CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2008-0188

WASTE DISCHARGE REQUIREMENTS FOR NORCAL WASTE SYSTEMS HAY ROAD LANDFILL, INCORPORATED HAY ROAD LANDFILL CLASS II & III LANDFILLS, CLASS II WASTE PILE, AND CLASS II LAND TREATMENT UNIT OPERATION, CLOSURE, POST-CLOSURE MAINTENANCE, AND CORRECTIVE ACTION SOLANO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Water Board) finds that:

1. Norcal Waste Systems Hay Road Landfill, Incorporated (hereafter Discharger), a subsidiary of Norcal Waste Systems, Incorporated, owns and operates the Hay Road Landfill facility, a Class II landfill facility about eight miles east of Vacaville on Hay Road (Section 2, T5N, R1E, MDB&M), as shown in Attachment A, which is incorporated herein and made part of this Order by reference. The landfill serves incorporated and unincorporated parts of Solano County and other jurisdictions throughout the state of California. The landfill has been in operation since 1964 serving the incorporated and unincorporated areas of Solano County.

2. The landfill is located on a 640-acre site, 256 acres of which encompasses the landfill footprint. The facility includes, from west to east, a borrow pit area and existing landfill modules in Landfill Unit 1 (LF-1), Landfill Unit 2 (LF-2), and Landfill Unit 3 (LF-3). The 640 acres correspond to Assessor's Parcel Numbers 42-020-02, 42-020-06, and 42-020-28. Immediately south of the expansion area is a habitat preservation area, which the Discharger is required to maintain under local permit, but is not part of the facility.

3. The Hay Road Landfill consists of two Class III landfills (LF-1 and LF-2), one Class II landfill (LF-3), a Class II waste pile (WP-9.1), a Class II land treatment unit (LTU), and a composting area. LF-1 consists of partially lined landfill module DM-1. LF-2 consists of lined landfill module DM-2.1. LF-3 will have a total of 15 disposal modules when completed. Currently, DM-2.2, DM-3.1, DM-4.1, DM-4.2, DM-5.1, DM-5.2, DM-11.1, and DM-11.2 are the only active modules in LF-3. Attachment B shows the facility layout and is incorporated herein and made part of this Order.

4. On 8 August 2008, the Discharger submitted an amended Report of Waste Discharge (RWD) as part of the Joint Technical Document (JTD) for the landfill. The information in the RWD/JTD has been used in writing these waste discharge requirements (WDRs). The RWD contains the applicable information required in Title 27, California Code of

Regulations (CCR), Chapter 4, Subchapter 3, Article 4. The RWD/JTD and supporting documents contain information related to this revision of the WDRs including:

a. Proposed recirculation of leachate and landfill gas condensate into composite lined modules DM-2.2, DM-4, DM-5, DM-11, and future landfill modules.

b. Information on management and disposal of treated wood waste in composite-lined LF-3.

c. Information about the increase in the final height of the landfill from 165 feet above mean sea level (MSL) to 215 feet above MSL.

d. An updated stability analysis for the landfill following closure.

e. Proposed changes to the monitoring and reporting program to reduce the sampling frequency for leachate, to reduce the water level measurement and sampling frequency in corrective action lysimeters and sumps, and to reduce the frequency of monitoring for major cations.

5. On 11 July 2003, the Regional Water Board issued previous WDRs Order No. R5-2003-0118, in which the units at the facility were classified as a Class II and Class III waste management units for the discharge of nonhazardous and designated wastes in accordance with the regulations in effect when the order was issued. This Order continues to classify the units as Class II and Class III waste management units that accept nonhazardous and designated wastes, including municipal solid waste (MSW), in accordance with Title 27, CCR Section 20005, et seq. (Title 27).

6. On 9 October 1991, the United States Environmental Protection Agency (USEPA) promulgated federal MSW regulations under the Resource Conservation and Recovery Act (RCRA), Subtitle D (Title 40, Code of Federal Regulations, Part 258), hereafter referred to as "Subtitle D". These regulations apply to all California Class II and Class III landfills which accept MSW.

SITE DESCRIPTION

7. The nearest fault is the Vaca fault about six miles west of the site, which is mapped as a Quaternary period fault with no evidence of Holocene activity. The nearest Holocene fault is the Central Valley Coast Range fault, about eight miles west of the site. The estimated maximum credible earthquake and ground acceleration for the site associated with this fault are 7.0 and 0.35g, respectively. No Holocene faults have been mapped in the site area.

8. Land within 1,000 feet of the facility is used for agricultural purposes.

9. The facility receives an average of 20 inches of precipitation per year based on an isohyetal map using data from the National Weather Service and other state and local records. The mean pan evaporation is 73 inches per year as measured at the Davis 2WSW Station, with monthly evaporation ranging from 1.3 inches in December to 12 inches in July.

10. The 1,000-year, 24-hour precipitation event is estimated to be 5.39 inches, based on historic rainfall data for the Davis 2WSW Station.

11. About one-half of the existing landfill area and 80 percent of the expansion area are within a 100-year flood plain based on the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (1988). Under federal Subtitle D regulations (40 CFR 258.11), as incorporated by SWRCB Resolution 93-62, the Discharger must demonstrate that any new or existing MSW landfill located in 100-year floodplain does not:

    a. Restrict the flow of a 100-year flood,
    b. Reduce the temporary water storage capacity of the floodplain, or
    c. Result in washout of solid waste so as to pose a hazard to human health and the environment.

    The owner or operator must place the demonstration in the operating record.

    The JTD indicates that:

    (1) the landfill is in the upper portion of the Ulatis Creek watershed, and is unlikely to impede flood waters. Further, realignment and excavation of the A-1 Channel in 1994 should further limit the actual extent of a 100-year flood.

    (2) the volume of the floodplain displaced by the landfill (approximately 1,350 acre-feet) is offset by the additional flood plain capacity created when the A-1 Channel was excavated and diverted around the site.

    (3) Most of the existing landfill and developed portions of the expansion area are equipped with a 40 foot MSL elevation exterior perimeter berm, except for the northern and western boundary of DM-1 which have an exterior perimeter berm of about 30 feet MSL. The elevation of the surrounding terrain ranges from about 2 to 30 feet MSL. The 100-year flood elevation is estimated to be 25 feet MSL. These WDRs contain a construction specification (D.9) requiring the Discharger to construct and maintain exterior perimeter berms around all landfill units as necessary to prevent inundation from a 100-year flood.

12. There are 11 domestic, industrial, or agricultural groundwater supply wells within a 1-mile radius of the site.

WASTE CLASSIFICATION AND UNIT CLASSIFICATION

13. The Discharger discharges nonhazardous and designated waste, including MSW to Class II and Class III waste management units at the facility. The Class III landfills accept construction and demolition debris (C&D) and friable and non-friable asbestos as designated in Finding No. 20. The Class II landfills accept household, commercial, and industrial (H/C/I) wastes; de-watered sewage sludge; industrial sludges; treated wood waste; dredge debris; slab/construction/demolition debris; commercial/industrial waste; glass cullet; asbestos containing waste; and other non-hazardous or designated wastes. Wastes requiring special handling ("special wastes", as defined in Title 27) are also discharged to the landfill. These classified wastes may be discharged only in accordance with Title 27, Resolution No. 93-62, and the Code of Federal Regulations, Title 40, Part 258 as required by this Order.

14. The landfill accepts contaminated soil (C-Soil), a designated waste, and discharges it as follows:

    a. To Class II landfill modules for disposal.
    b. To Class II modules as alternative daily cover (ADC).
    c. To Class II modules as foundation layer for final cover.
    d. To Class III modules equipped with a liner and leachate collection and removal system (LCRS) as foundation layer for final cover.

15. Lead-contaminated soil (LC-soil) previously accepted from the City of San Francisco Metro Muni project, re-classified as "nonhazardous" by the Department of Toxic Substances Control (pursuant to Section 66260.200(f), Title 22), is stockpiled on the side slope of module DM-2.1 beneath the DM-2.2 eastern side slope liner. Although DM-2.1 is a Class III unit and the LC-soil is a designated waste, the overlying liner minimizes the potential for mobilization of waste constituents. The Discharger plans to remove this soil for use as final cover foundation layer material for the Class II landfills upon depletion of the overlying C-Soil stockpile.

16. The Discharger accepts treated wood waste for disposal in modules DM-2.2 and DM-3 through DM-11. Treated wood waste is not allowed in modules DM-1 or DM-2.1. Title 22, CCR defines "Treated wood" to mean wood that has been treated with a chemical preservative for purposes of protecting the wood against attacks from insects, microorganisms, fungi, and other environmental conditions that can lead to decay of the wood and the chemical preservative is registered pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Sec. 136 and following). Section 67386.11 of Title 22 allows treated wood waste to be disposed in a composite-lined portion of a municipal solid waste landfill that is regulated by WDRs issued pursuant to the California Water Code provided that the landfill:

a. Comply with the prohibitions in Section 67386.3 of Title 22, which are:

   1. Treated wood waste shall not be burned, scavenged, commingled with other waste prior to disposal, stored in contact with the ground, recycled without treatment (except as in iii, below), treated except in compliance with Section 67386.10, or disposed to land except in compliance with Section 67386.11.

   2. Any label or mark that identifies the wood and treated wood waste shall not be removed, defaced, or destroyed.

   3. Treated wood waste may be recycled only by reuse when all of the following apply:

      A. Reuse is onsite.

      B. Reuse is consistent with FIFRA approved use of the preservative.

      C. Prior to reuse, treated wood waste is handled in compliance with Title 22, Division 4.5, Chapter 34.

b. Ensure treated wood waste is managed at the landfill according to Title 22, Division 4.5, Chapter 34 prior to disposal.

c. Monitor the landfill for a release and cease discharge of treated wood waste at that portion of the landfill until corrective action results in cessation of the release.

d. Handle treated wood waste in a manner consistent with the applicable sections of the California Occupational Safety and Health Act of 1973.

17. The landfill accepts asbestos containing waste (ACW), consistent with Section 25143.7 of the Health and Safety Code and Section 17897 of Title 14 CCR. Up to 2,500 tons per month of friable asbestos may be received at the landfill.

18. In addition to waste disposal operations, the Discharger accepts and stores de-watered sewage sludge in LF-3, DM-9.1, the first phase of DM-9. The sludge, primarily from the city of San Francisco, is stored in DM-9.1 during the wet season and removed from the module for drying at the beginning of the dry season. Although originally described (under Order No. 97-145) as a Class II landfill expansion module, WDRs Order No. 5-01-101 described and re-classified DM-9 as a separate waste unit (a Class II waste pile) in order to recognize the use of this unit for storage rather than disposal operations. The unit is hereafter referred to as WP-9.1. In the future, the waste pile must be clean-closed and re-built prior to use as a disposal module for landfill operations.

19. The Discharger conducts sludge drying operations in a 20-acre area between existing modules WP-9.1 and DM-5 (see Attachment B), and also within the Class II modules of

LF-3. The drying area was constructed, and is operated and monitored as a Land Treatment Unit per Title 27 CCR Sections 20250(b)(5), 20377 and 20380.

20. Waste discharge to the units and the unit classifications (described in Finding No. 3) are summarized as follows:

Unit	Modules	Unit Classification	Waste Classification	MSW ?	Waste Types
LF-1	DM-1	Class III	Inert, hazardous asbestos[1]	no (ceased 1992)	Concrete and asphalt demolition debris, tires, friable and non-friable asbestos containing waste[1]
LF-2	DM-2.1	Class III	Non-hazardous	yes	C&D
LF-3	DM- 2.2	Class II	Non-hazardous and designated	yes	Dried sludge, H/C/I[2], TWW[3], and special wastes[4]
LF-3	DM-4.1 & 4.2	Class II	Non-hazardous and designated	yes	Dried sludge, H/C/I[2], TWW[3], and special wastes[4]
LF-3	DM-5.1 & 5.2	Class II	Non-hazardous and designated	yes	Dried sludge, H/C/I[2], TWW[3], and special wastes[4]
LF-3	DM- 11.1 & 11.2	Class II	Non-hazardous and designated	yes	Dried sludge, H/C/I[2], TWW[3], and special wastes[4]
	WP-9.1	Class II	Non-hazardous and designated	no	De-watered sludge storage
	LTU	Class II	Non-hazardous	no	Sludge drying

1. Section 25143.7 of the California Health and Safety Code (HSC) permits the disposal of wastes containing greater than one percent (>1%) friable asbestos in any landfill which has WDRs that specifically permit the discharge, provided that the wastes are handled and disposed of in accordance with other applicable state and federal statutes and regulations.
2. Household, commercial, and industrial wastes.
3. Treated wood waste.
4. The special wastes include impacted soils, ash, dredge spoils, triple-rinsed pesticide containers, tires, large dead animals, and agricultural wastes.

21. The Discharger is proposing to use various non-hazardous and designated wastes accepted at the landfill as alternative daily cover (ADC) on landfill modules, including wood, green waste, compost materials, dried sludge, ash, cement kiln dust, dredge spoils, shredded tires, processed construction and demolition debris, and contaminated soil. These WDRs include a discharge specification requiring that, for each type of

waste, the Discharger first demonstrate that it does not pose a threat to water quality and meets the requirements for use as ADC under Title 27 CCR Section 20705.

22. The Discharger also accepts green waste, agricultural waste, and food waste as defined in Title 14 CCR for composting on a 22-acre all-weather pad east of DM-1 (see Attachment B). The finished green waste compost is used as a soil amendment for intermediate cover on module side-slopes to promote vegetative growth for erosion control or sold off-site to customers. Green waste and agricultural waste composting is conducted using windrows, and food waste composting is done in-vessel. These WDRs include requirements for the composting operation.

