**CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS**

**SECTION D. PROCESS INFORMATION - LANDFILLS**

| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| D-6 | Landfills | 270.21; 264.300 - 264.317 | | | |
| D-6a | List of Wastes | 270.21(a) | | | |
| D-6b(1) | Exemption Based on Existing Portion | 270.21(b)(1); 264.301(a) | Existing portions of landfills that have waste in place on November 8, 1984, and will have only vertical expansion are exempted from liner system requirements. Provide plan showing limits of existing portion. | | |
| D-6b(2) | Exemption Based on Alternative Design and Location | 270.21(b)(1); 264.301(d) | | | |
| D-6b(3) | Exemption for Replacement Landfill Unit | 270.21(b)(1); 264.301(f) | | | |
| D-6b(4) | Exemption for Monofills | 270.21(b)(1); 264.301(e) | | | |
| D-6b(5) | Groundwater Monitoring Exemption | 270.21(c); 264.90(b)(2) | If exemption from Subpart F groundwater monitoring requirements is sought, provide data demonstrating that the following conditions are met. | | |
| D-6b(5)(a) | Engineered Structure | 270.21(c); 264.90(b)(2)(i) | Provide design data showing that unit for which exemption is sought is an engineered structure. | | |
| D-6b(5)(b) | No Liquid Waste | 270.21(c); 264.90(b)(2)(ii) | Describe procedures for ensuring that no liquid waste or waste containing free liquids will be received by, or contained, in the unit. | | |
| D-6b(5)(c) | Exclusion of Liquids | 270.21(c); | Provide design and operating data | | |

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| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| | | 264.90(b)(2)(iii) | demonstrating how liquids, precipitation, and other runon and runoff will be excluded from the unit. | | |
| D-6b(5)(d) | Containment System | 270.21(c); 264.90(b)(2)(iv) | Describe containment system (both inner and outer layers) that will enclose waste. | | |
| D-6b(5)(e) | Leak Detection System | 270.21(c); 264.90(b)(2)(v) | Describe design and operating data demonstrating leak detection system built into each containment layer. | | |
| D-6b(5)(f) | Operation of Leak Detection System | 270.21(c); 264.90(b)(2)(vi) | Demonstrate means for ensuring continuing operation and maintenance of leak detection systems during active life of unit and closure and post-closure care periods. | | |
| D-6b(5)(g) | No Migration | 270.21(c); 264.90(b)(2)(vii) | Demonstrate that unit will not allow hazardous constituents to migrate beyond outer layer of containment system prior to end of post-closure care period. | | |
| D-6c | Liner System, General Items | 270.21(b)(1); 264.301(a),(c) | Discuss the items that apply to liner system as a whole. | | |
| D-6c(1) | Liner System Description | 270.21(b)(1); 264.301(a),(c) | Provide detailed description of liner system, demonstrating that any flow of liquids into and through liners will be prevented. Liner system includes liner foundation, bottom composite liner, leachate detection system, top synthetic liner, and any protective layer placed to protect leachate collection system from damage. | | |

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| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| D-6c(2) | Liner System Location Relative to High Water Table | 270.21(b)(1); 264.301(a)(1)(i) | Provide geological cross sections showing groundwater levels with seasonal fluctuations and liner foundation elevations. | | |
| D-6c(3) | Loads on Liner System | 270.21(b)(1); 264.301(a)(1)(i) | Provide results of calculations defining maximum loads or stresses that will be placed on liner system considering:<br>• both static and dynamic loads<br>• stresses due to installation or construction<br>• stresses resulting from operating equipment<br>• stresses due to maximum quantity of waste, cover, and proposed post-closure land use<br>• stresses resulting from settlement, subsidence, or uplift<br>• internal and external pressure gradients. | | |
| D-6c(4) | Liner System Coverage | 270.21(b)(1); 264.301(a)(1)(iii) | | | |
| D-6c(5) | Liner System Exposure Prevention | 270.21(b)(1); 264.301(a)(1)(i) | Demonstrate that the liner system will not be exposed to wind or sunlight or, if exposure to any part of the system is to be permitted, that such exposure will not result in unacceptable degradation of that portion of the system. | | |
| D-6d | Liner System, Foundation | | | | |

