-5f Compliance Point (Downgradient) Groundwater Monitoring: 9VAC20-60-264, 40 CFR 264.97(g) and 40 CFR 264.98(c)

Demonstrate that the downgradient compliance point groundwater monitoring wells adequately represent the quality of water passing the point of compliance. Detail how the system allows for the detection of contamination when a hazardous waste/constituent has migrated from a regulated unit to the uppermost aquifer. Submit analytical data obtained from sampling of compliance point groundwater monitoring wells. This must include data on each monitoring parameter or constituent and must be in a form necessary for the determination of statistical significance under 40 CFR 264.97(h). Also include the results of measurements of ground water flow rate, direction, and surface elevation.

E-5g Determination of Statistically Significant Evidence of Contamination: 9VAC20-60-264, 40 CFR 264.98(f) and (g).

E-5g(1) Procedures for and Results of Determination: 9VAC20-60-264, 40 CFR 264.98(f) and (g).

Provide procedures for and results of the determination of whether there is statistically significant evidence of contamination at each monitoring well at the compliance point. The procedures must specify the statistical method to be used in accordance with 40 CFR 264.97(h)

E-5g(2) Finding of Statistically Significant Evidence of Contamination: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(7) and 40 CFR 264.98(f) and (g)

If it has been determined that there is statistically significant evidence of contamination at any monitoring well at the compliance point, the owner/operator must document that the following have been or will be implemented:

- Notify the Director of the finding within seven days;
- Sample all monitoring wells for Appendix IX to 40 CFR Part 264 constituents;
- Establish a compliance monitoring program;
- Submit an engineering feasibility plan for a corrective action program or a permit schedule for submission of a plan, if applicable; and
- Demonstrate that a source other than the regulated unit caused the contamination, or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or is due to natural variation in the groundwater.

E-6 Compliance Monitoring Program: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(7) and 40 CFR 264.99.

Owners/operators who had detected the presence of hazardous constituents in the groundwater at the point of compliance at the time of permit application must provide sufficient information, supporting data, and analyses to establish a compliance monitoring program. The following information must be included.

E-6a Waste Description: 9VAC20-60-270, 40 CFR 270.14(c)(7)(i)

Provide a description of the wastes previously handled at the facility. This description must include:

- Historical records of volumes, types (including EPA ID number, if applicable), and chemical composition of wastes placed in units in the waste management area;
- The results of any direct sampling of the waste (see current edition of "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", SW-846);

- A list of constituents that are reasonably expected to be in or derived from the waste; and
- Identification of the dominant constituents expected to be present, and their relative abundance.

If it is expected that some constituents may form a separate, immiscible fluid, the composition of this fluid and its viscosity and density must be included in the application.

E-6b Characterization of Contaminated Groundwater: 9VAC20-60-270, 40 CFR 270.14(c)(7)(ii)

Provide a characterization of the contaminated groundwater including the concentration of identified hazardous constituents. For each well at the point of compliance, and for each background well, provide the following information:

- Concentrations of each constituent in 40 CFR Part 261Appendix IX ;
- Concentrations of major anions and cations; and
- Concentrations of the constituents listed in 9VAC20-264.B.7., if not already determined by the above.

E-6c Hazardous Constituents to be Monitored: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(7)(iii), 9VAC20-60-264.B.6, 40 CFR 264.93, and 40 CFR 264.99.

Specify the hazardous constituents to be monitored and present a rationale for selecting these constituents.

E-6d Concentration Limits: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(7)(iv), 9VAC20-60-264.B.6. and B.7., 40 CFR 264.94 and 40 CFR 264.99.

Specify concentration limits for each hazardous constituent. (The proposed concentration limit must not exceed the present background level of that constituent in the groundwater. For any of the constituents for which the USEPA has established a Maximum Contaminant Level (MCL) under the National Primary Drinking Water Regulation, 40 CFR Part 141 (regulations under the Safe Drinking Water Act), the concentration must not exceed the value of the MCL. If you wish to petition the Director to establish alternate concentration limits than those specified above, you must supply the information identified in Comment E-6e.)

E-6e Alternate Concentration Limits: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 264.94(b), 40 CFR 264.99(a)(2), and 40 CFR 270.14(c)(7)(iv)

Provide a justification for establishing alternate concentration limits. This justification must address each of the following factors.

E-6e(1) Potential Adverse Effects on Groundwater Quality: 9VAC20-60-264, 40 CFR 264.94(b)(1).

The potential adverse effects on groundwater quality, considering:

- The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration; 40 CFR 264.94(b)(1)(i)
- The hydrogeological characteristics of the facility and surrounding land; 40 CFR 264.94(b)(1)(ii)
- The quantity of groundwater and the direction of groundwater flow; 40 CFR 264.94(b)(1)(iii)
- The proximity and withdrawal rates of groundwater users; 40 CFR 264.94(b)(1)(iv)
- The current and future uses of groundwater in the area; 40 CFR 264.94(b)(1)(v)
- The existing quality of groundwater, including other sources of contamination and their cumulative impact on the groundwater quality; 40 CFR 264.94(b)(1)(vi)
- The potential for health risks caused by human exposure to waste constituents; 40 CFR 264.94(b)(1)(vii)
- The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste; 40 CFR 264.94(b)(1)(viii) constituents; and
- The persistence and permanence of the potential adverse effects; 40 CFR 264.94(b)(1)(ix)

E-6e(2) <u>Potential Adverse Effects on Surface Water Quality</u>: 9VAC20-60-264, 40 CFR 264.94(b)(2).

The potential adverse effects on hydraulically-connected surface-water quality, considering:

- The volume and physical and chemical characteristics of the waste in the regulated unit; 40 CFR 264.94(b)(2)(i)
- The hydrogeological characteristics of the facility and surrounding land; 40 CFR 264.94(b)(2)(ii)
- The quantity and quality of groundwater, and the direction of groundwater flow; 40 CFR 264.94(b)(2)(iii)
- The patterns of rainfall in the region; 40 CFR 264.94(b)(2)(iv)

- The proximity of the regulated unit to surface waters; 40 CFR 264.94(b)(2)(v)
- The current and future uses of surface waters in the area and any water quality standards established for those surface waters; 40 CFR 264.94(b)(2)(vi)
- The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality; 40 CFR 264.94(b)(2)(vii)
- The potential for health risks caused by human exposure to waste constituents; 40 CFR 264.94(b)(2)(viii)
- The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; 40 CFR 264.94(b)(2)(ix)
- The persistence and permanence of the potential adverse effects. 40 CFR 264.94(b)(2)(x)

E-6f Description of Wells: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(5), 40 CFR 264.97(a), (b), and (c).