SURFACE WATER AND GROUNDWATER CONDITIONS

23. The *Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin, Fourth Edition* (hereafter Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin.

24. The site is in the Putah plain, which is drained by natural and man-made watercourses. The nearest surface water is the Alamo Creek A-1 Channel, an agricultural drainage canal which flows by the north and east sides of the site. The A-1 Channel drains to Ulatis Creek about three miles southeast of the site, then to Cache Slough and the Sacramento-San Joaquin Delta. Alamo Creek formerly ran through the site but in the 1960s was diverted northeast of the site to Ulatis Creek. There is also a pond in the southeast corner of the site, referred to as “the bird sanctuary”, which collects site storm water flows and groundwater pumped from the borrow pit. See Attachment B.

25. The site is in the Elmira Hydrologic Area of the Valley Putah-Cache Hydrologic Unit in the Sacramento Hydrologic Basin Planning Area (as depicted on the interagency hydrologic maps prepared by the Department of Water Resources in August 1986).

26. Storm water discharges from the site are regulated by the SWRCB *General Permit for Discharges of Storm Water Associated with Industrial Activities*. Storm water runoff from the western half of the site is collected in ditches along the perimeter of the units and through a series of retention ponds sized to accommodate a 1,000-year 24-hour storm event. Spill over from the easternmost pond flows into a drainage channel, which flows to the A-1 Channel in the southeast part of the site. Drainage from the eastern part of the site flows through an eastern perimeter drainage ditch to the A-1 Channel. Surface water monitoring of the bird sanctuary and adjacent A-1 Channel is performed as specified in Monitoring and Reporting Program (MRP) No. R5-2008-0188 (attached).

27. The designated beneficial uses of the Sacramento-San Joaquin Delta, as specified in the Basin Plan, are: municipal and domestic supply; agricultural supply; industrial service supply; industrial process supply; water contact and non-contact water recreation; warm freshwater habitat; cold fresh water habitat; migration of aquatic

organisms; spawning, reproduction, and/or early development; wildlife habitat; and navigation.

28. The depth to groundwater varies from about 2 to 23 feet below ground surface (bgs), averaging about 10 feet bgs or 10 feet above mean sea level (MSL).

29. The regional groundwater flow direction is from northwest to southeast, but is altered over much of the site by groundwater pumping from the borrow pit. As a result, the shallow groundwater gradient direction over the western half of the site, including DMs-1, 2.2, 2.1, and 11 is to the south or southwest toward the borrow pit, while the eastern half of the site conforms more to the regional gradient direction.

30. The designated beneficial uses of the underlying groundwater, as specified in the Basin Plan, are municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply.

GROUNDWATER MONITORING

31. The groundwater monitoring program distinguishes between wells on the western half of the site where the groundwater gradient direction is controlled by pumping from the borrow pit, and wells on the eastern half of the site where the natural gradient prevails. The detection monitoring program for groundwater underlying each unit are as described in MRP No. R5-2008-0188.

32. The Discharger monitors the western portion of the site, including modules DM-1, DM-2.2, DM-2.1, DM-11.1, and DM-11.2 using the method of “intrawell” comparisons where each well serves as its own background well. Refer to Attachment B.

33. The Discharger monitors the eastern portion of the site, including WP-9.1, the LTU, DM-4.1, and DM-5 using an interwell approach with background wells installed along the northern perimeter of the landfill and detection wells installed immediately downgradient of each landfill module. Refer to Attachment B.

34. Volatile organic compounds (VOCs) are often detected in a release from a landfill, and are the primary waste constituents detected in groundwater beneath an MSW landfill. Since VOCs are not naturally occurring and thus have no background value, they are not amenable to the statistical analysis procedures contained in Title 27 CCR for the determination of a release of wastes from a Unit.

35. Title 27 CCR Sections 20415(e)(8) and (9) provide for the non-statistical evaluation of monitoring data that will provide the best assurance of the earliest possible detection of a release from a Unit in accordance with Title 27 CCR Section 20415(b)(1)(B)2.-4. However, Title 27 CCR does not specify a specific method for non-statistical evaluation of monitoring data.

36. The Regional Water Board may specify a non-statistical data analysis method pursuant to Title 27 CCR Section 20080(a)(1). Section 13360(a)(1) of the California Water Code allows the Regional Water Board to specify requirements to protect underground or surface waters from leakage from a solid waste site, which includes a method to provide the best assurance of determining the earliest possible detection of a release.

37. In order to provide the best assurance of the earliest possible detection of a release of non-naturally occurring waste constituents from a Unit, this Order specifies a non-statistical method for the evaluation of monitoring data.

38. The specified non-statistical method for evaluation of monitoring data provides two criteria (or triggers) for making the determination that there has been a release of non-naturally occurring waste constituents from a Unit. The presence of two non-naturally occurring waste constituents above their respective method detection limit (MDL), or one non-naturally occurring waste constituent detected above its practical quantitation limit (PQL), indicates that a release of waste from a Unit has tentatively occurred. Following a tentative indication of a release, verification testing will be conducted to determine whether there has been a release from the Unit, or there is a source of the detected constituents other than the landfill, or the detection was a false detection. Although the detection of one non-naturally occurring waste constituent above its MDL is sufficient to provide for the earliest possible detection of a release, the detection of two non-naturally occurring waste constituents above the MDL as a trigger is appropriate due to the higher risk of false-positive analytical results and the corresponding increase in sampling and analytical expenses from the use of one non-naturally occurring waste constituent above its MDL as a trigger.

39. The Discharger submitted a *Sampling and Analysis Plan* (SAP) dated April 2002 for the site that included appropriate statistical and non-statistical methods for performing detection monitoring at each unit. The SAP was submitted in accordance with previous WDRs Order No. 5-01-101 and details the field and laboratory procedures to be followed for the collection and analysis of samples. The SAP was approved by Regional Water Board staff on 6 May 2002.

DISPOSAL MODULE RELEASES AND CORRECTIVE ACTION

Disposal Module 11

40. During October 1999 and April 2000, respectively, VOC-impacted liquid was detected in the two pan lysimeters which monitor the LCRS sumps at DM-11. Approximately 4,755 gallons of liquid was pumped from PL-11.1 as a result of the first release, and 16,850 gallons was pumped from PL-11.2 through early August 2000 as a result of the second release. Additional liquid was detected in PL-11.2 in late October 2000, but water levels in DM-11.1 pan lysimeters have remained at minimal levels since August 2000. Confirmation analysis of the liquid indicated the presence of VOCs as follows:

Constituent	Concentration (µg/l)	
VOCs	**PL-11.1**	**PL-11.2**
Acetone	---	314 – 585
2-Butanone	---	346 – 1,500
Chloroethane	1.3 – 4.2	---
1,1-Dichloroethane	2.6 – 6.8	---
Methylene chloride	16.1 – 60.1	4.6
1,1,1-Trichloroethane	1.2 – 2.6	---
Trichlorofluoromethane	3.6 – 8.2	---

41. In accordance with Title 27 CCR, the Discharger proposed an *Evaluation Monitoring Program* (EMP) which Regional Water Board staff approved and incorporated into previous MRP No. 5-01-101. The EMP included weekly monitoring of the DM-11 lysimeters for liquid, sampling of any liquid detected at least twice per quarter, a soil pore fluid investigation, soil gas sampling, and other activities.

42. During May 2001, the Discharger submitted an *Engineering Feasibility Study* (EFS) for DM-11.1 and DM-11.2 in accordance with Title 27 CCR Section 20420(k)(6), which includes the results of the EMP. The extent of impact was evaluated through an investigation, which included soil, soil gas, and groundwater sampling near and downgradient of the disposal modules. Based on the investigation, several potential sources for the water and VOCs were evaluated. The EFS concluded that the VOCs detected in the liquid was likely due to the surface water coming into contact with VOCs on the active landfill ground surface before entering the gravel capillary break layer and possibly landfill gas (LFG). The corrective action measures implemented included covering the capillary break gravel layer during the rainy season and preventing surface water runoff from entering the gravel layer using improved surface runoff controls.

43. During March 2003, the Discharger submitted LFG monitoring and corrective action alternatives for DM-11. To better define the occurrence and potential for gas migration, the Discharger proposed to install and monitor seven new LFG probes (GP-2 through GP-8) and monitor one existing probe (GP-1). The probes were installed, and the Discharger conducted monitoring of the probes and the pan lysimeters for each lined landfill module.

44. The Discharger submitted proposed modifications to the perimeter LFG monitoring system in the 8 August 2008 JTD (Appendix N). To monitor for occurrence of LFG migration, the Discharger currently monitors mine LFG probes (GP-1, GP-2, GP-4 through GP-7, GP-9, GP-10, and GP-11. Probes GP-2, GP-4, and GP-5 are proposed to be replaced with new probes on the permitted site boundary. The Discharger conducts monitoring on these probes and pan lysimeters for each lined module.

45. The Discharger submitted a corrective action plan for DM-11.1 and DM-11.2 in May 2005 that was approved during August 2005. The plan consisted of installing additional

probes along the perimeter to provide more data for the design of an in-fill landfill gas control system. A landfill gas collection and control system has been installed in DM-2.1, DM-2.2, DM-4, DM-5, and DM-11. The full system will consist of nine new landfill gas wells, the existing landfill gas wells, and nine leachate sump risers. Startup of the full system is expected during the fall of 2008 following the completion of permitting with the local air district.

Disposal Module 2

46. The Discharger reported the detection of liquid in one of the lysimeters for DM-2.2 during July 1999, June 2002, and April 2004. Low levels of VOCs were detected in samples of the liquid. The VOC concentrations in the April 2004 sample were much lower than previous samples, and the inorganic parameters were much lower than in the leachate. The Discharger concluded that the source of the liquid in the lysimeter was likely not leachate. In May 2005, the Discharger submitted a plan to install two new groundwater monitoring wells in an interval in between the shallow zone wells and the deeper zone wells to target a sand/silty sand layer in order to provide the earliest detection of a release to shallow groundwater near DM-2.2. The plan was approved in August 2005, and the wells were installed in November 2005. An additional well, G-27 was installed in the uppermost portion of the saturated zone to the north of DM-2.2. Additionally, the Discharger samples and removes any water detected in the pan lysimeter. Module DM-2.2 is also connected to the landfill gas collection and control system.

Disposal Module 5

47. The Discharger reported the detection of liquid in one of the lysimeters for DM-5.1 during January 2005. Low levels of VOCs were detected in samples of the liquid; however, inorganic parameters were much lower than in the leachate. The Discharger concluded that the source of the liquid in the lysimeter was likely not leachate. The Discharger samples and removes any water detected in the pan lysimeter. Module DM-5.1 is also connected to the landfill gas collection and control system.

Waste Pile 9.1

48. During monitoring in July 2000, liquid was detected in pan lysimeters PL-9.1A and PL-9.1B located beneath WP-9.1. Grab water samples were obtained from both pan lysimeters and elevated concentrations of nitrate/nitrite as nitrogen were detected (395 milligrams per liter (mg/L) in PL-9.1A and 153 mg/L in PL-9.1B). Liquid from each pan lysimeter was sampled during fourth quarter 2000, first quarter 2001, and second quarter 2001. Analytical results from these samples confirmed the presence of high concentrations of nitrate/nitrite as nitrogen.

49. The Discharger submitted an *Amendment to Report of Waste Discharge and Establishment of Evaluation Monitoring Program for Pan Lysimeters PL-9.1A and PL-*

9.1B (EMP), dated 7 June 2001. The EMP concluded that a leak in the liner of WP-9.1 may have allowed leachate to enter the capillary break layer and/or the pan lysimeters. Approximately 3,200 gallons of liquid was removed from PL-9.1A and 3,700 gallons from PL-9.1B. The EMP includes the installation of two new downgradient groundwater monitoring wells, G-19 (southern side) and G-21 (eastern side) and daily monitoring of liquid levels in both pan lysimeters. Additional investigation was proposed which included a review of the landfill module design, construction, and operations and maintenance records as well as conducting an electrical leak location survey to locate liner leaks.

50. The Discharger submitted an EFS during November 2001 describing the results of the June 2001 EMP to define the nature of the release. Evaluation monitoring confirmed degradation in new monitoring well G-21 with concentrations of nitrate/nitrite as nitrogen of 30 mg/L and 22 mg/L in June and July 2001, respectively. A leak was detected using electrical leak location survey on the eastern half of WP-9.1. The hole measured approximately 4 inches by 6 inches and was repaired. Corrective action measures included repair of the liner leak and covering the exposed edges of the landfill module liner system with plastic sheeting to reduce the possibility of surface water from entering the capillary break layer.

51. The Discharger performed work in April 2002 to further investigate the nature and extent of the release to the unsaturated zone and groundwater, and was reported in the EFS during May 2002. Soil samples were obtained below the landfill capillary break layer and in the soils surrounding WP-9.1 to investigate an overflow of leachate out of the module which likely occurred when leachate levels in the sumps exceeded the elevation of the WP-9.1 liner along the northeast and northwest perimeters. Soil analytical results indicated that leachate impacted the soil at and adjacent to an area of erosion observed near the northeast corner of WP-9.1. In response, the Discharger installed new pumps, larger leachate storage tanks, additional LCRS pipes in the operation layer, and improved off-site leachate disposal capabilities. Grab groundwater samples were also obtained downgradient of well G-21, and adjacent to the northeast corner of WP-9.1. The grab groundwater analytical results indicated that the nitrate/nitrite as nitrogen concentrations in downgradient groundwater are lower than in well G-21, but are above background concentrations. Additional investigation was recommended.