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**SECTION D. PROCESS INFORMATION - LANDFILLS**

| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| D-6d(1) | Foundation Description | 270.21(b)(1); 264.301(a)(1)(ii) | Describe foundation for liner system, including foundation materials and indicate bearing elevations on geological and construction drawings. Indicate any load-bearing embankments placed to support liner system. | | |
| D-6d(2) | Subsurface Exploration Data | 270.21(b)(1); 264.301(a)(1)(ii) | Verify engineering characteristics of liner system foundation materials through subsurface explorations. Provide information to fully describe these efforts. | | |
| D-6d(3) | Laboratory Testing Data | 270.21(b)(1); 264.301(a)(1)(ii) | Provide index testing results to classify site materials and lab test data to evaluate engineering properties of foundation materials. Provide references to standard test procedures. | | |
| D-6d(4) | Engineering Analyses | 270.21(b)(1); 264.301(a)(1)(ii) | Provide engineering analyses based on subsurface exploration and laboratory testing data. Include discussion of methods used, assumptions, copies of calculations, and appropriate references. | | |
| D-6d(4)(a) | Settlement Potential | 270.21(b)(1); 264.301(a)(1)(ii) | Provide estimates of total and differential settlement of liner system foundation. Consider stresses imposed by liner system and applicable stresses computed in item D-6c(3). | | |
| D-6d(4)(b) | Bearing Capacity | 270.21(b)(1); 264.301(a)(1)(ii) | Provide analysis of allowable bearing capacity of liner system foundation. | | |
| D-6d(4)(c) | Stability of Landfill Slopes | 270.21(b)(1); | Provide, as appropriate, analyses of | | |

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**SECTION D. PROCESS INFORMATION - LANDFILLS**

| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| | | 264.301(a)(1)(ii) | stability of:<br>• excavated slopes for units constructed below grade<br>• embankment slopes for units constructed with earthen dikes or berms<br>• landfill slopes consisting of liner system or cover system placed on waste. | | |
| D-6d(4)(d) | Potential for Excess Hydrostatic or Gas Pressure | 270.21(b)(1); 264.301(a)(1)(ii) | Provide estimates of potential for bottom heave or blow-out of liner system due to unequal hydrostatic or gas pressures. | | |
| D-6e | Liner System, Liners | | | | |
| D-6e(1) | Synthetic Liners | 270.21(b)(1); 264.301(a)(1)(ii),(c) | For each synthetic liner in system or under consideration, provide following general information: thickness; type; material; brand name; and manufacturer. | | |
| D-6e(1)(a) | Synthetic Liner Compatibility Data | 270.21(b)(1); 264.301(a)(1)(i) | Provide summary and discuss test results and conclusions as to suitability of synthetic liner based on liner/waste compatibility testing. | | |
| D-6e(1)(b) | Synthetic Liner Strength | 270.21(b)(1); 264.301(a)(1)(i) | Provide data showing that synthetic liners, including seams, have sufficient strength after exposure to waste and waste leachate. | | |
| D-6e(1)(c) | Synthetic Liner Bedding | 270.21(b)(1); 264.301(a)(1)(ii) | Demonstrate that sufficient bedding will be provided above and below synthetic liners to prevent rupture during installation and | | |