Identify the number of wells and the depth and location of each well. Describe in detail the materials of construction. Provide a description of the well casing and screen. Provide an explanation supporting the representative nature of groundwater quality sampled from background monitoring wells and compliance point monitoring wells.

E-6g Sampling and Analysis Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(6)(iv), and 40 CFR 264.97(d)
Submit the groundwater sampling and analysis plan. Provide the following information.

E-6g(1) Sample Collection: 9VAC20-60-264, 40 CFR 264.97(d)(1).

Describe the procedures and techniques used for sample collection.

E-6g(2) Sample Preservation and Shipment: 9VAC20-60-264, 40 CFR 264.97(d)(2).

Describe the procedures and techniques used for sample preservation and shipment.

E-6g(3) Analytical Procedures: 9VAC20-60-264, 40 CFR 264.97(d)(3) and (g).

Identify the analytical methods that will be used for each monitoring parameter. The methods specified in the most recent edition of "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (SW-846) must be used.

E-6g(4) Chain of Custody: 9VAC20-60-264, 40 CFR 264.97(d)(4).

Describe the procedures to be used to assure sample integrity throughout sampling, transportation, analysis and reporting.

E-6g(5) Appropriate Sampling and Analytical Methods: 9VAC20-60-264, 40 CFR 264.97(e)

Demonstrate that sampling and analytical methods used are appropriate for groundwater sampling and accurate in the measurement of hazardous constituents in groundwater samples.

E-6g(6) Determination of Groundwater Elevation: 9VAC20-60-264, 40 CFR 264.97(f).

Describe procedures used for determining the groundwater surface elevation each time groundwater is sampled.

E-6g(7) Determination of Groundwater Flow Rate and Direction: 9VAC20-60-264, 40 CFR 264.99(e)

Describe procedures for the determination of the groundwater flow rate and direction in the uppermost aquifer on at least an annual basis.

E-6g(8) Sample Size and Statistical Analysis: 9VAC20-60-264, 40 CFR 264.97(g) and 40 CFR 264.99(d) and 99(f)

Provide the frequencies for collecting samples and the quantity of samples to be collected. Demonstrate that the number of samples chosen to be collected is large enough to reasonably ensure that a contaminant release to ground water will be detected. Note that at least four samples must be collected at least semi-annually from each background and compliance well unless an alternate sampling procedure has been approved by the Director.

E-6h Statistical Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(6)(iv), 40 CFR 264.97(h)., 40 CFR 264.99(d).

The owner/operator must specify the statistical method to be used to evaluate groundwater monitoring data for each hazardous constituent. The method chosen must be one of those described in E-5d(1) - (5) and must be consistent with the following:

- Conduct the statistical test separately for each hazardous constituent in each well.
- Appropriate for distribution of chemical parameters or hazardous constituents. More than one statistical method may be needed if distributions differ.
- Account for data below the detection limit.
- Any practical quantification limit (PQL) shall be the lowest concentration level within levels of precision and accuracy for routine lab operations; and

- Procedures to control or correct for seasonal and spatial variability and temporal correlation in data.

E-6h(1) Parametric Analysis of Variance (ANOVA): 9VAC20-60-264, 40 CFR 264.97(h)(1).

ANOVA followed by multiple comparisons procedures:

- Include estimation and testing of contrasts between each compliance well's mean and the background mean levels for each constituent; and

- If using individual well comparison procedure, Type 1 error level of no less than 0.01 shall be maintained; if using multiple comparison procedure, Type 1 error level no less than 0.05 for each testing period must be used.

E-6h(2) Non-parametric ANOVA (Based on Ranks): 9VAC20-60-264, 40 CFR 264.97(h)(2).

ANOVA based on ranks followed by multiple comparisons procedures:

- Estimation and testing of each compliance well's median and background median levels for each constituent; and

- If using individual well comparison procedures, type 1 error level of no less than 0:01 shall be maintained; if using multiple comparison procedure, type 1 error level no less than 0:05 for each testing period must be used.

E-6h(3) Tolerance or Prediction Interval Procedure: 9VAC20-60-264, 40 CFR 264.97(h)(3).

- Establish interval for each constituent based on distribution of background data;

- Compare level of each constituent in each compliance well to the upper tolerance or prediction limit; and

- Prepare levels of confidence and/or percentage of the population that the interval must contain considering number of samples in the background data base, data distribution, and range of concentration values for each constituent of concern.

E-6h(4) Control Chart Approach: 9VAC20-60-264, 40 CFR 264.97(h)(4).

- Control limits for each constituent; and

- Specify type of control chart and associated parameter values.

E-6h(5) Alternative Approach: 9VAC20-60-264, 40 CFR 264.97(h)(5)

An alternative approach can be proposed which complies with all performance standards set in 264.97(i).

E-6i Background Groundwater Monitoring 9VAC20-60-270, 40 CFR 270.14(c)(7).

E-6i(1) Background Groundwater Monitoring Wells Not Upgradient: 9VAC20-60-264, 40 CFR 264.97(a)(1)
For wells that are not hydraulically upgradient of the waste management area, demonstrate that (1) the hydrogeologic conditions do not allow determination of whether wells are upgradient, or (2) sampling at other wells will provide an indication of background groundwater quality that is at least as representative of background as upgradient wells.

E-6i(2) Upgradient Background Groundwater Monitoring Wells: 9VAC20-60-264, 40 CFR 264.97(a)(1).

Provide details for the groundwater monitoring system showing that it provides for a sufficient number of upgradient wells at appropriate locations and depths to yield ground-water samples from the uppermost aquifer that represents the quality of background water not affected by a regulated unit.

E-6i(3) Concentrations and Coefficients of Variation of Parameters: 9VAC20-60-264, 40 CFR 264.98(a)(4).

Specify the concentrations and coefficients of variation for each of the monitoring parameters or constituents in the background groundwater quality.

E-6i(4) Background Groundwater Monitoring Data: 9VAC20-60-264, 40 CFR 264.97(g) and 40 CFR 264.98(c).

Submit analytical data obtained from sampling the background groundwater monitoring wells. This must include background values for each monitoring parameter or constituent and must be in a form necessary for the determination of statistical significance under40 CFR 264.97(h).

E-6j Compliance Point (Downgradient) Groundwater Monitoring: 9VAC20-60-264, 40 CFR 264.97(g) and 40 CFR 264.98(c).

Demonstrate that the downgradient compliance point groundwater monitoring wells adequately represent the quality of water passing the point of compliance. Detail how the system allows for the detection of contamination when a hazardous waste/constituent has migrated from a regulated unit to the uppermost aquifer. Submit analytical data obtained from sampling of compliance point groundwater monitoring wells. This must include data on each monitoring parameter or constituent and must be in a form necessary for the determination of statistical significance under 40 CFR 264.97(h). Include also the results of measurements of ground water flow rate, direction, and surface elevation.