52. During November 2002 and January 2003, the Discharger submitted a revised EFS and addendum, respectively, which presented the results of additional soil and groundwater sampling to complete the definition of the extent of soil and groundwater impacts in the area of WP-9.1. Soil samples were obtained below the landfill capillary break layer and in the soils surrounding the unit. Soil analytical results indicated that leachate had impacted the soil at and adjacent to an area of erosion observed near the northeast corner and in soils at the northwest corner of the unit. Interim corrective action was taken in October 2002, resulting in the excavation of approximately 1,500 cubic yards of leachate-impacted soil and lining the module containment berms to seal off the LCRS layer, which should prevent future overflow of leachate from the module. Grab

groundwater samples were also obtained downgradient of well G-21 and adjacent to the northeast corner of the unit. The grab groundwater analytical results indicated that the area of nitrate impact to groundwater is limited to the area immediately surrounding and approximately 150 feet downgradient of G-21.

53. Additional corrective action measures for WP-9.1 included installing a new groundwater extraction well (G-22), and installing two monitoring wells (GP-23 and GP-24) to monitoring the effectiveness of the groundwater extraction. Monitoring wells G-21, G-23, G-24, and extraction well G-22 are sampled quarterly and analyzed for depth to water, turbidity, pH, specific conductance, and nitrate/nitrite as nitrogen as part of corrective action monitoring program. G-21 is also monitored semi-annually for the routine detection monitoring parameters. The nitrate concentrations in wells G-21 and G-22 have decreased significantly since groundwater extraction was implemented (G21: 26 mg/L decreasing to 11 mg/L and G-22: 37 mg/L decreasing to 3.2 mg/L). During 2007, approximately 312,000 gallons of impacted groundwater were pumped from G-22 and stored for dust control on lined modules. The average flow rate is approximately 0.6 gallons per minute, which is close to the design extraction rate.

LINER PERFORMANCE DEMONSTRATION

54. On 15 September 2000 the Regional Water Board adopted Resolution No. 5-00-213 "Request For The State Water Resources Control Board To Review The Adequacy Of The Prescriptive Design Requirements For Landfill Waste Containment Systems To Meet The Performance Standards Of Title 27." The State Board responded, in part, that "a single composite liner system continues to be an adequate minimum standard" however, the Board "should require a more stringent design in a case where it determines that the minimum design will not provide adequate protection to a given body of groundwater."

55. In a letter dated 17 April 2001, the Executive Officer notified Owners and Operators of Solid Waste Landfills that "the Board will require a demonstration that any proposed landfill liner system to be constructed after 1 January 2002 will comply with Title 27 CCR performance standards. A thorough evaluation of site-specific factors and cost/benefit analysis of single, double and triple composite liners will likely be necessary."

56. The Discharger submitted a *Liner Performance Demonstration Report for DM-4.1 and Future Class II Liner Systems* dated 15 April 2003. The Disposal Module 4.1 (DM-4.1) base liner for Hay Road Landfill is proposed as follows (from top to bottom):

- 12-inch thick operations layer;
- 8-oz. Geotextile filter layer;
- LCRS gravel layer at least 6 inches thick;
- 60-mil HDPE geomembrane;
- 2-foot thick compacted clay liner with a permeability of $1x10^{-7}$ cm/s or less;

- 6-inch thick foundation soil layer;
- Leak detection geocomposite;
- 60-mil high density polyethylene (HDPE) geomembrane liner; and
- Compacted subgrade comprised of fined-grained soils.

The side-slope liner system is proposed as follows (from top to bottom):

- 1.5-foot minimum operations layer;
- LCRS geocomposite;
- 60-mil HDPE geomembrane;
- A geosynthetic clay liner (GCL) with 30-mil geomembrane; and
- Compacted subgrade comprised of fined-grained soils.

The Discharger will provide comprehensive construction quality control during the liner system construction, complete an electrical leak location survey to verify the integrity of the primary liner system, and install LFG collection pipes within the LCRS to control LFG in the future, if necessary.

57. The demonstration compared efficiencies and leakage potential of six different liner system designs. A total leakage potential of 1.04 gallons was calculated throughout the life of the landfill (operations and 30-year post-closure period) for the 14-acre (DM-4.1) cell. In addition, a cost-benefit analysis was performed which showed that additional liner components would cost significantly more without significantly less leakage potential. As such, the demonstration concluded that a more stringent liner system is not warranted since the proposed system will meet the performance requirements of Title 27 CCR because it exemplifies the prescriptive standard with an additional leak detection component.

CONSTRUCTION AND ENGINEERED ALTERNATIVE

58. On 17 June 1993, the State Water Resources Control Board adopted Resolution No. 93-62 implementing a State Policy for the construction, monitoring, and operation of municipal solid waste landfills that is consistent with the federal municipal solid waste regulations promulgated under Title 40, Code of Federal Regulations, Part 258 (Subtitle D).

59. Resolution No. 93-62 requires the construction of a specified composite liner system at new MSW landfills, or expansion areas of existing MSW landfills, that receive wastes after 9 October 1993.

60. Resolution No. 93-62 also allows the Regional Water Board to consider the approval of engineered alternatives to the prescriptive standard. Section III.A.b. of Resolution No. 93-62 requires that the engineered alternative liner systems be of a composite design similar to the prescriptive standard.

61. Title 27 CCR Section 20080(b) allows the Regional Water Board to consider the approval of an engineered alternative to the prescriptive standard. In order to approve an engineered alternative in accordance with Title 27 CCR 20080(c)(1) and (2), the Discharger must demonstrate that the prescriptive design is unreasonably and unnecessarily burdensome and will cost substantially more than an alternative which will meet the criteria contained in §20080(b), or would be impractical and would not promote attainment of applicable performance standards. The Discharger must also demonstrate that the proposed engineered alternative liner system(s) is consistent with the performance goal addressed by the particular prescriptive standard, and provides protection against water quality impairment equivalent to the prescriptive standard in accordance with Title 27 CCR Section 20080(b)(2).

62. Section 13360(a)(1) of the California Water Code allows the Regional Water Board to specify the design, type of construction, and/or particular manner in which compliance must be met in waste discharge requirements or orders for the discharge of waste at solid waste disposal facilities.

63. The Discharger proposes a liner system which will be designed, constructed, and operated in accordance with the criteria set forth in Title 27, and the provisions in State Water Resources Control Board Resolution No. 93-62 for municipal solid wastes.

64. Title 27 CCR Section 20240 (c) requires that new landfills, waste piles and surface impoundments be "sited, designed, constructed and operated", to ensure or maintain at least five feet of separation between the contained wastes and the highest anticipated level of the groundwater table. Existing WMUs are to be "operated" to maintain the required separation.

Landfill 1 – DM-1

65. DM-1 is an “existing unit” under Title 27 CCR. Because the natural water table would be less than five feet below the base of the unit during the wet season, the Discharger must de-water the module. De-watering of units to meet prescriptive separation and to maintain operability of the borrow pit is accomplished by extracting groundwater from the borrow pit during the dry season under General Order R5-2008-0081/NPDES Permit CAG995001. The pumping creates a cone of depression in the water table extending radially to the eastern edge of DM-11.

66. The eastern two-thirds of LF-1 are unlined and does not have an LCRS. The western third of the landfill is clay lined and has a 6-inch-thick gravel drainage layer for an LCRS. The module is covered by a 12-inch thick low permeability interim soil cover to prevent infiltration from rainfall.

67. The asbestos fill area within the western third of LF-1 has a de-watering trench, a leachate collection trench, and a composite base liner consisting of the following, from top to bottom:

    - A one-foot thick gravel drainage blanket
    - A 60-mil HDPE liner
    - One-foot of compacted clay ($k < 1x10^{-6}$ cm/sec)

    Leachate from the LCRS on the western portion of LF-1 drains into a sump (S-1) along its western perimeter.

68. In an attempt to create an inward gradient to de-water modules and prevent waste constituent migration into groundwater, the Discharger constructed a slurry wall around the original landfill area (the western half of the site) in 1985. Groundwater pumping was then initiated from the de-watering trench along the western portion of LF-1, but subsequent monitoring showed that the impact of the slurry wall on the gradient was negligible. Initiation of borrow pit pumping operations in 1996 eliminated any further need for pumping from the extraction trench.

Landfill 2 – DM-2.1

69. Order No. 89-178 approved of an engineered alternative design for separation (EAD/S) for LF-2 (DM-2.1), which reduced the minimum required separation to three feet at the LCRS sumps. The module was constructed to these specifications in 1992. The design includes a base liner and LCRS, constructed in the configuration of an inverse pyramid. The synthetic liner over the inner third of the inverse pyramid (constructed prior to the applicability of Resolution 93-62), is compositely underlain by only one foot of compacted clay ($k < 1 \times 10^{-6}$ cm/sec), while the outer two thirds of the module's base is compositely lined in accordance with Resolution 93-62, as follows from top to bottom:

    - One foot of gravel (LCRS)
    - 60-mil HDPE (bottom side textured)
    - Two feet of compacted clay soil ($k < 1x10^{-7}$ cm/sec)
    - Prepared subgrade

    The landfill floor has a 2 percent slope and leachate is extracted from a centrally located sump at the base of the pyramid, where it is pumped through a pipeline above the liner to a collection tank at the southern edge of the module. The unit is a Class III landfill under Title 27 CCR.

Landfill 3 – Existing and Expansion Modules

WMU Siting – Engineered Alternative Design for Separation

70. In previous WDRs Order No. 95-202, the Regional Water Board approved of the designs for DM-2.2 and the expansion modules, including EADs for separation (EAD/S) and liner design (EAD/L). The EAD/S allowed for a minimum separation of two and one half feet from the bottom of the LCRS (including LCRS sump) to the groundwater table (including capillary fringe). The EAD/S included a one-foot gravel layer under each new module base liner to serve as a capillary break and underdrain. Approximately 8% of the area of each LF-3 module on the western half of the site has less than five feet of separation, and the sump areas, comprising approximately 0.6% of the unfilled landfill areas, will have 2.5 feet of separation between wastes and groundwater.

71. In previous WDRs Order No. 97-145, the Regional Water Board approved of the Discharger's proposal to reduce the thickness of the gravel in the capillary break to one-half foot for the remaining expansion modules. The perimeter levee side-slopes of the expansion modules will have an EAD/S consisting of a geocomposite (geotextile filter/geonet/ geotextile filter) capillary break. The Discharger demonstrated that this modified EAD/S was consistent with the performance goal addressed by the prescriptive standard and affords equivalent or better protection against water quality impairment.

72. In the 15 April 2003 *Liner Performance Demonstration*, the Discharger proposed to replace the capillary break layer with a leak detection layer lined with 60-mil HDPE membrane for DM-4.1 and all remaining expansion modules. The 60-mil HDPE would act as a capillary barrier, thereby affording equivalent or better protection against water quality impairment.

LCRS and Base Liner (EAD/L)

73. In previous WDRs Order No. 95-269, the Regional Water Board approved the use of a GCL instead of the prescriptive two feet of compacted clay liner (CCL) as the EAD/L. The Discharger demonstrated that the use of GCL with 12 inches of CCL ($k < 1 \times 10^{-7}$ cm/sec) provided liquid containment capacity in excess of *five* feet of 1×10^{-7} cm/sec CCL when the 30-mil HDPE geomembrane backing to the GCL is considered. The design for the LCRS and base liner of the expansion modules was as follows, from top to bottom:

- One foot operations layer
- Geotextile filter
- One foot of gravel (LCRS)
- 60-mil HDPE geomembrane (bottom side textured)
- A GCL underlain by 30-mil HDPE geomembrane backing
- One foot of compacted clay ($k < 1 \times 10^{-7}$ cm/sec)

- Six inches of engineered foundation soil
- One foot of capillary break gravel
- Prepared subgrade consisting of six inches of re-compacted native soils

The base liner design included a 2 percent cross slope to central leachate collection pipes sloped at one percent draining to perimeter sumps.

74. In previous WDRs Order No. 97-145, the Regional Water Board approved of the Discharger's proposal to reduce the thickness of the gravel in the LCRS to 6 inches for the remaining expansion modules.

75. DMs 5, 9, and 11 were constructed in accordance with the modified EAD/S and EAD/L, as described in Findings Nos. 71 and 74.

76. The Discharger submitted a *Liner Performance Demonstration Report for DM-4.1 and Future Class II Liner Systems* dated 15 April 2003 (see Finding 56). The new proposed base liner system for Disposal Module 4 (DM-4.1) and remaining expansion modules is as follows (from top to bottom):

- One foot operations layer;
- 8-oz. geotextile filter layer;
- LCRS gravel layer at least 6 inches thick;
- 60-mil HDPE geomembrane;
- 2.5-foot thick CCL with a permeability of 1×10^{-7} cm/s or less;
- Leak detection geocomposite;
- 60-mil HDPE geomembrane liner; and
- Compacted subgrade comprised of fined-grained soils

In addition, the Discharger will provide comprehensive construction quality control during the liner system construction, complete an electrical leak location survey to verify the integrity of the primary liner system, and install LFG collection pipes within the LCRS to use to control LFG in the future. The Discharger demonstrated that this modified EAD/L was consistent with the performance goal addressed by the prescriptive standard and affords equivalent or better protection against water quality impairment as noted in Finding 57.