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**SECTION D. PROCESS INFORMATION - LANDFILLS**

| Section and Requirement | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|
| | | operation. Synthetic membrane of bottom composite liner should be placed directly on soil portion. | | |
| D-6e(2) Soil Liners | 270.21(b)(1); 264.301(a),(c) | Provide description of soil portion of bottom composite liner, including its classification, thickness, hydraulic conductivity, and material specifications. | | |
| D-6e(2)(a) Material Testing Data | 270.21(b)(1); 264.301(c) | Provide complete results for index tests, laboratory and/or in situ permeability tests, strength tests, consolidation tests, and shrink-swell properties of soil liner material. Discuss potential for dispersion and piping of soil due to flow of liquid through soil liner layer. | | |
| D-6e(2)(b) Soil Liner Compatibility Data | 270.21(b)(1); 264.301(a)(1)(i); 264.301(c)(3)(iii) | Provide complete test results of permeability testing of soil liner material using representative of leachate from surface impoundment. | | |
| D-6e(2)(c) Soil Liner Strength | 270.21(b)(1); 264.301(a)(1)(i); 264.301(c)(3)(iii) | Demonstrate that soil liner has sufficient strength to support loads/stresses computed in item D-4c(3). | | |
| D-6f Liner System, Leachate Collection/Detection Systems | 270.21(b)(1); 264.301(a)(2); 264.301(c)(2),(3) | | | |
| D-6f(1) System Operation and Design | 270.21(b)(1); 264.301(a)(2); 264.301(c)(2),(3) | Describe design features of leachate detection system and how system will function to detect any leakage through either liner in timely manner. | | |

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**SECTION D. PROCESS INFORMATION - LANDFILLS**

| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| D-6f(2) | Drainage Material | 270.21(b)(1); 264.301(a)(2),(c)(3)(ii) | Describe leachate detection system drainage material. | | |
| D-6f(3) | Grading and Drainage | 270.21(b)(1); 264.301(a)(2),(c)(2),(3) | Indicate slopes of leachate detection system and provide contour plan for system along with plan showing layout and spacing of piping system and any sumps, pumps, etc. Demonstrate that leak detection system is appropriately graded to assure that leakage at any point in liner system is detected in timely manner. | | |
| D-6f(4) | Maximum Leachate Head | 270.21(b)(1); 264.301(a)(2),(c)(2) | | | |
| D-6f(5) | Systems Compatibility | 270.21(b)(1); 264.301(a)(2)(i)(A),(c)(3)(iii) | | | |
| D-6f(6) | Systems Strength | 270.21(b)(1); 264.301(a)(2)(i)(B),(c)(3)(iii) | | | |
| D-6f(6)(a) | Stability of Drainage Layers | 270.21(b)(1); 264.301(a)(2)(i)(B),(c)(3)(iii) | | | |
| D-6f(6)(b) | Strength of Piping | 270.21(b)(1); 264.301(a)(2)(i)(B),(c)(3)(iii) | Demonstrate that pipe used in piping systems have sufficient strength to support loads as computed in item D-6c(3). | | |
| D-6f(7) | Prevention of Clogging | 270.21(b)(1); | | | |

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|---|---|---|---|---|---|
| | | 264.301(a)(2)(ii), (c)(3)(iv) | | | |
| D-6f(8) | Liquid Removal | 270.21(b)(1); 264.301(c)(3)(v),(4) | | | |
| D-6f(9) | Location Relative to Water Table | 270.21(b)(1)(iii); 264.301(c)(5) | | | |
| D-6g | Liner System, Construction and Maintenance | | | | |
| D-6g(1) | Material Specifications | | | | |
| D-6g(1)(a) | Synthetic Liners | 270.21(b)(1); 264.301(a)(1) | Provide detailed material specifications for specific synthetic liner or liners to be used. | | |
| D-6g(1)(b) | Soil Liners | 270.21(b)(1); 264.301(a)(1) | For soil liners constructed of borrowed material, provide specifications. For soil liners using in-place soil, provide specifications to be used to assure that all existing materials meet requirements of liner design. | | |
| D-6g(1)(c) | Leachate Collection/Detection Systems | 270.21(b)(1); 264.301(a),(c) | Provide material specifications for drainage layer material, filter fabric or filter layer, piping, and sumps. | | |
| D-6g(2) | Construction Specifications | | | | |
| D-6g(2)(a) | Liner System Foundation | 270.21(b)(1); 264.301(a)(1); 264.303(a) | Provide construction specifications of foundation installation procedures. For units that use in-place material for liner system foundation, provide construction specifications for preparation of foundation. | | |