E-6j(1) Compliance Point: 9VAC20-60-264, 40 CFR 264.95.

Specify the point of compliance, in accordance with 264.95, at which groundwater monitoring will be conducted.

E-6j(2) Compliance Period: 9VAC20-60-264, 40 CFR 264.96.

Specify the compliance period during which the groundwater protection standard applies.

E-6j(3) Compliance Point Groundwater Monitoring Data: 9VAC20-60-264, 40 CFR 264.99(a) and (f)

Submit analytical data obtained from sampling of compliance point groundwater monitoring wells. This must include data on each chemical parameter or constituent and must be in a form necessary for the determination of statistical significance under 40 CFR 264.97(h). Include also the results of measurements of groundwater flow rate, direction, and surface elevation.

Provide analytical data for all Appendix IX (Part 264) constituents. Include a list of all Appendix IX constituents that have been added to the monitoring list.

E-6k Determination of Statistically Significant Evidence of Increased Contamination: 9VAC20-60-264, 40 CFR 264.99(d).

E-6k(1) Procedures for and Results of Determination: 9VAC20-60-264, 40 CFR 264.99(d)(1).

Provide procedures for and results of the determination of whether there is statistically significant evidence of increased contamination at each monitoring well at the compliance point. The procedures must specify the statistical method to be used in accordance with 40 CFR 264.97(h).

E-6k(2) Finding of Statistically Significant Evidence of Increased Contamination: 9VAC20-60-264, 40 CFR 264.99(h) and (i)

If it has been determined that any groundwater concentration limits under 40 CFR 264.92 are being exceeded at any monitoring well at the point of compliance, document that the following procedures will be implemented:

- Notify the Director of the finding within seven days; and.
- Submit an application for a permit modification to establish a corrective action program, including details of the program to comply with the groundwater protection standard and details of a groundwater monitoring program to demonstrate effectiveness of the corrective action program; or
- Demonstrate that a source other than a regulated unit caused the contamination or that the detection is an artifact caused by an error in sampling, analysis, or statistical variation or is due to natural variation in the groundwater; and
- Submit an engineering feasibility plan for a corrective action program to meet the requirements of 40 CFR 270.14(c)(8) and 40 CFR 264.100 or submit a schedule for submittal of the plan.

E-7 Corrective Action Program: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8), 40 CFR 264.99(h)(2), and 40 CFR 264.100.

If hazardous constituents (per 9VAC20-60-264.B.6) have been measured in the groundwater which exceed the concentration limits established under 9VAC20-60.264.B.7 and/or 40 CFR 264.94(b) or if groundwater monitoring conducted at the time of permit application under Subpart F at the waste boundary indicates the presence of hazardous constituents from the facility in groundwater over background concentrations, the owner/operator must submit sufficient information, supporting data, and analyses to establish a corrective action program which meets the requirements of 40 CFR 264.100. (However, an owner/operator is not required to submit information to establish a corrective action program if he demonstrates to the Director that alternate concentration limits will protect human health and the environment after considering the criteria listed in 40 CFR 264.94(b). The owner/operator must instead submit sufficient information to establish a compliance monitoring program (see section E-6).

Provide the following information to establish a corrective action program.

E-7a Characterization of Contamination: 9VAC20-60-270, 40 CFR 270.14(c)(8)(i).

Provide a characterization of the contaminated groundwater including the concentration of identified hazardous constituents. For each well at the point of compliance, and for each background well, provide the following information:

- Concentrations of each constituent in Appendix IX of Part 264
- Concentrations of major anions and cations; and
- Concentrations of the constituents listed in 9VAC20-60-264.B.7., if not already determined by the above.

E-7b Concentration Limits: 9VAC20-60-270, 9VAC20-60-264, 9VAC20-60-264.B.6. and B.7, 40 CFR 264.94, and 40 CFR 270.14(c)(8)(ii)

Specify concentration limits for each hazardous constituent. (The proposed concentration limit must not exceed the present background level of that constituent in the groundwater. For any of the constituents for which the USEPA has established a Maximum Contaminant Level (MCL) under the National Primary Drinking Water Regulation, 40 CFR Part 141 (regulations under the Safe Drinking Water Act), the concentration must not exceed the value of the MCL. If you wish to petition the Director to establish alternate concentration limits than those specified above you must supply the information identified in item E-7c.)

E-7c Alternate Concentration Limits: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(i), and 40 CFR 264.92 and 94(b).

Provide a justification for establishing alternate concentration limits. This justification must address each of the following factors.

E-7c(1) Potential Adverse Effects on Groundwater Quality: 9VAC20-60-264, 40 CFR 264.94(b)(1).

Potential adverse effects on groundwater quality, considering:

- The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration;
- The hydrogeological characteristics of the facility and surrounding land;
- The quantity of groundwater and the direction of groundwater flow;
- The proximity and withdrawal rates of groundwater users;
- The current and future uses of groundwater in the area;
- The existing quality of groundwater, including other sources of contamination and their cumulative impact on the groundwater quality;
- The potential for health risks caused by human exposure or waste constituents;
- The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
- The persistence and permanence of the potential adverse effects.

E-7c(2) Potential Adverse Effects on Surface Water Quality: 9VAC20-60-264, 40 CFR 264.94(b)(2).

Potential adverse effects on hydraulically-connected surface-water quality considering:

- The volume and physical and chemical characteristics of the waste in the regulated unit;
- The hydrogeological characteristics of the facility and surrounding land;
- The quantity and quality of groundwater, and the direction of groundwater flow;
- The patterns of rainfall in the region;
- The proximity of the regulated unit to surface waters;
- The current and future uses of surface waters in the area and any water quality standards established for those surface waters;
- The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality;
- The potential for health risks caused by human exposure to waste constituents;
- The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
- The persistence and permanence of the potential adverse effects.

E-7d Corrective Action Plan: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8), and 40 CFR 264.100.

The owner/operator must submit detailed plans and an engineering report on the corrective actions proposed for the facility. Alternatively, the owner/operator may submit a schedule for submission of the plan. The corrective action plan must prevent hazardous constituents from exceeding concentration limits at the compliance point, and between the compliance point and the downgradient property boundary by

removing the hazardous waste constituents or treating them in place. The following information must be included in the corrective action plan.

E-7d(1) Location: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iii), and 40 CFR 264.100(b).

Provide maps showing the location of engineered barriers, caps, drains and wells, etc. (use the topographic map in Section B-2).