LCRS and Side Slopes (EAD/L)

77. In previous WDRs Order No. 97-145, the Regional Water Board approved of the Discharger's proposal for the following side slope designs for the expansion modules:

a. Those modules which will overlie unlined Class III landfill module (DM-1), the following LCRS and EAD/L, from top to bottom:

- Geocomposite (geotextile filter/drainage geonet) - LCRS
- 60-mil HDPE geomembrane (bottom side textured)
- A GCL backed with a 30-mil HDPE geomembrane
- One and one-half feet of compacted soil ($k < 1 \times 10^{-7}$ cm/sec)
- Prepared subgrade consisting of six inches of re-compacted native soils

b. Those new Class II modules which will overlie portions of LF-2 that already have a Subtitle D liner (i.e., DMs-2.2 and 11):

- 60-mil HDPE geomembrane (bottom side textured)
- Prepared subgrade consisting of six inches of re-compacted native soils

c. The side-slopes of modules along the perimeter levee, the following LCRS and EAD/L, from top to bottom:

- Geocomposite (geotextile filter/drainage geonet) - LCRS/cushion
- 60-mil HDPE geomembrane (bottom side textured)
- A GCL underlain by a 30-mil HDPE geomembrane
- Geocomposite (geotextile filter/drainage geonet) - capillary break

78. The 15 April 2003 *Liner Performance Demonstration* changed the side slope liner design to be consistent with the base liner design. As such all remaining expansion modules will be constructed without a capillary break geocomposite since the GCL underlain by a 30-mil HDPE geomembrane will operate as a capillary barrier and groundwater separation is greater than 5 feet from the side slope liner.

Waste Pile – WP-9.1

79. WP-9.1, the first phase of LF-3, are operated as a Class II waste pile for the storage of de-watered sewage sludge during the wet season. WP-9.1 covers seven acres of the 22-acre area ultimately planned for DM-9 (see Attachment B). The module has the same engineered alternative containment system design as that for DM-11, as follows from top to bottom:

- One-foot operations layer soil
- Geotextile filter
- One-half foot of gravel (LCRS)
- 60-mil HDPE geomembrane (bottom side textured)
- A GCL with a 30-mil HDPE geomembrane backing
- One foot of compacted clay ($k < 1 \times 10^{-7}$ cm/sec)
- Prepared foundation layer consisting of six inches of re-compacted native soils
- One-half foot capillary break gravel

80. The northern side slope of the module has the perimeter levee containment system outlined in Finding No. 77. The remaining three sides of the waste pile are bounded by an engineered soil berm consisting of contaminated soil capped with one-foot of borrow clay. The berms are constructed over the existing operations layer soil and LCRS, and have 2:1 (horizontal-to-vertical) interior and exterior side slopes. The berm heights range from nine to 12 feet above the operations soil elevation. The capacity of the waste pile is estimated to be 54,000 cubic yards of wet sludge, with three feet of freeboard from the top of the sludge to the top of the perimeter berms. Calculations in the JTD indicate that the berms will be stable under both static and dynamic loading conditions. The failure surface was the interface between the underlying LCRS and geosynthetic liner.

81. The LCRS drains at a two percent slope to two perimeter sumps on the north side of the module. Calculations contained in the JTD indicate that the maximum head on the LCRS should not be greater than 0.5 inches, based on the design 1,000-year 24-hour storm event for a Class II unit. The soil berm is constructed over the operations layer soil and LCRS, and is therefore intended to contain the sludge rather than leachate, which is collected and pumped from the LCRS sumps.

82. All contact storm water collected within the waste pile berms must be treated as leachate per Title 27 CCR Section 20365(b). All storm water diverted by the berms is directed to a perimeter storm water ditch along the northern side of the module, sized for a 1,000-year 24-hour storm.

83. An access road and tipping pad has been constructed on the southern side of WP-9.1 for offloading de-watered sewage sludge.

Land Treatment Unit

84. The LTU area comprises 20-acres between DM-9 and DM-5 in the northeast corner of the site. During summer 2000, the Discharger conducted a test plot within the proposed LTU area to demonstrate the feasibility of the LTU per Title 27 CCR Section 20250(b)(5). The test plot results provided a reasonable indication that all sludge COCs were either degraded, transformed, or immobilized within the upper five feet of soil. No sludge COCs were detected in samples collected below the treatment zone.

85. The LTU is approximately 20 acres in area as shown on Attachment B with a maximum depth of five feet. The LTU is used only during the dry season and only for drying de-watered sewage sludge.

86. The LTU is monitored as described in the attached monitoring and reporting program.

87. A soil pad was constructed within the LTU to facilitate placement and removal of sludge. The pad is graded for perimeter collection and drainage in the event of a design storm. All contact storm water is treated as leachate (i.e., collected in a sump in a corner of the

unit and pumped to a leachate holding tank). A soil berm has been constructed around the LTU area for storm water diversion. Diverted storm water is directed to the perimeter ditch along the northern site boundary.

Composting Area

88. A 54-acre composting facility is located at the landfill in an area where future landfill modules will be constructed. The composting facility includes 22-acres of all-weather surface constructed of concrete, foamed asphalt, or similarly impervious materials to provide a working surface for active composting. An additional 32-acres is used to store finished compost product. Green waste is composted using windrows and food waste composting is conducted in-vessel. The 22-acre active composting area drains to a sump, from which the leachate is pumped to a lined low-flow pond for collection and recirculation of leachate to the windrow composting area. Leachate from the in-vessel composting is collected and returned within the system. During significant precipitation events, the runoff from the active composting area is directed to a lined high-flow pond so that it does not mix with the leachate in the low-flow pond. The low-flow pond is lined with a 60-mil HDPE geomembrane, and the high-flow pond is lined with an 80-mil HDPE geomembrane. The high-flow pond has capacity for the average annual rainfall (20 inches), plus a 100-year, 24-hour storm (4.82 inches). Any pond overflow flows through bioswales and a sedimentation basin prior to off-site discharge under the general industrial storm water permit.

FACILITIES OPERATION

Landfill

89. Refuse is discharged to the landfill using the area fill method. The active face is approximately 150 feet wide and the refuse fill slopes are about 3:1 horizontal-to-vertical.

90. Daily cover and/or ADC is placed on the active face in accordance with the requirements of Title 27 CCR Sections 20680 and 20690. Wastes proposed for ADC include dry sewage sludge, contaminated soils, dredge spoils, foundry sands, compost overs, ground wood, C&D, shredded tires, moisture-conditioned ash and/or cement kiln dust, and mixtures of these wastes. Geosynthetic fabric, blankets, and foam products may also be used as ADC. All ADC materials are stockpiled within the module where they will be used.

91. The design flow rate for each Class II module is approximately 18,000 gallons/acre/day. Leachate is also recirculated into Class II modules. During dry season, leachate is used for dust control on lined modules.

Waste Pile

92. During the wet season, incoming de-watered sewage sludge is directed to the tipping pad at WP-9.1. The sludge is then discharged within Class II waste pile area for storage until the dry season.

Land Treatment Unit

93. Sewage sludge is removed from WP-9.1 at the beginning of each dry season and discharged to the LTU for drying. Any incoming sludge will also be directed to the LTU during the dry season. The sludge is spread in six to 18-inch lifts on a given portion of the LTU area and periodically disked to promote drying. The drying time for a lift is estimated to be about eight days. Once dried, the sludge is removed as needed for ADC, composting, cover amendment, or manufacturing soil.

94. It is estimated that there is about a 3.7 million cubic yard deficit in the amount of soil needed for future module construction activities and operations, and the available onsite supply from the borrow pit (estimated to be about 5.8 million cubic yards). The Discharger plans to make up the difference through the importation of soil and ADC, and from soil manufacturing operations.

95. The soil manufacturing operations are conducted during the dry season within the LTU area. The manufactured soil will consist of a mixture of dried sludge (60%), compost overs (20%) and onsite soil (20%), or only dried sludge (70%) and soil (30%). Once mixed, the soil is stockpiled next to the module where it is needed for construction operations. For modules not scheduled for construction that year, the stockpiles are winterized prior to the wet season by grading and capping them (with a one-foot layer of clay) for drainage and erosion control.

Borrow Pit

96. The lower portion of the borrow pit has been excavated below the water table and must be de-watered in the wet season to allow further soil removal. Groundwater pumped from the borrow pit is used in various site operations, including irrigation, dust control, and composting. Groundwater pumped from the borrow pit is also discharged into a perimeter storm water ditch which flows to the bird sanctuary. Any groundwater stored in the bird sanctuary cannot be discharged to the A-1 Channel without an NPDES permit.

LEACHATE AND CONDENSATE MANAGEMENT

97. As part of the amended RWD/JTD submitted on 8 April 2008, the Discharger requested to be allowed to return leachate and landfill gas condensate to the units which they came from to reduce leachate and condensate management costs. The units the Discharger has requested these returns are DM-4, DM-5, DM-11, and future modules.

Title 27 CCR 20340(g) requires that leachate be returned to the unit from which it was came or be discharged in a manner approved by the Regional Water Board. This section also references State Water Board Resolution No. 93-62 regarding liquids restrictions in 40CFR 258.28 for MSW landfills. 40CFR 258.28 states that liquid waste may not be placed in MSW landfill units unless the waste is leachate or gas condensate derived from the landfill unit and it is designed with a composite liner and leachate collection system. Therefore, leachate and landfill gas condensate from composite lined units at the landfill may be returned to unit from which they came. This Order includes requirements for returning leachate and landfill gas condensate back to the units such that it is not exposed to surface water runoff, will not cause instability of the landfill, and will not seep from the edges of the units.

CLOSURE AND POST-CLOSURE MAINTENANCE

Landfills

98. During April 2007, the Discharger submitted an updated *Preliminary Closure and Post-Closure Maintenance Plan* (PCPMP) for the facility. Under the plan, all three landfills will be closed contiguously as a single closed facility. Final cover will be installed as portions of the landfills reach final refuse grade. The crest elevation for the closed facility, including final cover, will be about 215 feet MSL compared to the base elevation of about 30 feet MSL. The final cover side slopes will have a maximum slope of 4:1 (horizontal-to-vertical), with 25-foot wide benches for every 50 vertical feet. The crest will have a minimum slope of five percent to ensure adequate drainage and control erosion.

99. The prescriptive standard under Title 27 CCR for final cover for landfill closure is as follows:

- One foot vegetative cover soil (erosion-resistant/vegetative cover layer)
- 60-mil HDPE geomembrane
- One foot of compacted soil ($k \leq 1 \times 10^{-6}$ cm/sec) (low hydraulic conductivity layer)
- Two feet of compacted soil (foundation layer)

Title 27 CCR and Resolution 93-62 further require that the permeability of the low conductivity/infiltration layer be no greater than that of the base liner (T27, Section 21090(a)(2), Subtitle D, Section 258.60(a)(1)) in order to prevent a “bathtub effect”.

100. The Discharger proposes an engineered alternative cover design as follows:

For the top deck areas of the landfill consisting of (from top to bottom):

- A one-foot thick vegetative soil layer;
- A protective 10-oz/y geotextile cushion layer;

- A 60-mil HDPE geomembrane
- A low-permeability GCL; and
- A one-foot thick compacted soil foundation layer.

The side slope design includes (from top to bottom):

- A one-foot thick vegetative soil layer;
- A geocomposite drainage layer;
- A 60-mil HDPE geomembrane (textured on both sides); and
- A one-foot thick compacted soil foundation layer.

The Discharger made the demonstration that the EAD will provide equal or better performance than the prescriptive standard and the previously proposed EAD described in the 1993 RDSI and previous WDRs Order Nos. 5-01-101. The Discharger showed that the geosynthetic materials proposed can tolerate substantially higher strains up to 10 to 20 percent or greater before yielding and can tolerate strains 10 times larger than its soil components. As such, a two-foot thick foundation is not necessary for geosynthetic materials and that a one-foot thick foundation layer is adequate to provide a clean, firm surface for its installation. In addition, the Discharger provided a hydraulic equivalency evaluation for the system using GCL that showed significantly improved infiltration performance over the 1993 EAD cover system, and provided equal or improved performance to the prescriptive cover system. The EAD was described and approved in previous WDRs Order No. R5-2003-0118.

101. The final cover grades reach a maximum elevation of 215 feet above MSL and maintain a maximum side-slope inclination of 4H:1V (horizontal to vertical). To facilitate drainage and minimize erosion, 25-foot wide benches are incorporated into the side-slopes at least every 50 vertical feet. The top surface will be graded at 5 percent to accommodate post-closure settlements and maintain positive drainage.

Waste Pile & LTU

102. When no longer needed for sludge storage operations, or when a new location for sludge storage is needed, WP-9.1 will be **clean closed** in accordance with Title 27 CCR Section 21410. Leachate releases from the waste pile have been confirmed in the underlying pan lysimeters which indicates that contamination may exist under the unit. New containment facilities can then be constructed for Class II landfill disposal operations as part of DM-9. The Discharger may at that time propose a new waste pile at another location in order to continue sludge storage operations.

103. The LTU will be clean-closed at the end of its operating life in accordance with Title 27 CCR Section 21420.

104. The revised PCPMP dated 7 June 2002 included plans for closure and post-closure maintenance of the waste pile and LTU. WP-9.1 and the LTU will be closed as part of the planned expansion of the Class II Landfill and is reflected in the approved cost estimates.