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**SECTION D. PROCESS INFORMATION - LANDFILLS**

| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| D-6g(2)(b) | Soil Liner | 270.21(b)(1); 264.301(a)(1); 264.303(a)(2) | Describe procedures for installing soil liner. | | |
| D-6g(2)(c) | Synthetic Liners | 270.21(b)(1); 264.301(a)(1); 264.303(a)(1) | Provide construction specifications for placement of synthetic liners. | | |
| D-6g(2)(d) | Leachate Collection/Detection Systems | 270.31(b)(1); 264.301(a),(c) | Provide construction specifications for placement of all components of leachate collection/detection systems. | | |
| D-6g(3) | Certified Quality Auditor (CQA) Program | 270.21(b)(1); 270.30(k)(2); 264.19; 264.303(a) | Provide complete details of CQA program to be used during construction of liner system to assure that it is built as designed. | | |
| D-6g(4) | Maintenance Procedures for Leachate Collection/Detection Systems | 270.21(b)(1); 264.301(a),(c) | Describe anticipated maintenance activities that will be used to assure proper operation of leachate collection/detection systems throughout landfill's expected life. | | |
| D-6g(5) | Liner Repairs During Operations | 270.21(b)(1); 264.301(a) | Describe methods that will be used to repair any damage to liner that occurs while landfill is in operation during placement of waste (such as a dozer ripping the liner). | | |
| D-6h | Action Leakage Rate | 270.21(b)(1)(v); 264.302 | | | |
| D-6h(1) | Determination of the Action Leakage Rate | 270.21(b)(1)(v); 264.302(a) | | | |
| D-6h(2) | Monitoring the Leakage | 270.21(b)(1)(v); | To determine if action leakage rate has | | |

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| Section and Requirement | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|
| | 264.302(b) | been exceeded, owner/operator must convert required leachate flow rate monitoring data to average daily flow rate for each sump. This average daily flow rate must be calculated weekly during active life of facility and closure period, and monthly during post-closure care period. | | |
| D-6i Leakage Response Action Plan | 270.21(b)(1)(v); 264.304 | | | |
| D-6i(1) Response Actions | 270.21(b)(1)(v); 264.304(a) | | | |
| D-6i(2) Leak and/or Remedial Determinations | 270.21(b)(1)(v); 264.304(b),(c) | | | |
| D-6i(3) Notifications | 270.21(b)(1)(v); 264.304(b) | | | |
| D-6j Runon and Runoff Control Systems | | | | |
| D-6j(1) Runon Control System | 270.21(b)(2); 264.301(g) | Describe system that will be used to prevent runon onto active portions of landfills. | | |
| D-6j(1)(a) Design and Performance | 270.21(b)(2); 264.301(g) | Describe runon control system design and how that design prevents runon from reaching active portions of site. Provide plan view. | | |
| D-6j(1)(b) Calculation of Peak Flow | 270.21(b)(1); 264.301(g) | Identify peak surface water flow expected to result from 2-year design storm. Provide copies of calculations and data. | | |
| D-6j(2) Runoff Control System | 270.21(b)(3); | Describe runoff control system to be used | | |

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| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| | | 264.301(h) | to collect and control runoff from active portions. | | |
| D-6j(2)(a) | Design and Performance | 270.21(b)(3); 264.301(h) | Describe runoff collection and control system design. Indicate fate of collected runoff that is considered hazardous waste until tested and/or treated. | | |
| D-6j(2)(b) | Calculation of Peak Flow | 270.21(b)(3); 264.301(h) | Identify total runoff volume expected to result from at least a 24-hour, 25-year storm event. Provide copies of calculations and data. | | |
| D-6j(3) | Management of Collection and Holding Units | 270.21(b)(4); 264.301(i) | Describe how collection and holding facilities associated with runon and runoff control systems will be emptied or otherwise managed expeditiously after storms to maintain system design capacity. Describe fate of liquids discharged from these systems. | | |
| D-6j(4) | Construction | 270.21(b)(2),(3); 264.301(g),(h) | Provide detailed construction and material specifications for runon and runoff control systems. | | |
| D-6j(5) | Maintenance | 270.21(b)(2),(3); 264.301(g),(h) | Describe any maintenance activities required to assure continued proper operations of runon and runoff control systems throughout active life of unit. | | |
| D-6k | Control of Wind Dispersal | 270.21(b)(5); 264.301(j) | | | |
| D-6L | Liquids in Landfills | | | | |