E-7d(2) Construction Detail: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iii), and 40 CFR 264.100(b)

Provide descriptions and engineering drawings of construction details and specifications for any proposed features to contain groundwater or redirect its flow (e.g., engineered barriers, caps, drains, wells, etc). Provide the details of the Construction Quality Assurance Plan to be used during the construction phase.

E-7d(3) Plans for Removing Wastes: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iii), and 40 CFR 264.100(e)

Provide plans for removing and handling of any hazardous wastes, if applicable.

E-7d(4) Treatment Technologies: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iii), and 40 CFR 264.100(b).

Provide a description of the treatment technologies to be used for contaminated groundwater that is pumped or drained from the zone of contamination.

E-7d(5) Additional Hydrogeologic Data: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iii), and 40 CFR 264.100(b)

Provide a description and summary of any additional hydrogeologic data collected for use in designing the corrective action.

E-7d(6) Operation and Maintenance: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iii), and 40 CFR 264.100(e)(3).

Submit operation and maintenance plans for the correction action measures.

E-7d(7) Schedule for Corrective Action: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iii), and 40 CFR 264.100(e)(3).

Submit a schedule for the implementation of corrective action measures.

E-7e Corrective Action for Groundwater Contamination Within and/or Beyond Facility Boundary: 9VAC20-60-264, 40 CFR 264.100(e).

Where hazardous constituents exceeding concentration limits in groundwater have been detected between the compliance point and the facility boundary and/or beyond the facility boundary, the owner/operator must provide details for conducting a corrective action program

(see item E-7d), where necessary to protect human health and the environment. However, where the owner/operator can demonstrate that he was unable to obtain the necessary permission to undertake such action, a corrective action program is not required. The owner/operator must then describe specific on-site measures to address such releases.

E-7f Groundwater Monitoring Program: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(8)(iv), and 40 CFR 264.100(d)

Describe the groundwater monitoring program used to assess the adequacy and effectiveness of the corrective action measures and describe the components of the monitoring program that enable it to demonstrate the adequacy of corrective action. Alternatively, submit a schedule for submission of this description. Water quality monitoring must be conducted over the on-site extent of the contaminated groundwater. The following information must be included for the groundwater monitoring program.

E-7f(1) Description of Wells: 9VAC20-60-264, 40 CFR 264.97(a)

Identify the number of wells and the depth and location of each well. Describe the materials of construction. Provide a description of the well casing and screen.

E-7f(2) Sampling and Analysis Procedures: 9VAC20-60-264, 40 CFR 264.97(d).

Submit the groundwater sampling and analysis plan including the following information.

E-7f(2)(a) Sample Collection: 9VAC20-60-264, 40 CFR 264.97(d)(1).

Describe the procedures and techniques used for sample collection.

E-7f(2)(b) Sample Preservation and Shipment: 9VAC20-60-264, 40 CFR 264.97(d)(2).

Describe the procedures and techniques used for sample preservation and shipment.

E-7f(2)(c) Analytical Procedures: 9VAC20-60-264, 40 CFR 264.97(d)(3)

Identify the analytical methods that will be used for each monitoring parameter. The methods specified in the most recent edition of "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (SW-846) must be used.

E-7f(2)(d) Chain of Custody: 9VAC20-60-264, 40 CFR 264.97(d)(4)

Describe the procedures to be used to assure sample integrity throughout sampling, transportation, analysis and reporting.

E-7f(2)(e) Appropriate Sampling and Analytical Methods: 9VAC20-60-264, 40 CFR 264.97(e).

Demonstrate that sampling and analytical methods used are appropriate for groundwater sampling and accurate in the measurement of hazardous constituents in groundwater samples.

E-7f(2)(f) Determination of Groundwater Elevation: 9VAC20-60-264, 40 CFR 264.97(f)

Describe procedures used for determining the groundwater surface elevation each time groundwater is sampled.

E-7f(2)(g) Determination of Groundwater Flow Rate and Direction: 9VAC20-60-264, 40 CFR 264.99(e).

Describe procedures for the determination of the groundwater flow rate and direction in the uppermost aquifer on at least an annual basis.

E-7f(2)(h) Sample Size and Statistical Analysis: 9VAC20-60-264, 40 CFR 264.97(g) and 40 CFR 264.99(d) and (f)

Provide the frequencies for collecting samples and the quantity of samples to be collected. Demonstrate that the number of samples chosen to be collected is large enough to reasonably ensure that a contaminant release to ground water will be detected. .Note that at least four samples must be collected at least semi-annually from each background and compliance well unless an alternate sampling procedure has been approved by the Director.

E-7f(3) Statistical Procedures: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c)(7)(vi), 40 CFR 264.97(h), 40 CFR 264.99(d)

Specify the statistical method to be used to evaluate groundwater monitoring data for each hazardous constituent. The method chosen must be one of those described in E-5d(1)-(5) and must be consistent with the following:

- Conduct statistical tests separately for each hazardous constituent in each well;
- Appropriate for distribution of chemical parameters or hazardous constituents. More than one statistical method may be needed if distributions differ;
- Account for data below the detection limit;
- Any practical quantification limit (PQL) shall be the lowest concentration level within levels of precision and accuracy for routine lab operations; and
- Include procedures to control or correct for seasonal and spatial variability and temporal correlation in data.

E-7f(3)(a) Parametric Analysis of Variance (ANOVA): 9VAC20-60-264, 40 CFR 264.97(h)(1)

ANOVA followed by multiple comparisons procedures:

- Includes estimation and testing of contrasts between each compliance well's mean and the background mean levels for each constituent;
- If using individual well comparison procedure, Type 1 error level of no less than 0.01 shall be maintained; if using multiple comparison procedure, Type 1 error level no less than 0.05 for each testing period must be used.

E-7f(3)(b) Non-parametric ANOVA (Based on Ranks): 9VAC20-60-264, 40 CFR 264.97(h)(2)

ANOVA based on ranks followed by multiple comparisons procedures:

- Estimation and testing of each compliance well's median and background median levels for each constituent; and
- If using individual well comparison procedures, Type 1 error level of no less than 0.01 shall be maintained; if using multiple comparison procedure, Type 1 error level no less than 0.05 for each testing period must be used.

E-7f(3)(c) Tolerance or Prediction Interval Procedure: 9VAC20-60-264, 40 CFR 264.97(h)(3)

- Establish interval for each constituent based on distribution of background data;
- Compare level of each constituent in each compliance well to the upper tolerance or prediction limit; and
- Prepare levels of confidence and/or percentage of the population that the interval must contain considering number of samples in the background data base, data distribution, and range of concentration values for each constituent of concern.

E-7f(3)(d) Control Chart Approach: 9VAC20-60-264, 40 CFR 264.97(h)(4)

- Control limits for each constituent; and
- Specify type of control chart and associated parameter values.