LANDFILL STABILITY ANALYSIS

105. The April 2007 PCPMP includes an updated slope stability analysis for the increased final height of the landfill. The Discharger performed both static and dynamic (seismic) analyses and analyzed the three primary failure modes including foundation stability, refuse slope stability, and cover veneer stability. Title 27 CCR and Subtitle D require that the factor of safety (FOS) against slope failure be 1.5 or greater. The design earthquake for the seismic analyses is a magnitude 7.0 produced by the Central Valley Coast Range fault resulting in a peak bedrock acceleration of 0.35g at the site.

106. The Discharger's foundation stability analysis indicates a static FOS of 2.1, and the dynamic analysis indicates permanent displacements of approximately 0.1 inches. The static FOS meets the requirements of Title 27 and Subtitle D, and the dynamic displacements are less than the maximum allowable displacement of 12 inches commonly accepted for Class II and Class III landfills.

107. The Discharger's refuse slope considers movement along a failure plan that extends through the refuse and along the liner system. The analysis found that the critical section runs through module DM-11.2 with a static FOS of 1.5, and the dynamic displacement of 2.6 inches. The static FOS meets the requirements of Title 27 and Subtitle D, and the dynamic displacements are less than 12 inches.

108. The Discharger performed final cover component stability analyses under both static and dynamic conditions using the maximum final cover slope of 4H:1V. Based on laboratory testing performed by the Discharger, the critical cover component interface occurs either between the vegetative soil layer and the geocomposite drainage layer, or between the geocomposite and the textured geomembrane layer. The FOS under static conditions was calculated to be 1.7. The calculated displacements for the Maximum Credible Earthquake seismic loading were less than 3 inches for sliding along the length of the cover, and less than 6 inches for localized sliding near the crest of the cover. These are less than the commonly accepted maximum allowable displacement of 12 inches.

FINANCIAL ASSURANCES

109. The RWD/JTD submitted by the Discharger contains a preliminary closure and post-closure maintenance plan (PCPCMP) for the landfill. The PCPCMP includes information required by Title 27 CCR Section 21769(b), and includes a lump sum estimate of the cost of carrying out all actions necessary to close each Unit, to prepare detailed design specifications, to develop the final closure and post-closure maintenance plan, and to

carry out the first thirty years of post-closure maintenance. The cost estimate for closure of Landfills 1, 2, and 3, including contingency, is estimated to be $21,795,821 (in 2008 dollars), while that for post-closure maintenance is estimated to be $237,091 annually ($7,112,730 over 30 years). The Discharger has provided the required funding based on these estimates to the California Integrated Waste Management Board (CIWMB) per Title 27 CCR Section 22225. The financial assurance mechanism consists of a Closure and Post-Closure Trust Fund. This Order requires that the Discharger maintain financial assurance for closure and post-closure maintenance with the CIWMB in at least the amount of the cost estimates, plus any annual inflation adjustments required by the CIWMB.

110. The Discharger has also submitted a cost estimate for corrective action of all known or reasonably foreseeable releases as required by Title 27 Section 22221. The Discharger submitted a *Corrective Action Financial Assurance Update* dated 5 July 2002, which presented a revised analysis of the existing corrective action financial assurance cost estimates for a known or reasonably foreseeable release from the landfill. The revised cost estimate was $1,478,000. This cost estimate was approved in previous WDR Order No. R5-2003-0118. This Order requires that the Discharger maintain financial assurance for corrective action with the CIWMB in at least the amount of this cost estimate, plus any annual inflation adjustments required by the CIWMB.

CEQA AND OTHER CONSIDERATIONS

111. On 7 December 1995, the Solano County Planning Commission adopted an initial study and negative declaration for reclassification of the site as Class II, and construction of a composting facility. On 3 March 2005, the Solano County Planning Commission certified an Environmental Impact Report for modification of the landfill final grades and changes to composting operations, in accordance with the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) and CEQA guidelines (Title 14 CCR Section 15000 et seq.).

112. This order implements:

    a. *The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition*;

    b. The prescriptive standards and performance goals of Chapters 1 through 7, Subdivision 1, Division 2, Title 27, of the California Code of Regulations, effective 18 July 1997, and subsequent revisions;

    c. The prescriptive standards and performance criteria of RCRA Subtitle D, Part 258; and

d. State Water Resources Control Board Resolution No. 93-62, *Policy for Regulation of Discharges of Municipal Solid Waste*, adopted 17 June 1993, and revised on 21 July 2005.

113. Section 13267(b) of California Water Code provides that: "In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposed to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who had discharged, discharges, or is suspected of having discharged or discharging, or who proposed to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports."

114. The technical reports required by this Order and the attached "Monitoring and Reporting Program No. R5-2008-0188" are necessary to assure compliance with these waste discharge requirements. The Discharger owns and operates the facility that discharges the waste subject to this Order.

PROCEDURAL REQUIREMENTS

115. All local agencies with jurisdiction to regulate land use, solid waste disposal, air pollution, and to protect public health have approved the use of this site for the discharges of waste to land stated herein.

116. The Regional Water Board notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge, and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

117. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

118. Any person affected by this action of the Regional Water Board may petition the State Water Resources Control Board to review the action in accordance with Sections 2050 through 2068, Title 23, California Code of Regulations. The petition must be received by the State Water Resources Control Board, Office of Chief Counsel, P.O. Box 100, Sacramento, California 95812, within 30 days of the date of issuance of this Order. Copies of the laws and regulations applicable to the filing of a petition are available on the Internet at http://www.swrcb.ca.gov/water_laws/index.html and will be provided on request.

IT IS HEREBY ORDERED, pursuant to Sections 13263 and 13267 of the California Water Code, that Order No. R5-2003-0118 is rescinded, and that Norcal Waste Systems Hay Road Landfill, Incorporated, and its agents, successors, and assigns, in order to meet the provisions of Division 7 of the California Water Code and the regulations adopted thereunder, shall comply with the following:

A. PROHIBITIONS

1. With the exception of asbestos-containing wastes discharged to Landfill 1 as described in Finding No. 17, the discharge of “hazardous wastes” at the landfill is prohibited. The discharge of “designated wastes” to Class III units is also prohibited. For the purposes of this Order, the term “hazardous waste” is as defined in Title 23, California Code of Regulations, Section 2510 et seq., and “designated waste” is as defined in Title 27 CCR.

2. The discharge of biohazardous wastes at the facility is prohibited. Non-infectious medical wastes treated and transformed into solid waste (as defined by Section 40191 (c) of the California Public Resources Code) in accordance with the Medical Waste Management Act (Section 118215 of the California Health and Safety Code) may be disposed of at the landfill, provided that no designated wastes are disposed of in Class III modules.

3. The discharge of wastes which have the potential to reduce or impair the integrity of containment structures or which, if commingled with other wastes in the unit, could produce violent reaction, heat or pressure, fire or explosion, toxic by-products, or reaction products which in turn: require a higher level of containment than provided by the unit; or are "restricted hazardous wastes"; or impair the integrity of containment structures is prohibited.

4. The discharge of waste constituents to the unsaturated zone or to groundwater is prohibited.

5. The discharge of wastes outside of a Unit or portions of a Unit specifically designed for their containment is prohibited.

6. The discharge of waste to a closed Unit is prohibited.

Landfills

7. Liquids or semi solid waste (i.e., waste containing less than 50 percent solids, by weight), other than co-disposal of dewatered sewage or water treatment sludge per Title 27 CCR Section 20220(c), shall not be discharged to Class III landfills.

8. Waste that contains liquid in excess of the moisture holding capacity of the waste in the Class II unit, or which contains liquid in excess of the moisture holding capacity as

a result of waste management operations, compaction, or settlement, shall not be discharged to a Class II unit.

9. With the exception of temporary soil and ADC stockpiles to be used for cover operations, the storage of wastes in landfill modules is prohibited.

10. The application of designated wastes as ADC in Class III modules is prohibited.

11. The ponding of any liquid on any landfill module that has received waste is prohibited.

12. The discharge of wastes (including composting wastes) as part of the final cover for any landfill is prohibited. Compost or dried sewage sludge from the LTU may be used as a soil amendment over intermediate or final cover to promote vegetative growth, if applied at agronomic rates and there is no threat to water quality from storm water runoff. Also, soil that contains waste may be used in the foundation layer.

Waste Pile

13. A Class II waste pile shall not be used for disposal of wastes.

14. No wastes other than de-watered sewage sludge (sludge that contains at least 20 percent solids (by weight) if primary sludge, or at least 15 percent solids if secondary sludge, or is a mixture of primary and secondary sludges) shall be discharged to WP-9.1 as a Class II waste pile.

15. Wastes containing free liquids shall not be discharged to a Class II waste pile.

Land Treatment Unit

16. No wastes shall be discharged to the LTU from 16 October through 15 April of each year.

Composting Area

17. Ponding of water or leachate in the active composting area is prohibited.

18. Active composting outside of the all-weather composting pad area is prohibited.

Surface Water

19. The discharge of solid or liquid waste or leachate to surface waters, surface water drainage courses, or groundwater is prohibited.

20. The discharge of groundwater, storm water, or wastewater to surface water or any surface water drainage courses is prohibited without an NPDES permit authorizing the discharge.

21. The discharge of waste to ponded water from any source is prohibited.

22. The discharge of waste within 100 feet of surface waters is prohibited.

B. DISCHARGE SPECIFICATIONS

Landfills

1. LF-1 and LF-2 shall be operated as Class III landfills. All existing and future expansion modules constructed in LF-3 shall be operated as Class II landfill modules.

2. The discharge shall remain within the designated disposal area at all times.

3. The discharge of waste shall not cause a nuisance condition.

4. The discharge of wastes to LF-1 shall be limited to asbestos and inert wastes.

5. Friable asbestos received at the landfill shall not exceed 2,500 tons per month.

6. De-watered sewage sludge discharged to a Class III landfill module shall be co-disposed with refuse per Title 27 CCR Section 20220(c) and shall only be discharged to a lined unit with an LCRS. De-watered sewage sludge shall not be discharged to LF-1.

7. Prior to the use of wastes not already listed in this Order as ADC or intermediate cover, the Discharger shall demonstrate that such application does not pose a threat to water quality and meets the waste classification, composition, and liquid percolation requirements of Title 27 CCR Section 20705.

8. Storm water contacting wastes used as ADC or intermediate cover shall be handled and disposed of as leachate, except as allowed under Prohibition A.12.

9. “Treated wood” wastes may be discharged, but only to an area equipped with a composite liner and leachate collection and removal system, and only if the wastes are handled in accordance with Section 67386.11 of Title 22 as described in Finding No. 16 of this Order. “Treated wood” means wood that has been treated with a chemical preservative for purposes of protecting the wood against attacks from insects, microorganisms, fungi, and other environmental conditions that can lead to decay of the wood and the chemical preservative is registered pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Sec. 136 and following). This may include but is not limited to waste wood that has been treated with chromated

copper arsenate (CCA), pentachlorophenol, creosote, acid copper chromate (ACC), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA), or chromated zinc chloride (CZC).

10. Treated wood must be managed to ensure consistency with Section 67386.11 of Title 22. Treated wood waste shall not be discharged to landfill cells that are leaking. Treated wood waste shall not be discharged to any landfill cell after confirmation of a release from that cell to either the unsaturated zone or groundwater until corrective action results in cessation of the release.

11. Discharge Specifications B.9 and B.10, above, apply only to treated wood waste that is a hazardous waste solely due to the presence of a preservative in the wood, and is not subject to regulation as a hazardous waste under the federal act.

12. Treated wood waste shall not be discharged to landfill modules DM-1 or DM-2.1.

13. Leachate or landfill gas condensate from a lined landfill module shall be discharged either to a publicly owned treatment works under permit, or to the composite-lined landfill unit from which it was generated. Leachate and condensate may be returned only to landfill modules DM-4, DM-5, DM-11, and future landfill modules. Leachate and condensate returned to a landfill unit shall be managed such that it does not cause instability of the waste, does not cause leachate seeps, does not generate additional landfill gas that is not extracted from the landfill by an active landfill gas extraction system, does not cause contaminants to enter surface water runoff, and does not cause leachate volumes to exceed the maximum capacity of the LCRS or violation of Construction Specification No. D.4 of this Order.

Waste Pile

14. DM-9.1 shall be classified as a Class II waste pile (WP-9.1) and be operated as a Class II waste pile for temporary storage of de-watered sewage sludge until clean-closed.

15. WP-9.1 shall be operated to provide a minimum separation of two and one half feet between waste or leachate and the highest anticipated elevation of underlying groundwater.

16. Contact storm water collected in a waste pile LCRS shall be handled and disposed of as leachate.

17. Storm water shall not be allowed to pond on top of a waste pile for more than 24 hours. Storm water which ponds on the waste pile shall be removed and disposed of as leachate.

Land Treatment Unit

18. The sludge drying area shall be operated and maintained as a Class II LTU until clean-closed.

19. The LTU shall be operated to provide a minimum separation of five feet between the base of the LTU and the highest anticipated elevation of underlying groundwater.

20. Wastes discharged to the LTU shall be limited to de-watered sewage sludge, as described in the JTD.

21. The LTU shall only be operated from **16 April through 15 October**. All sludge shall be removed by **15 October** each year, as specified in Prohibition A.16.

22. The LTU shall be operated to maximize the degradation, transformation, and immobilization of waste constituents in the treatment zone, in accordance with Title 27 CCR Section 20377.

23. The LTU shall be operated and maintained so as not to reduce the zone of attenuation and to maintain a minimum of five feet of separation from highest anticipated groundwater. The LTU pad thickness may be included as part of the zone of attenuation.