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| Section and Requirement | | Federal Regulation | Review Consideration[a] | Location in Application[b] | See Attached Comment Number[c] |
|---|---|---|---|---|---|
| D-6L(1) | Bulk or Noncontainerized Free Liquids | 270.21(h); 264.314 | Describe procedures that will be used to ensure that no bulk or noncontainerized liquid hazardous waste or waste with free liquids will be placed in landfill. Demonstrate, by paint filter test, Method 9095, that no free liquids will be placed in landfill. | | |
| D-6L(2) | Containers Holding Free Liquids | 270.21(h); 264.314(d) | For facilities that intend to dispose of containers holding free liquids, describe how free liquids will be removed from containers or stabilized within container before container is placed in landfill. If liquid is removed, container must be backfilled or crushed. | | |
| D-6L(3) | Restriction to Small Containers | 270.21(h); 264.314(d)(2) | If small containers are to be disposed of in landfill, demonstrate by indicating container volume, that containers will be very small (such as ampules). | | |
| D-6L(4) | Nonstorage Containers | 270.21(h); 264.314(d)(3) | If nonstorage containers are to be disposed of in landfill, demonstrate by describing the containers designed to hold free liquids for use other than storage (e.g., batteries, capacitors). | | |
| D-6L(5) | Lab Packs | 270.21(h); 264.314(d)(4) | Describe how it will be assured that lab packs to be landfilled containing free liquids meet requirements for lab packs. | | |
| D-6L(5)(a) | Inside Containers | 270.21(h); 264.314(d)(4); 264.316(a) | | | |

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|---|---|---|---|---|---|
| D-6L(5)(b) | Overpack | 270.21(h); 264.314(d)(4); 264.316(b) | Demonstrate that overpacking consists of metal, Department of Transportation (DOT) containers, metal DOT containers, with open heads no larger than 110 gallons; and sufficient sorbent material determined to be non-biodegradable to completely sorb all liquid contents of inside container. | | |
| D-6L(5)(c) | Sorbent Material | 270.21(h); 264.314(d)(4),(e) 264.316 | Demonstrate that sorbent materials used are no capable of reacting dangerously with, being decomposed by, or being ignited by contents of inside containers. | | |
| D-6L(5)(d) | Incompatible Wastes | 270.21(h); 264.314(d)(4); 264.316(d) | Demonstrate that incompatible waste will not be placed in same outside containers. | | |
| D-6L(5)(e) | Reactive Wastes | 270.21(h); 264.314(d)(4); 264.316(d) | Demonstrate that incompatible waste will not be placed in same outside containers. | | |
| D-6m | Containerized Wastes | 270.21(i); 264.315 | | | |
| D-6n | Special Waste Management Plan for Landfills Containing Wastes F020, F021, F022, F023, F026, and F027 | 270.21(j); 264.317 | Provide plan for waste management in this special facility. Plan must address the following factors. | | |
| D-6n(1) | Waste Descriptions | 270.21(j)(1); 264.317(a)(1) | Identify volume, physical, and chemical characteristics of waste, including potential to migrate through soil or volatilize or escape into atmosphere. | | |
| D-6n(2) | Soil Description | 270.21(j)(2); | Describe attenuative properties of | | |

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|---|---|---|---|---|
| | 264.317(a)(2) | underlying and surrounding soils or other materials. | | |
| D-6n(3) Mobilizing Properties | 270.21(j)(2); 264.317(a)(2) | Describe mobilizing properties of other materials codisposed of with this waste. | | |

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.