E-7f(3)(e) Alternate Approach: 9VAC20-60-264, 40 CFR 264.97(h)(5)

An alternate approach can be proposed which complies with all performance standards set in 9VAC20-60-264, 40 CFR 264.97(i).

E-7f(4) Background Groundwater Monitoring 9VAC20-60-270, 40 CFR 270.14(c)

E-7f(4)(a) Background Groundwater Monitoring Wells Not Upgradient: 9VAC20-60-264, 40 CFR 264.97(a)(1)

For wells that are not hydraulically upgradient of the waste management area, demonstrate that (1) the hydrogeologic conditions do not allow determination of whether wells are upgradient, or (2) sampling at other wells will provide an indication of background quality that is at least as representative of background as upgradient wells.

E-7f(4)(b) Upgradient Background Groundwater Monitoring Wells: 9VAC20-60-264, 40 CFR 264.97(a)(1)

Provide details for the groundwater monitoring system showing that it provides for a sufficient number of upgradient wells at appropriate locations and depths to yield ground-water samples from the uppermost aquifer that represents the quality of background water not affected by a regulated unit.

E-7f(4)(c) Concentrations and Coefficients of Variation of Parameters: 9VAC20-60-264, 40 CFR 264.98(a)(4).

Specify the concentrations and coefficients of variation for each of the monitoring parameters or constituents in the background groundwater quality.

E-7f(4)(d) Background Groundwater Monitoring Data: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(c), 40 CFR 264.97(a)(1) and 40 CFR 264.97(j).

Submit analytical data obtained from sampling of background groundwater monitoring wells. This must include background values for each monitoring parameter or constituent and must be in a form necessary for the determination of statistical significance under 40 CFR 264.97(h).

E-7f(5) Compliance Point (Downgradient) Groundwater Monitoring: 9VAC20-60-264, 40 CFR 264.99(a) and (b).

Demonstrate that the downgradient compliance point groundwater monitoring wells adequately represent the quality of water passing the point of compliance. Detail how the system allows for the detection of contamination when a hazardous waste/constituent has migrated from a regulated unit to the uppermost aquifer. Submit analytical data obtained from sampling of compliance point groundwater monitoring wells. This must include data on each monitoring parameter or constituent and must be in a form necessary for the determination of statistical significance under 40 CFR 264.97(h).. Include also the results of measurements of ground water flow rate, direction, and surface elevation.

E-7f(5)(a) Compliance Point: 9VAC20-60-264, 40 CFR 264.95.

Specify the point of compliance, in accordance with 264.95(a), at which groundwater monitoring will be conducted.

E-7f(5)(b) Compliance Period: 9VAC20-60-264, 40 CFR 264.96.

Specify the compliance period during which the groundwater protection standard applies.

E-7f(5)(c) Compliance Point Groundwater Monitoring Data: 9VAC20-60-264, 40 CFR 264.99(c) and 40 CFR 264.99(g)

Submit analytical data obtained from sampling of compliance point groundwater monitoring wells. This must include data on each chemical parameter or constituent and must be in a form necessary for the determination of statistical significance under 40CFR 264.97(h).90.H.8. Include also the results of measurements of groundwater flow rate, direction, and surface elevation.

Provide analytical data for all Appendix IX to part 264 constituents. Include a list of all constituents that have been added to the monitoring list.

E-7g Evaluation of Effectiveness of Corrective Action Program: 9VAC20-60-264, 40 CFR 264.100(a) and 40 CFR 264.100(d).

E-7g(1) Procedures for Evaluating Effectiveness of Corrective Action: 9VAC20-60-264, 40 CFR 264.100(d), and 40 CFR 264.100(g)

Describe procedures to be used for evaluating the effectiveness of the corrective action program. Procedures must be based on data obtained from groundwater monitoring. Procedures used must specify the statistical method used to determine whether statistically and significant evidence of increased contamination exists.

E-7g(2) Reporting Requirements: 9VAC20-60-264, 40 CFR 264.100(g).

Provide procedures for submission to the Director of semi-annual reports on the effectiveness of corrective action.

F. POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS: 9VAC20-60-270, 9VAC20-60-265, 9VAC20-60-264, 40 CFR 270, 40 CFR 265, and 40 CFR 264.

Post-closure care requirements in accordance with 9VAC20-60-265. B.18, 9VAC20-60-264, 40 CFR 264.310, and 40 CFR 264 apply to the following hazardous waste management units:

- Tanks (per 40 CFR 264.197)
- Surface Impoundments (per 40 CFR 264.228)
- Waste Piles (per 40 CFR 264.258)
- Land Treatment Units (per 40 CFR 264.280)

- Subpart X miscellaneous unit that is a disposal unit (per 40 CFR 264.603)

if the owner/operator cannot demonstrate that all wastes and contaminated sub-soils (including groundwater) cannot be practicably removed or decontaminated.

F-1 Closure of Landfills: 9VAC20-60-270, 9VAC20-60-265.B.18, 9VAC20-60-264, 40 CFR 270.21 and 40 CFR 264.310.

Provide detailed plans and an engineering report describing the final cover. The plans and report must include descriptions of how the cover will comply with the following requirements.

F-1a Minimization of Liquid Migration: 9VAC20-60-264, 40 CFR 264.310(a)(1).

Provide a description and/or calculations showing that the cover will provide long-term minimization of liquids through the closed landfill.

F-1b Maintenance Needs: 9VAC20-60-264, 40 CFR 264.310(a)(2).

Discuss how the cover system will function effectively with minimum maintenance needs.

F-1c Drainage and Erosion: 9VAC20-60-264, 40 CFR 264.310(a)(3)

Describe methods used to promote drainage and minimize erosion or abrasion of the final cover. Provide the following information:

- Data demonstrating that the final slopes will not cause significant cover erosion.
- Descriptions of drainage materials and their permeabilities.
- Engineering calculations demonstrating free drainage of precipitation off of and out of the cover; and
- Estimation of the potential for drainage-layer clogging.

F-1d Settlement and Subsidence: 9VAC20-60-264, 40 CFR 264.310(a)(4).

Describe potential cover settlement and subsidence, considering immediate settlement, primary consolidation, secondary consolidation, creep, and liquefaction. Include the following information:

- Potential foundation compression.
- Potential soil liner settlement; and

- Potential waste consolidation and compression.

Describe the effects of potential subsidence/settlement on the ability of the final cover to minimize infiltration.

F-1e Cover Permeability: 9VAC20-60-264, 40 CFR 264.310(a)(5).