24. The quantity of wastes discharged to the LTU shall not exceed its drying capacity.

25. Stockpiles of manufactured soil in the LTU area or adjacent to modules to be constructed shall be winterized in accordance with the winterization plan, as described in Section E.7 of Monitoring and Reporting Program No. R5-2008-0188.

26. Storm water contacting wastes in the LTU area shall be handled and disposed of as leachate.

Composting Area

27. Feedstock for windrow composting shall be limited to green waste and agricultural waste as defined in Title 14 CCR. Food waste feedstock shall be limited to in-vessel composting as defined in Title 14 CCR, and may be combined with green waste for in-vessel composting.

28. The Discharger shall conduct an electronic leak location survey on geomembrane layer for the runoff retention basins and repair any holes or leaks following removal of sediment, or at least every five years, beginning in **2012**.

29. The Discharger shall reuse water to the extent feasible in the runoff retention basins to maintain capacity in the basins.

30. The Discharger shall monitor the runoff retention basins in accordance with MRP No. R5-2008-0188, and shall not cause, or threaten to cause, a condition of pollution, or nuisance (including odors).

31. The Discharger shall maintain containment and control structures (e.g., berms, pads, runoff retention basins, and runon/runoff control structures) in good working order.

32. At least annually, the Discharger shall inspect any runoff retention basins for damage to visible portions of the geomembrane liner, and shall inspect the active composting pad for surface failures such as cracking or subsidence. Discharger shall immediately take necessary measures to correct and/or repair any damage to these structures, shall notify the Regional Water Board, and shall include in the next semi-annual report a description of the damage, its location and extent, the date observed, and the date and nature of repair.

C. FACILITY SPECIFICATIONS

1. The Discharger shall, in a timely manner, remove and relocate any wastes discharged at this facility in violation of this Order. If the Discharger is unable to remove and relocate the waste, the Discharger shall submit a report to the Regional Water Board explaining how the discharge occurred, why the waste cannot be removed, and any updates to the waste acceptance program necessary to prevent re-occurrence.

2. Waste filling at landfill modules shall be conducted in accordance with a fill plan demonstrating that all temporary refuse fill slopes will be stable under both static and dynamic conditions for the design event for the unit.

3. All temporary stockpiles of ADC and other wastes shall be stable under both static and dynamic conditions for the design event for the unit.

4. The Discharger shall immediately notify the Regional Water Board of any flooding, unpermitted discharge of waste off-site, equipment failure, slope failure, or other change in site conditions which could impair the integrity of waste or leachate containment facilities or precipitation and drainage control structures.

5. Water used for facility maintenance shall be limited to the minimum amount necessary for dust control, and construction.

6. The Discharger shall maintain in good working order any facility, control system, or monitoring device installed to achieve compliance with the waste discharge requirements.

7. All LCRS shall convey to a sump or other appropriately lined collection area all leachate that reaches the liner.

8. Methane and other landfill gases shall be adequately vented, removed from the Unit, or otherwise controlled to prevent the danger of adverse health effects, nuisance conditions, degradation, or impairment of the beneficial uses of surface water or groundwater due to migration through the unsaturated zone.

9. Surface drainage within the waste management facility shall either be contained on-site or be discharged in accordance with applicable storm water regulations.

10. Precipitation and drainage control systems shall be designed and constructed to accommodate the anticipated volume of precipitation and peak flows from surface runoff under 1,000-year, 24-hour precipitation conditions.

11. MSW landfill units shall not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to human health and the environment (40 CFR 258.11). Units which cannot comply with this requirement shall close by 9 October 1996, unless otherwise extended by the appropriate authority (40 CFR 258.16).

12. The Discharger shall prevent floodwaters from a 100-year flood from contacting wastes in a disposal module. As the site is developed, a flood protection and slope stability levee (or berm) shall be constructed around the site to at least 40 feet above mean sea level to prevent flood waters from a 100-year flood from entering the site.

13. The Discharger shall maintain a *Storm Water Pollution Prevention Plan* and *Monitoring Program and Reporting Requirements* in accordance with State Water Resources Control Board's most recent WDRs for Discharges of Storm Water associated with Industrial Activities (currently Order No. 97-03-DWG, NPDES No. CAS000001), or retain all storm water on-site.

14. Gas control measures shall be implemented for a Class II landfill module upon the confirmed presence of gas-phase concentrations of VOCs in the leak detection layer. The gas control measures shall be sufficient to prevent the gas-phase migration of VOCs from the Class II module.

15. All wells shall have sanitary seals that meet the requirements of the Solano County Department of Environmental Management or shall be properly abandoned. A record of the sealing and/or abandonment of such wells shall be sent to the Regional Water Board and to the State Department of Water Resources.

D. CONSTRUCTION SPECIFICATIONS

1. The Discharger shall submit for review and approval at least 90 days **prior to** construction, design plans and specifications for new Units and expansions of existing Units, that include the following:

   a. A Construction Quality Assurance Plan meeting the requirements of Title 27 CCR Section 20324;

   b. A geotechnical evaluation of the area soils, evaluating their use as the base layer;

   c. An unsaturated zone monitoring system, which is demonstrated to remain effective throughout the active life, closure, and post-closure maintenance periods of the Unit, which shall be installed beneath the composite liner system in accordance with Title 27 CCR Section 20415(d); and

   d. Revised Sampling and Analysis Plan incorporating changes to the groundwater detection monitoring system to accommodate the new unit in accordance with Title 27 CCR Section 20420.

2. The following minimum separation shall be maintained between the wastes or leachate and the highest anticipated elevation of the groundwater, at each module: three feet at LF-2 (DM-2.1), two and one-half feet at DMs-2.2 through 16 and WP-9.1, and five feet at the LTU.

3. All Class II units and modules shall be designed and constructed for a maximum credible earthquake per Title 27 CCR Section 20370.

4. LCRSs shall be designed, constructed, and maintained to collect at least twice the anticipated daily volume of leachate generated by the module and to prevent the buildup of hydraulic head on the underlying liner at any time. The depth of fluid in any LCRS sump shall be kept at or below the minimum needed to ensure safe pump operation, but shall be no greater than the depth of the LCRS sump plus 3 inches in new expansion modules and 12 inches total in DM-2.2a, DM-2.2b, DM-11, and DM-5.

5. If monitoring reveals substantial or progressive increases of leachate generation above the design leachate flow volume of 18,000 gallons/acre/day (see Finding No. 91) by the Unit or portion of the Unit, such that the depth of fluid on any portion of the LCRS exceeds the values listed in Construction Specification D.4, the Discharger shall immediately notify the Regional Water Board and provide a written notification within seven days. The notification shall include a timetable for remedial or corrective action necessary to achieve compliance with the leachate depth limitation.

6. Each LCRS shall be designed and operated to be free draining and at no time shall the LCRS be allowed to become a pressurized conduit.

7. LCRS shall be designed and operated to function without clogging through the scheduled closure of the Unit and during the post closure maintenance period. The systems shall be tested at least annually to demonstrate proper operation (i.e., no clogging, collapse, or reduced drainage capacity). The results of the tests shall be compared with earlier tests made under comparable conditions and reported to the Regional Water Board in the Annual Report.

8. Each unit's LCRS sumps shall be equipped with automated pumps. Extracted leachate volume from each unit shall be recorded monthly based on accumulated volumes in dedicated tanks. The Discharger shall maintain and implement an O&M plan to ensure that the LCRS, pumps and pump meters are operating properly. The O&M plan shall be kept in the facility office.

9. The Discharger shall construct and maintain berms along the exterior of each landfill unit as necessary to prevent inundation and washout of wastes from a 100-year flood.

10. Both the bottom and side slope containment systems of all new LF-3 expansion modules shall be constructed in accordance with one of the following composite liner designs:

    a. The prescriptive standard design which consists of a lower compacted soil layer that is a minimum of two feet thick with a hydraulic conductivity of 1×10^{-6} cm/sec or less and has a minimum relative compaction of 90%. Immediately above the compacted soil layer, and in direct and uniform contact with the soil layer, shall be a synthetic flexible membrane component that shall be at least 40-mil thick (or at least 60-mil thick if composed of HDPE), which is immediately overlain with an LCRS. A soil operations layer shall be placed above the LCRS; OR

    b. In accordance with the engineered alternative base liner and side slope designs specified in the *Liner Performance Demonstration*, see Finding Nos. 56 and 76.

11. The Discharger may propose changes to the liner system design prior to construction, provided that approved components are not eliminated, the engineering properties of the components are not substantially reduced, and the proposed liner system results in the protection of water quality equal to or greater than the design prescribed by Title 27 CCR and this Order. The proposed changes may be made following approval by the Executive Officer. Substantive changes to the design require reevaluation as an engineered alternative and approval by the Regional Water Board.

12. Construction shall proceed only after all applicable construction quality assurance plans have been approved.

13. Following the completion of construction of a Unit or portion of a Unit, and prior to discharge onto the newly constructed liner system, the final documentation required in Title 27 CCR Section 20324(d)(1)(C) shall be submitted for review and approval. The report shall be certified by a registered civil engineer or a certified engineering

geologist. It shall contain sufficient information and test results to verify that construction was in accordance with the design plans and specifications, and with the prescriptive standards and performance goals of Title 27.

14. A third party independent of both the Discharger and the construction contractor shall perform all of the construction quality assurance monitoring and testing during the construction of a liner system.

15. The leachate collection system in DM-1 shall consist of sufficient leachate monitoring/extraction devices to ensure that leachate does not accumulate in deposited wastes. Description and operation of this system shall be included in the facility's LCRS Operation and Maintenance Manual.

E. DETECTION MONITORING SPECIFICATIONS

1. The Discharger shall submit for review and approval a groundwater detection monitoring program demonstrating compliance with Title 27 for any Unit expansion.

2. The Discharger shall comply with the detection monitoring program provisions of Title 27 for groundwater, surface water, and the unsaturated zone, and in accordance with Monitoring and Reporting Program No. R5-2008-0188. A detection monitoring program for a new Unit shall be installed, operational, and one year of monitoring data collected prior to the discharge of wastes [Title 27 CCR Section 20415(e)(6)].

3. The Discharger shall provide Regional Water Board staff a minimum of **one week** notification prior to commencing any field activities related to the installation, repair, or abandonment of monitoring devices, and a minimum 48 hour notification prior to the collection of samples associated with a detection monitoring program, evaluation monitoring program, or corrective action program.

4. The Discharger shall comply with the Water Quality Protection Standard as specified in this Order, Monitoring and Reporting Program No. R5-2008-0188, and the Standard Provisions and Reporting Requirements, dated April 2000.

5. The Water Quality Protection Standard for organic compounds which are not naturally occurring and not detected in background groundwater samples shall be taken as the detection limit of the analytical method used (i.e., US-EPA methods 8260 and 8270). The repeated detection of one or more non-naturally occurring organic compounds in samples above the Water Quality Protection Standard from detection monitoring wells is evidence of a release from the Unit.

6. The concentrations of the constituents of concern in waters passing the Point of Compliance shall not exceed the concentration limits established pursuant to Monitoring and Reporting Program No. R5-2008-0188.

7. For each monitoring event, the Discharger shall determine whether the landfill is in compliance with the Water Quality Protection Standard using procedures specified in Monitoring and Reporting Program No. R5-2008-0188 and Title 27 CCR Section 20415(e).

8. The Discharger shall establish and maintain an approved Sample Collection and Analysis Plan. The Sample Collection and Analysis Plan shall at a minimum include:

   a. Sample collection procedures describing purging techniques, sampling equipment, and decontamination of sampling equipment;

   b. Sample preservation information and shipment procedures;

   c. Sample analytical methods and procedures;

   d. Sample quality assurance/quality control (QA/QC) procedures; and

   e. Chain of Custody control.

9. For any given monitored medium, the samples taken from all monitoring points and background monitoring points to satisfy the data analysis requirements for a given reporting period shall all be taken **within a span not to exceed 30 days**, unless a longer time period is approved, and shall be taken in a manner that ensures sample independence to the greatest extent feasible. Specific methods of collection and analysis must be identified. Sample collection, storage, and analysis shall be performed according to the most recent version of USEPA Methods, such as the latest editions, as applicable, of: (1) Methods for the Analysis of Organics in Water and Wastewater (USEPA 600 Series), (2) Test Methods for Evaluating Solid Waste (SW-846, latest edition), and (3) Methods for Chemical Analysis of Water and Wastes (USEPA 600/4-79-020), and in accordance with the approved Sample Collection and Analysis Plan.

10. If methods other than USEPA-approved methods or Standard Methods are used, the exact methodology shall be submitted for review and approval prior to use.

11. The **methods of analysis and the detection limits** used must be appropriate for the expected concentrations. For the monitoring of any constituent or parameter that is found in concentrations which produce more than 90% non-numerical determinations (i.e., “trace” or “ND”) in data from background monitoring points for that medium, the analytical method having the lowest method detection limit (MDL) shall be selected from among those methods which would provide valid results in light of any matrix effects or interferences.

12. **"Trace" results** - results falling between the MDL and the practical quantitation limit (PQL) - shall be reported as such, and shall be accompanied both by the estimated MDL and PQL values for that analytical run.

13. **MDLs and PQLs** shall be derived by the laboratory for each analytical procedure, according to State of California laboratory accreditation procedures. These MDLs and PQLs shall reflect the detection and quantitation capabilities of the specific analytical procedure and equipment used by the lab, rather than simply being quoted from USEPA analytical method manuals. In relatively interference-free water, laboratory-derived MDLs and PQLs are expected to closely agree with published USEPA MDLs and PQLs.