Demonstrate that the final cover has a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

F-1f Survey Plat: 9VAC20-60-265, 9VAC20-60-264, 40 CFR 264.116

No later than the submission of the certification of closure, submit a survey plat indicating the location and dimensions of all hazardous waste disposal units (including surface impoundments, waste piles, and tanks which closed as landfills) with respect to permanently surveyed benchmarks. The plat must be prepared and certified by a professional land surveyor. The plat must contain a note, prominently displayed, which states the owner's/operator's obligation to restrict disturbance of the hazardous waste disposal units in accordance with applicable 40 CFR 264, Subpart G regulations.

F-1g Certification of Closure: 9VAC20-60-264, 40 CFR 264.115.

Within 60 days of the completion of closure, submit a certification that the facility (unit) has been closed in accordance with the specifications in the approved closure plan. The certification must be signed by the owner/operator and by an independent, Virginia registered professional engineer. Certification of closure of land treatment facilities may be made by an independent qualified soil scientist, in lieu of an independent registered professional engineer. Where available, provide also documentation indicating Director approval of the certification.

F-2 Post-Closure Plan: 9VAC20-60-270, 40 CFR 270.14(b)(13).

Submit a copy of the post-closure plan. Include the following information, where applicable.

F-2a Inspection Plan: 9VAC20-60-270, 40 CFR 270.14(a)(5)

Describe the inspections to be conducted during the post-closure care period, their frequency, the inspection procedure, and the logs to be kept. The following items, as applicable, should be included in the inspection plan:

- Security control devices;
- Erosion damage;
- Cover settlement, subsidence and displacement;

- Vegetative cover condition;
- Integrity of run-on and run-off control measures;
- Cover drainage system functioning;
- Leachate collection/detection and removal system (permitted units only);
- Gas venting system;
- Well condition; and
- Benchmark integrity.

The rationale for determining the length of time between inspections should be provided.

F-2b Monitoring Plan: 9VAC20-60-270, 9VAC20-60-264, 40 CFR 270.14(b)(5), 40 CFR 270.14(c) and 40 CFR 264.118(b)(1)

Describe the monitoring to be conducted during the post-closure care period, including, as applicable, the procedures for conducting the following operations and evaluating the data gathered:

- Groundwater monitoring; and
- Leachate collection/detection and removal.

F-2c Maintenance Plan: 9VAC20-60-264, 40 CFR 264.118(b)(2)

Describe the preventative and corrective maintenance procedures, equipment requirements and material needs. Include the following items in the maintenance plan, as applicable:

- Repair of security control devices;
- Erosion damage repair;
- Correction of cover settlement, subsidence and displacement;
- Mowing, fertilization and other vegetative cover maintenance;
- Maintenance and repair of run-on and run-off control structures;
- Leachate collection/detection systems maintenance;
- Well repair and replacement; and
- Protection and maintenance of surveyed benchmarks.

Describe the rationale to be used to determine the need for corrective maintenance activities.

F-2d Security: 9VAC20-60-264, 40 CFR 264.117(b)

If hazardous wastes may remain exposed after completion of partial or final closure, or access to the closed site by the public or domestic livestock may pose a hazard to human health, provide a description of security measures to be provided at the site in compliance with 40 CFR 264.117(b).

F-2e Post-Closure Contact: 9VAC20-60-264, 40 CFR 264.118(a)(3)

Provide the name, address, and phone number of the person(s) or office to contact about the hazardous waste disposal units or facility during the post-closure period.

F-2f Additional Post-Closure Care Requirements for Land Treatment Facilities: 9VAC20-60-264, 40 CFR 264.280.

Provide descriptions of procedures to be used to conduct the following activities, and identify frequencies at which they are to be conducted:

- Continuance of methods to enhance land treatment;
- Maintenance of vegetative cover;
- Maintenance of run-on control systems and run-off management systems;
- Wind dispersal control;
- Continued compliance with prohibitions or conditions regarding food-chain crops; and
- Continuance of unsaturated zone monitoring.

In addition, interim status land treatment facilities must provide procedures and frequencies for continued soil-core monitoring including collection and analysis of samples.

F-2g Additional Post-Closure Care Requirements for Miscellaneous Units: 9VAC20-60-264, 40 CFR 264.603

Provide a detailed description of the plans and procedures used to ensure protection of human health and the environment and to meet the requirements of 40 CFR 264.601 during the post-closure care period. Include the prevention of any releases to groundwater or the subsurface environment; surface water or wetlands or on the soil surface; or to air.

F-2h Certification of Completion of Post-Closure Care: 9VAC20-60-264, 40 CFR 264.120

Provide a statement indicating that, no later than 60 days after completion of the post-closure care period for each hazardous waste disposal unit, the owner/operator will submit a certification to the Director that the post-closure care period was performed in accordance with the specifications in the post-closure plan. The certification must be signed by the owner/operator and an independent Virginia registered professional engineer. Documentation supporting the independent registered professional engineer's certification must be furnished to the Director upon request until he releases the owner/operator from the financial assurance requirements for post-closure care.

F-3 Post-Closure Notices: 9VAC20-60-264, 40 CFR 264.119.

Provide a statement indicating that the following post-closure notices will be appropriately filed and submitted.

F-3a Notice to Local Land Use Authority: 9VAC20-60-264, 40 CFR 264.119.

Provide a statement indicating that a record of the type, location, and quantity of hazardous wastes disposed of within each disposal unit of the facility will be submitted to the local land use authority and the Director no later than 60 days after certification of closure of each disposal unit. For hazardous wastes disposed of before January 12, 1981, identify the type, location, and quantity of the hazardous wastes to the best of the owner/operator's knowledge and in accordance with any records he has kept.

F-3b Notice in Deed: 9VAC20-60-264, 40 CFR 264.116 and 264.119

Provide a statement indicating that a notation in the deed to the facility property will be made within 60 days of certification that will, in perpetuity, notify any potential purchaser of the property that:

1. The land has been used to manage hazardous wastes;

2. Use of the land is restricted to activities that will not disturb the integrity of the final cover, containment system, or monitoring system during the post-closure period; and

3. The survey plat (item F-1f) and record of waste disposal (item F-3a) have been filed with the local land use authority and the Director.

The owner/operator must also submit to the Director a certification that he has recorded the notice in the deed.

F-4 Post-Closure Cost Estimate: 9VAC20-60-264, 9VAC20-60-264.B.17, 9VAC20-60-264.B.18., 9VAC20-60-264.B.19., 40 CFR 264.144

Provide a copy of the up-to-date post-closure cost estimate, calculated to cover the cost, in current dollars, of post-closure monitoring and maintenance of the facility in accordance with the applicable post-closure plan. The post-closure cost estimate must be based on the costs of having a third party perform the post-closure activities. The cost estimate must be adjusted annually for inflation.

F-5 Financial Assurance Mechanism for Post-Closure Care: 9VAC20-60-264, 9VAC20-60-264.B.9., 9VAC20-60-264.B.10., 9VAC20-60-264.B.14., 9VAC20-60-264.B.15., 9VAC20-60-264.B.16.,9VAC20-60-264.B.20., 9VAC20-60-264.B.22., 40 CFR 264.145

Provide a copy of the established financial assurance mechanism for post-closure care of the facility. The mechanism must be one of the following.

F-5a Post-Closure Trust Fund: 9VAC20-60-264, 40 CFR 264.145(a)

Provide a copy of the post-closure fund agreement with the wording required by 40 CFR 264.145(a). and submit a formal certification of acknowledgment.

F-5b Surety Bond: 9VAC20-60-264, 9VAC20-60-264.B.9, 9VAC20-60-264.B.10., 40 CFR 264.145(b)

F-5b(1) Surety Bond Guaranteeing Payment Into a Post-Closure Trust Fund: 9VAC20-60-264, 9VAC20-60-264.B.9., 9VAC20-60-264.B.10., 40 CFR 264.145(b)

Provide a copy of the surety bond with the required wording and a copy of the standby trust agreement. The bond must guarantee that the owner or operator will fund the standby trust fund in an amount equal to the penal sum of the bond before the beginning of final closure of the facility or fund the standby trust fund in an amount equal to the penal sum within 15 days of an order to begin closure or provide alternate financial assurance if the bond is canceled.

F-5b(2) Surety Bond Guaranteeing Performance of Post-Closure Care: 9VAC20-60-264, 9VAC20-60-264.B.9., 9VAC20-60-264.B.10., 9VAC20-60-264.B.20, 40 CFR 264.145(c)

Provide a copy of the surety bond with the required wording, guaranteeing that the owner or operator will perform post-closure care according to the post-closure plan and the requirements of 40 CFR 264, Subpart G

F-5c Post-Closure Letter of Credit: 9VAC20-60-264, 9VAC20-60-264.B.21., 40 CFR 264.145(d)

Provide a copy of the irrevocable letter of credit with the required wording and a copy of the standby trust agreement. The letter of credit must be issued for a period of at least one year and be for the amount of estimated post-closure costs.

F-5d Post-Closure Insurance: 9VAC20-60-264, 9VAC20-60-264.B.22, 40 CFR 264.145(e)

Provide a copy of the certificate of insurance with the required wording.

F-5e Financial Test and Corporate Guarantee for Post-Closure Care: 9VAC20-60-264, 9VAC20-60-264.B.14., 9VAC20-60-264.B.15.,40 CFR 264.145(f).

Submit (1) a letter signed by the owner's or operator's chief financial officer and worded as specified by 40 CFR 264.151(f); (2) a copy of the independent certified public accountant's report on examination of the applicant's financial statements for the latest fiscal year; and (3) a special report from the certified public accountant. If a parent corporation is guaranteeing post-closure care for a subsidiary facility, the corporate guarantee must accompany the preceding items and must be worded as specified in 40 CFR 264.151(h).

F-5f Use of Multiple Financial Mechanisms: 9VAC20-60-264, 40 CFR 264.145(g)

Provide a copy of a combination of financial mechanisms, including trust fund agreements, surety bonds guaranteeing payment into a post-closure trust fund, letters of credit, and insurance, together which provide financial assurance for the amount of post-closure care. Combined financial assurance must be at least equal to the adjusted post-closure cost estimate.

F-5g Use of Financial Mechanism for Multiple Facilities: 9VAC20-60-264, 9VAC20-60-264.B.16., 40 CFR 264.145(h)

Provide a copy of a financial assurance mechanism for more than one facility showing, for each facility, the EPA ID number, name, address, and amount of post-closure funds assured by the mechanism. The amount of funds available through the mechanism must be no less than the sum of funds that would be available if a separate mechanism had been established and maintained for each facility.

F-6 Liability Requirements: 9VAC20-60-264, 9VAC20-60-264.B.14., 9VAC20-60-264.B.15., 9VAC20-60-264.B.23., 40 CFR 264.147

If applicable, provide copies of the required items documenting compliance with applicable liability requirements for sudden and non-sudden accidental occurrences.

F-6a Coverage for Sudden Accidental Occurrences: 9VAC20-60-264, 9VAC20-60-264.B.23., 40 CFR 264.147(a)

Liability coverage must be maintained for sudden accidental occurrences in the amount of at least $1 million per occurrence with an annual aggregate of at least $2 million. Liability coverage may be demonstrated in one of six ways.

F-6a(1) Endorsement or Certification: 9VAC20-60-264, 40 CFR 264.147(a)(1)(i).

Submit a signed duplicate original of the Hazardous Waste Facility Liability Endorsement, with the wording specified by 40 CFR 264.151, or of a Certificate of Liability Insurance, with the wording specified by 40 CFR 264.151.

F-6a(2) Financial Test of Guarantee for Liability Coverage: 9VAC20-60-264, 9VAC20-60-264.B.14., 40 CFR 264.147(a)(2), (f) and (g).

Submit a letter signed by the owner's or operator's chief financial officer and worded as specified by 40 CFR 264.151., a copy of the independent certified public accountant's report on examination of the applicant's financial statements for the latest fiscal year, and a special report from the certified public accountant. If the applicant is using the financial test to demonstrate both assurance for closure or post-closure care and liability coverage, the letter specified must be submitted to cover both forms of financial responsibility. Under these circumstances, a separate letter is not required.

F-6(a)(3) Letter of Credit: 9 VAC20-60-264, 40 CFR 264.147(a)(3)

Submit a copy of the Letter of Credit for liability coverage that meets the requirements of 40 CFR 264.147(h).

F-6(a)(4) Surety Bond: 9VAC20-60-264, 40 CFR 264.147(a)(4)

Submit a copy of the Surety Bond for liability coverage that meets the requirements of 40 CFR 264.147(i).

F-6(a)(5) Trust Fund: 9VAC20-60-264, 40 CFR 264.147(a)(5)

Submit a copy of the Trust Fund for liability coverage that meets the requirements of 40 CFR 24.147(b)(j).

F-6a(6) Use of Multiple Mechanisms: 9VAC20-60-264, 40 CFR 264.145(g), 40 CFR 264.147(a)(6).

Submit items demonstrating required liability coverage through a combination of insurance, financial test, guarantee, letter of credit, surety bond, and trust fund, except that the owner or operator may not combine a financial test covering part of the liability coverage requirement with a guarantee unless the financial statement of the owner or operator is not consolidated with the financial statement of the guarantor. The amounts of coverage demonstrated must total at least the minimum amounts required by this section. If the owner or operator demonstrates the required coverage through the use of a combination of financial assurances under this paragraph, the owner or operator shall specify at least one such assurance as “primary” coverage and shall specify other assurance as “excess” coverage. The amounts of coverage demonstrated must total at least the minimum amounts required by 40 CFR 264.147(a).

F-6b Coverage for Nonsudden Accidental Occurrences: 9VAC20-60-264, 9VAC20-60-264.B.23., 40 CFR 264.147(b).

If applicable, liability coverage must be maintained for nonsudden accidental occurrences in the amount of at least $3 million per occurrence with an annual aggregate of at least $6 million. Liability coverage may be demonstrated in one of six ways.

F-6b(1) Endorsement or Certification: 9VAC20-60-264, 40 CFR 264.147(b)(1)(i).

Submit a signed duplicate original of the Hazardous Waste Facility Liability Endorsement, with the wording specified by 40 CFR 264.151, or of a Certificate of Liability Insurance, with the wording specified by 40 CFR 264.151

F-6b(2) Financial Test or Corporate Guarantee for Liability Coverage: 9VAC20-60-264, 40 CFR 264.147(b)(2), (f) and (g)

Submit (1) a letter signed by the owner's or operator's chief financial officer and worded as specified by 40 CF 264.151; (2) a copy of the independent certified public accountant's report on examination of the applicant's financial statements for the latest fiscal year; and (3) a special report from the certified public accountant. If the applicant is using the financial test to demonstrate both assurance for closure or post-closure care and liability coverage, the letter specified in 40 CFR 264.151. must be submitted to cover both forms of financial responsibility. Under these circumstances, a separate letter is not required. If a parent company is guaranteeing closure for a subsidiary facility, the corporate guarantee must accompany the preceding items and must be worded as specified in 40 CF 264.151.

F-6(b)(3) Letter of Credit: 9 VAC20-60-264, 40 CFR 264.147(b)(3)

Submit a copy of the Letter of Credit for liability coverage that meets the requirements of 40 CFR 264.147(h).

F-6(b)(4) Surety Bond: 9VAC20-60-264, 40 CFR 264.147(b)(4)

Submit a copy of the Surety Bond for liability coverage that meets the requirements of 40 CFR 264.147(i).

F-6(b)(5) Trust Fund: 9VAC20-60-264, 40 CFR 264.147(b)(5)

Submit a copy of the Trust Fund for liability coverage that meets the requirements of 40 CFR 264.147(j).

F-6b(6) Use of Multiple Mechanisms: 9VAC20-60-264, 40 CFR 264.145(g), 40 CFR 264.147(b)(6).

Submit items demonstrating required liability coverage through a combination of insurance, financial test, guarantee, letter of credit, surety bond, and trust fund, except that the owner or operator may not combine a financial test covering part of the liability coverage requirement with a guarantee unless the financial statement of the owner or operator is not consolidated with the financial statement of the guarantor. The amounts of coverage demonstrated must total at least the minimum amounts required by this section. If the owner or operator demonstrates the required coverage through the use of a combination of financial assurances under this paragraph, the owner or operator shall specify at least one such assurance as “primary” coverage and shall specify other assurance as “excess” coverage. The amounts of coverage demonstrated must total at least the minimum amounts required by 40 CFR 264.147(b).

F-6c Request for Variance: 9VAC20-60-264, 40 CFR 264.147(c)

Request for an adjusted level of required liability coverage must be accompanied by supporting information to demonstrate that established levels of financial responsibility specified in 40 CFR 264.147(a) or (b) are not consistent with the degree and duration of risk associated with treatment, storage, or disposal at the applicant's facility or group of facilities.

F-7 State Assumption of Responsibility: .NA

40 CFR 264.150 is not included as part of the Virginia Hazardous Waste Management Regulations per 9VAC20-60-264.B.1.

G. CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS:

G-1 Solid Waste Management Units: 9VAC20-60-264, 40 CFR 264.101.

Identify all solid waste management units at the facility including hazardous and non-hazardous units, as well as active and inactive units, if known. A solid waste management unit may include any of the following:

- Landfill;
- Surface Impoundment;
- Waste pile;
- Land treatment unit;
- Tank (including 90-day accumulation tank);
- Injection well;
- Incinerator;
- Wastewater treatment tank;
- Container storage area;
- Waste handling area;
- Transfer station; and
- Waste recycling operation.

G-1a Characterize the Solid Waste Management Units

For each solid waste management unit, submit the following information:

- Type of each unit;
- Location of each existing or closed unit on the topographic map [See comment B-2];
- Engineering drawings of the unit, if available;
- Dimensions and materials of construction of each unit;
- Dates when the unit was in operation;
- Quantity or volume of waste, if known

G-1b No Solid Waste Management Units

Describe the methodology used to determine that no existing or former solid waste management units exist at the facility (e.g., review of old solid waste permits, blueprints).

G-2 Releases

Provide all information available, including releases reported under CERCLA Section 103, on whether or not releases have occurred from any solid waste management units at the facility. Reasonable efforts to identify releases must be made, even if releases have not been verified. (A release may include spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment. It does not include releases otherwise permitted or authorized under law.)

G-2a Characterize Releases

Information on releases must include the following types of available information concerning prior or current releases:

- Date of the release;
- Type of waste constituent released;
- Nature of the release:
  - spill,
  - overflow,
  - ruptured pipe or tank,
  - result of the unit's construction (e.g., unlined surface impoundment, leaky tank)
- Groundwater monitoring and other analytical data available to describe nature and extent of release. If other than groundwater monitoring data, please describe;
- Physical evidence of distressed vegetation and soil contamination;
- Historical evidence of releases such as tanker truck accidents;
- Any state, local, or federal enforcement action that may address releases;
- Any public citizen complaints about the facility that could indicate a release; and
- Any information showing the migration of a release.

G-2b No Releases

Describe the methodology used to determine that releases from solid waste management units are not present (e.g., review of groundwater monitoring data).

H. OTHER FEDERAL LAWS: 9VAC20-60-270, 40 CFR 270.3 and 270.14(b)(20)

Demonstrate compliance with the requirements of applicable Federal laws such as the Wild and Scenic Rivers Act, National Historic Preservation Act of 1966, Endangered Species Act, Coastal Zone Management Act, and Fish and Wildlife Coordination Act.

I. PART B CERTIFICATION: 9VAC20-60-270, 40 CFR 270.11

Applications must be accompanied by a certification letter as specified in 40 CFR 270.11. The required signatures are as follows: (1) for a corporation, a principal executive officer (at least at the level of vice-president); (2) for a partnership or sole proprietorship, a general partner or the proprietor, respectively; (3) for a municipal, state, Federal, or other public agency, either a principal executive officer or ranking elected official.