14. If the laboratory suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived MDL/PQL values, the results shall be flagged accordingly, along with estimates of the detection limit and quantitation limit actually achieved. The **MDL shall always be calculated such that it represents the lowest achievable concentration associated with a 99% reliability of a nonzero result**. The PQL shall always be calculated such that it represents the lowest constituent concentration at which a numerical value can be assigned with reasonable certainty that it represents the constituent's actual concentration in the sample. Normally, PQLs should be set equal to the concentration of the lowest standard used to calibrate the analytical procedure.

16. All **QA/QC data** shall be reported, along with the sample results to which they apply, including the method, equipment, analytical detection and quantitation limits, the percent recovery, an explanation for any recovery that falls outside the QC limits, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name and qualifications of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recoveries. In cases where contaminants are detected in QA/QC samples (i.e., field, trip, or lab blanks), the accompanying sample results shall be appropriately flagged.

17. Unknown chromatographic peaks shall be reported, flagged, and tracked for potential comparison to subsequent unknown peaks that may be observed in future sampling events. Identification of unknown chromatographic peaks that recur in subsequent sampling events may be required

18. The statistical method shall account for data below the PQL with one or more statistical procedures that are protective of human health and the environment. Any PQL validated pursuant to Title 27 CCR Section 20415(e)(7) that is used in the statistical method shall be **the lowest concentration (or value) that can be reliably achieved** within limits of precision and accuracy specified in the WDRs for routine laboratory operating conditions that are available to the facility. The Discharger's

technical report, pursuant to Title 27 CCR Section 20415(e)(7), shall consider the PQLs listed in Appendix IX to Chapter 14 of Division 4.5 of Title 22, CCR, for guidance when specifying limits of precision and accuracy. For any given constituent monitored at a background or downgradient monitoring point, an indication that falls between the MDL and the PQL for that constituent (hereinafter called a "trace" detection) shall be identified and used in appropriate statistical or nonstatistical tests. Nevertheless, for a statistical method that is compatible with the proportion of censored data (trace and ND indications) in the data set, the Discharger can use the laboratory's concentration estimates in the trace range (if available) for statistical analysis, in order to increase the statistical power by decreasing the number of "ties".

19. Background for water samples or soil-pore gas samples shall be represented by the data from all samples taken from applicable background monitoring points during that reporting period (at least one sample from each background monitoring point). The Discharger may propose an alternate statistical method [to the methods listed under Title 27 CCR Section 20415(e)(8)(A-D)] in accordance with Title 27 CCR Section 20415(e)(8)(E), for review and approval.

20. The Discharger may propose an alternate statistical method [to the methods listed under Title 27 CCR Section 20415(e)(8)(A-D)] in accordance with Title 27 CCR Section 20415(e)(8)(E), for review and approval. Upon receiving written approval, alternate statistical procedures may be used for determining the significance of analytical results for common laboratory contaminants (i.e., methylene chloride, acetone, diethylhexyl phthalate, and di-n-octyl phthalate). Nevertheless, analytical results involving detection of these analytes in any background or downgradient sample shall be reported and flagged for easy reference by Regional Water Board staff.

21. The Discharger shall use the following non-statistical method for all analytes that are detected in less than 10% of the background samples. The non-statistical method shall be implemented as follows:

    a. From the constituent of concern or monitoring parameter list, identify each analyte in the current sample that exceeds either its respective MDL or PQL. The Discharger shall conclude that the exceedance provides a preliminary indication [or, for a retest, provides measurably significant evidence] of a release or a change in the nature or extent of the release, at that monitoring point, if ***either***:

        1) The data contains two or more analytes that are detected in less than 10% of background samples that equal or exceed their respective MDLs; or

        2) The data contains one analyte that equals or exceeds its PQL.

b. **Discrete Retest** [Title 27 CCR Section 20415(e)(8)(E)]:

1) In the event that the Discharger concludes (pursuant to paragraph 21.a., above) that there is a preliminary indication of a release, then the Discharger shall immediately notify Regional Water Board staff by phone or e-mail and, within 30 days of such indication, shall collect **two** new (retest) samples from the monitoring point where the release is preliminarily indicated.

2) For any given retest sample, the Discharger shall include, in the retest analysis, only the laboratory analytical results for those analytes detected in the original sample. As soon as the retest data are available, the Discharger shall apply the same test [under 21.a.], to separately analyze each of the two suites of retest data at the monitoring point where the release is preliminarily indicated.

3) If either (or both) of the retest samples trips either (or both) of the triggers under 21.a., then the Discharger shall conclude that there is measurably significant evidence of a release at that monitoring point for the analyte(s) indicated in the validating retest sample(s) and shall:

a) **Immediately** notify the Regional Water Board about the constituent verified to be present at the monitoring point, and follow up with written notification submitted by certified mail **within seven days** of validation; and

b) Comply with 22, below.

4) Any analyte that triggers a discrete retest per this method shall be added to the monitoring parameter list such that it is monitored during each regular monitoring event.

22. If the Discharger determines that there is measurably significant evidence of a release from the Unit at any monitoring point, the Discharger shall **immediately** implement the requirements of **XI. Response To A Release, C. Release Has Been Verified**, contained in the Standard Provisions and Reporting Requirements.

F. CLOSURE SPECIFICATIONS

1. At closure, each landfill shall receive a final cover in accordance with the prescriptive standards of Subtitle D and Title 27 CCR or engineered alternative design as described in Finding No. 100.

2. Vegetation shall be planted and maintained over each closed landfill module. Vegetation shall be selected to require a minimum of irrigation and maintenance and shall have a rooting depth not in excess of the vegetative layer thickness.

3. During closure, sufficient erosion and sedimentation controls shall be installed to prevent erosion of the cover material before vegetation and be established and to prevent excessive sediment in storm water runoff.

4. The WMU slopes shall not exceed a horizontal-to-vertical ratio of 4:1 (not including benching) to ensure slope stability. Other areas with slopes greater than ten percent, surface drainage courses, and areas subject to erosion by wind or water shall be designed and constructed to prevent such erosion.

5. The closed landfill shall have 25-foot wide benches at least every 50 vertical feet.

6. The WMU final slopes shall not be less than five percent grade to accommodate post closure settlement and to prevent ponding and infiltration.

7. All final cover slopes shall be designed and constructed to withstand an MCE event as required under Title 27 CCR Section 21750(f)(5).

8. The waiting period for installation of the final cover shall not exceed five years after the date a portion of the landfill reaches final elevation, as specified under "Prompt Incremental Closure," Title 27 CCR Section 21090(b)(1)(D).

9. Upon termination of sludge storage operations, Class II waste pile WP-9.1 shall be clean closed. After clean closure, the unit may be re-built as part of a Class II landfill module (DM-9) and may be used for disposal operations.

G. PROVISIONS

1. The Discharger shall maintain a copy of this Order at the facility and make it available at all times to facility operating personnel, who shall be familiar with its contents, and to regulatory agency personnel.

2. The Discharger shall comply with all applicable provisions of Title 27 CCR and 40 Code of Federal Regulations Part 258 (Subtitle D) that are not specifically referred to in this Order.

3. The Discharger shall comply with Monitoring and Reporting Program No. R5-2008-0188, which is incorporated into and made part of this Order.

4. The Discharger shall comply with the applicable portions of the Standard Provisions and Reporting Requirements for Waste Discharge Requirements for Nonhazardous Solid Waste Discharges Regulated by Title 27 CCR and/or Subtitle D (27 CCR §20005 et seq. and 40 CFR 258 et seq.), dated April 2000, which are hereby incorporated into this Order.

5. In the event the Discharger does not comply or will be unable to comply with any prohibition or limitation of this Order for any reason, the Discharger shall notify the appropriate Regional Water Board office by telephone **as soon as** it or its agents have knowledge of such noncompliance or potential for noncompliance, and shall confirm this notification in writing **within two weeks**. The written notification shall state the nature, time, and cause of noncompliance, and shall describe the measures being taken to prevent recurrences and shall include a timetable for corrective actions.

6. All reports and transmittal letters shall be signed by persons identified below:

   a. For a corporation: by a principal executive officer of at least the level of senior vice-president.

   b. For a partnership or sole proprietorship: by a general partner or the proprietor.

   c. For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected or appointed official.

   d. A duly authorized representative of a person designated in a, b, or c above if;

      1) The authorization is made in writing by a person described in a, b, or c of this provision;

      2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a Unit, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

      3) The written authorization is submitted to the Regional Water Board.

   e. Any person signing a document under this Section shall make the following certification:

   "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

7. The Discharger shall take all reasonable steps to minimize any adverse impact to the waters of the State resulting from noncompliance with this Order. Such steps shall include accelerated or additional monitoring as necessary to determine the nature, extent, and impact of the noncompliance.

8. The Discharger shall have the continuing responsibility to assure protection of waters of the state from discharged wastes and from gases and leachate generated by discharged waste during the active life, closure, and post-closure maintenance period of the Unit(s) as long as the wastes pose a threat to water quality.

9. The fact that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order shall not be regarded as a defense for the Discharger's violations of the Order.

10. To assume ownership or operation under this Order, the succeeding owner or operator must apply in writing to the Regional Water Board requesting transfer of the Order within 14 days of assuming ownership or operation of this facility. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, the name and address and telephone number of the persons responsible for contact with the Regional Water Board, and a statement. The statement shall comply with the signatory requirements contained in Provision G.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer of this Order shall be approved or disapproved by the Regional Water Board.

11. The Discharger shall maintain assurances of financial responsibility for closure of the landfill in the amount of the approved cost estimate described in Finding No. 109 of this Order, plus any annual inflation adjustments required by the California Integrated Waste Management Board (CIWMB). If the CIWMB determines that either the amount of coverage or the mechanism is inadequate, the Discharger shall submit a demonstration of acceptable financial assurance to the CIWMB within no more than 90 days of notification.

12. The Discharger shall maintain assurances of financial responsibility for carrying out the first 30 years of post-closure maintenance at the landfill in the amount of the approved cost estimate described in Finding No. 109 of this Order, plus any annual inflation adjustments required by the CIWMB. If the CIWMB determines that either the amount of coverage or the mechanism is inadequate, the Discharger shall submit a demonstration of acceptable financial assurance to the CIWMB within no more than 90 days of notification.

13. The Discharger shall maintain assurances of financial responsibility for initiating and completing corrective action for all known or reasonably foreseeable releases from the landfill with the CIWMB in the amount of the approved cost estimate described in Finding No. 110 of this Order, plus any annual inflation adjustments required by the CIWMB. If the CIWMB determines that either the amount of coverage or the mechanism is inadequate, the Discharger shall submit a demonstration of acceptable financial assurance to the CIWMB within no more than 90 days of notification.

14. The Discharger shall submit a post-earthquake inspection plan for review and approval **within 90 days** following adoption of this Order. The plan shall include inspecting liners and covers; LCRS riser pipes, sump pump operation, and storage tanks; landfill gas flares; drainage control facilities; and detection monitoring facilities for damage following an earthquake of Magnitude (M) 5.0 or greater within 25 miles of the facility or a M6.0 or greater earthquake within 50 miles of the facility.

15. The Discharger shall conduct an earthquake inspection in a timely manner following earthquakes of the magnitude as specified in Provision 14. A report of the inspection shall be submitted within 30 days after the inspection assessing any damage and shall contain proposals to repair or replace any damaged structures or facilities.

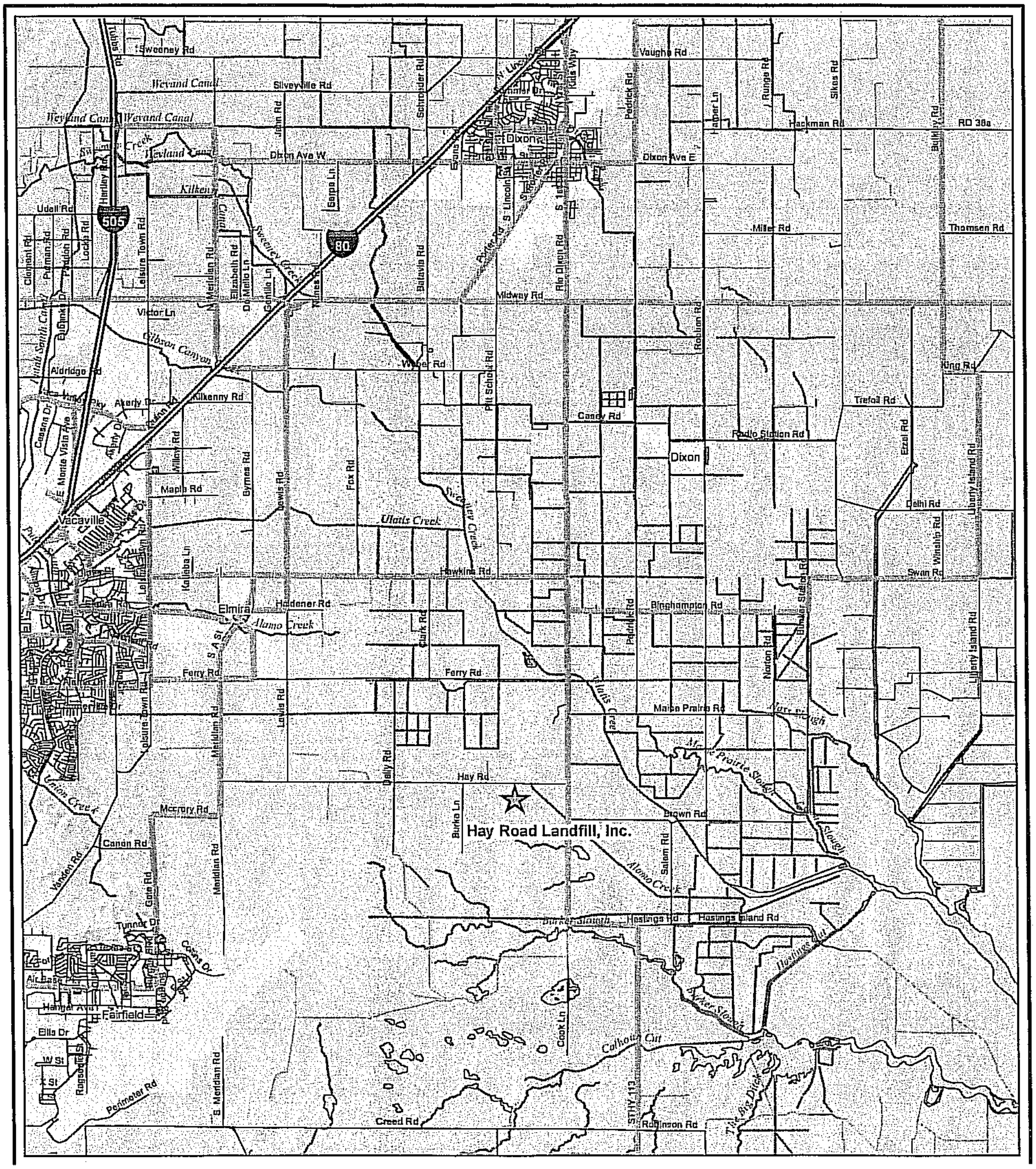
16. The Discharger shall complete the tasks contained in these waste discharge requirements in accordance with the following time schedule:

Task	Compliance Date
A. Construction Plans	
Submit construction and design plans for review and approval per Construction Specification D.1.	**90 Days prior to construction**
B. Construction Report	
Submit a construction report upon completion demonstrating construction was in accordance with approved construction plans for review and approval per Construction Specification D.12.	**Prior to discharge**

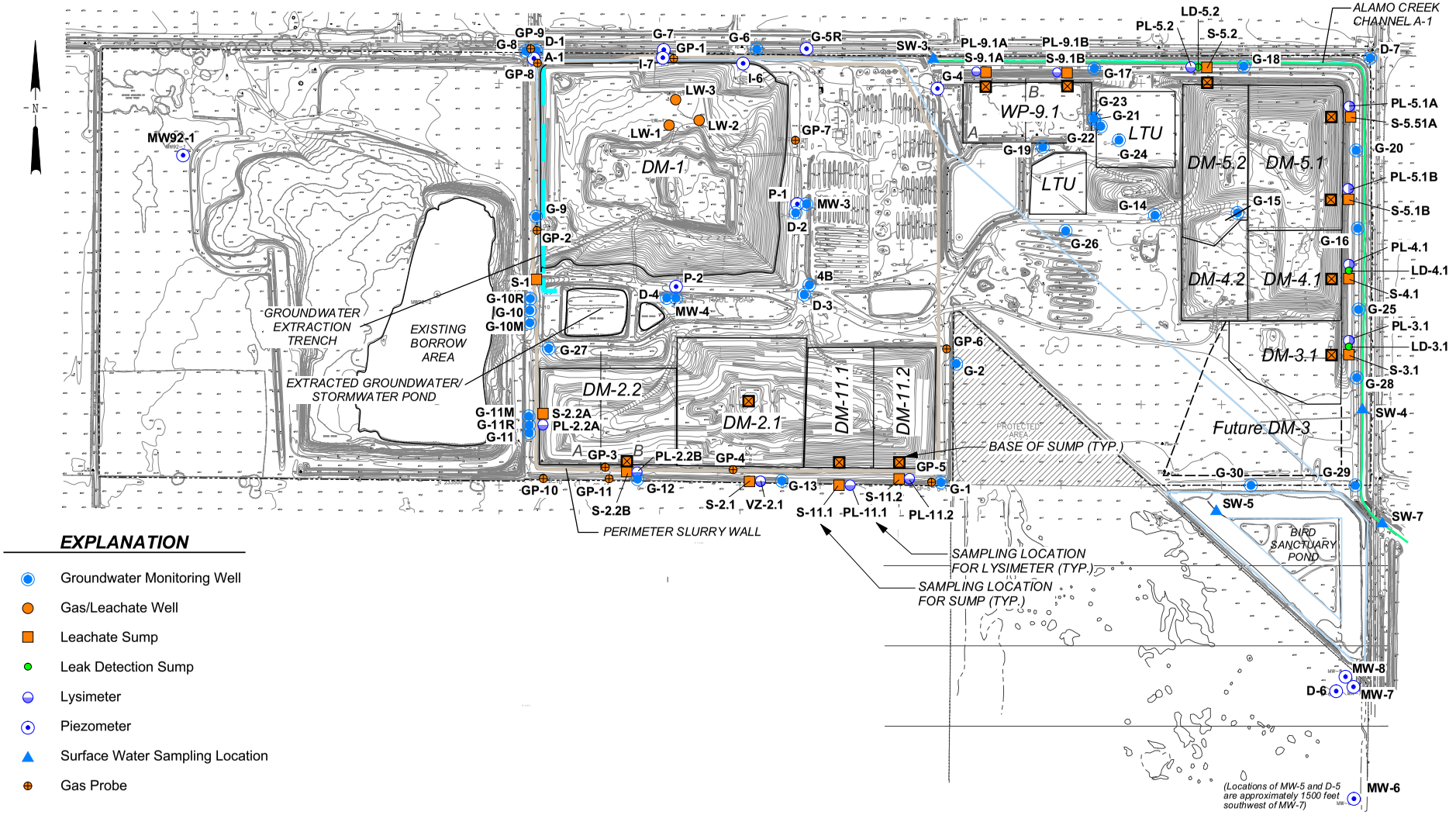
I, PAMELA C. CREEDON, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 5 December 2008.

_____
PAMELA C. CREEDON, Executive Officer

WLB



Drawing Reference: Golder Associates, Site Vicinity Map, Figure 1-1	**ATTACHMENT A** **SITE LOCATION MAP** HAY ROAD LANDFILL SOLANO COUNTY	N S W E

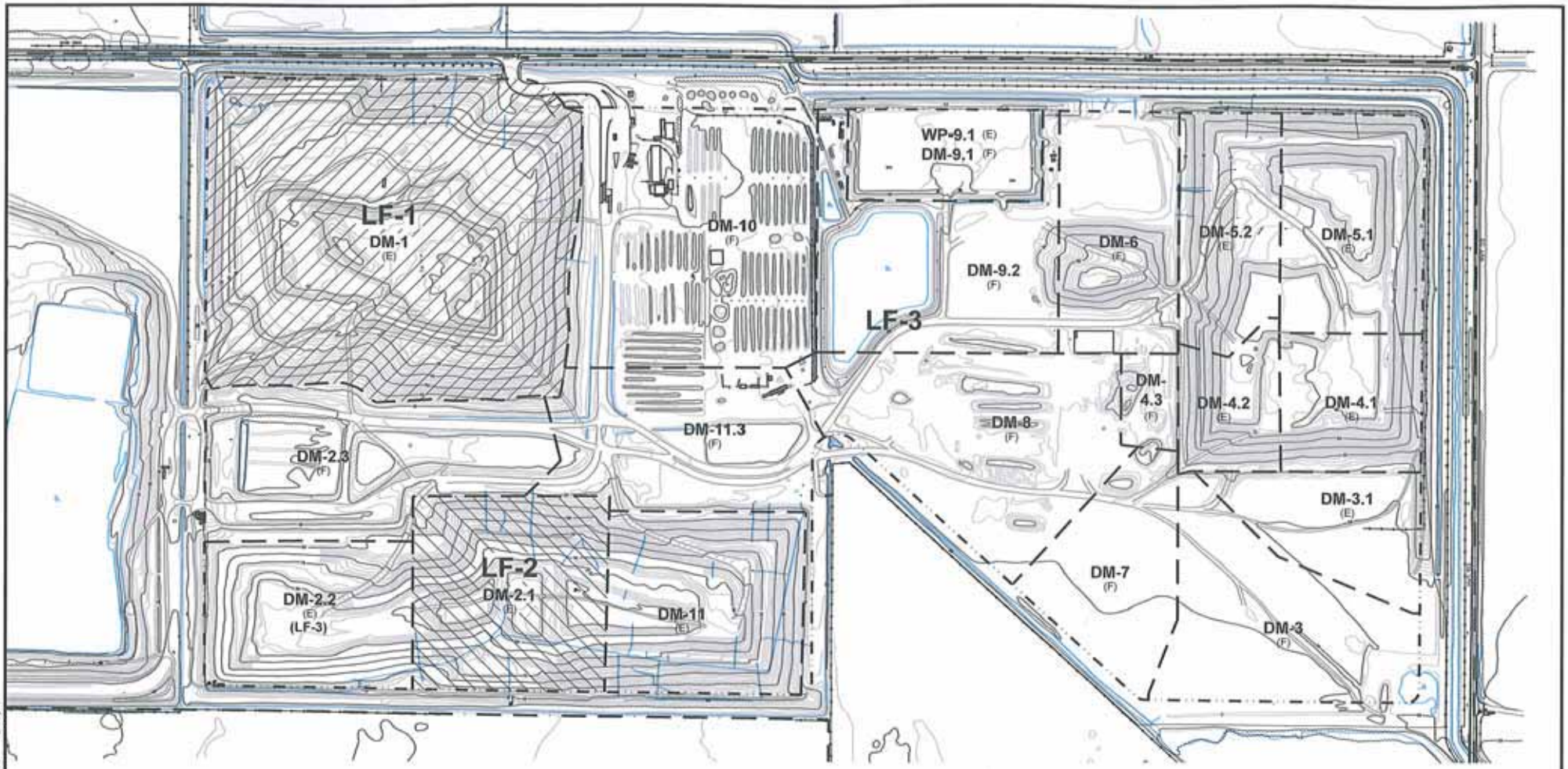


EXPLANATION

- Groundwater Monitoring Well
- Gas/Leachate Well
- Leachate Sump
- Leak Detection Sump
- Lysimeter
- Piezometer
- Surface Water Sampling Location
- Gas Probe

Topographic base: May 7, 2007.

Waste Discharge Requirements Order No. R5-2008-0188	SCALE: 0 600 1,200 1,800 FEET	Attachment B Site Map Hay Road Landfill Solano County	FIGURE PROJECT NO.



NOTES

1. TOPOGRAPHIC CONTOURS PREPARED USING PHOTOGRAMMETRIC METHODS BY AERO-GEODETIC CORP. DATE OF PHOTOGRAPHY: MAY 3, 2008.

LEGEND

- PROPERTY LINE
- LANDFILL LIMIT
- DISPOSAL MODULE LIMIT
- (E) EXISTING DISPOSAL MODULE
- (F) FUTURE DISPOSAL MODULE
- LF-1 (DM-1)
- LF-2 (DM-2.1)
- LF-3 (REMAINDER OF DISPOSAL MODULES)

400 0 400
SCALE FEET

ATTACHMENT C
SITE PLAN
NWS HAY ROAD LANDFILL
SOLANO COUNTY, CALIFORNIA

Waste Discharge Requirements Order No. R5-2008-0188

PROJECT No. 08397354 FILE No. NWSHRL Site CADD JDR DATE 09/16/08

Drawing File: NWSHRL Site Plan.dwg Sep 16, 2008 - 12:06pm

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2008-0188

MONITORING AND REPORTING PROGRAM
FOR
NORCAL WASTE SYSTEMS HAY ROAD LANDFILL, INCORPORATED
HAY ROAD LANDFILL
CLASS II & III LANDFILLS, CLASS II WASTE PILE, AND
CLASS II LAND TREATMENT UNIT
OPERATION, CLOSURE, POST-CLOSURE MAINTENANCE,
AND CORRECTIVE ACTION
SOLANO COUNTY

The Discharger shall comply with this Monitoring and Reporting Program, with Title 27, California Code of Regulations, Section 20005, et seq. (hereafter Title 27), and with the *Standard Provisions and Reporting Requirements for Waste Discharge Requirements for Nonhazardous Solid Waste Discharges Regulated by Title 27 and/or Subtitle D (27 CCR §20005 et seq. and 40 CFR 258)*, dated April 2000, as ordered by Waste Discharge Requirements Order No. R5-2008-0188.

A. REQUIRED MONITORING REPORTS

	Report	Due
1.	Groundwater Monitoring (Section D.1)	**See Tables I-A, I-B, I-C**
2.	Unsaturated Zone Monitoring (Section D.2)	**See Tables II-A, II-B, II-C-1, II-C-2**
3.	Landfill Gas Monitoring (Section D.3)	**See Table III**
4.	Leachate Monitoring/Seeps (Section D.4)	**See Tables IV-A, IV-B**
5.	Leak Detection Monitoring (Section D.5)	**See Table V**
6.	Surface Water Monitoring (Section D.6)	**See Table VI**
7.	Storm Water Monitoring (Section D.7)	**As necessary**
8.	Semi-solid Waste Monitoring (Section D.8)	**See Table VII**
9.	Composting Area Pond Monitoring (Section D.9)	**See Table VIII**
10.	Facility Monitoring (Section D.10)	**As necessary**
11.	Annual Monitoring Summary Report (Section E.5)	**Annually**

12. Response to a Release **As necessary**
(Standard Provisions and Reporting Requirements)

B. REPORTING

The Discharger shall submit semiannual monitoring reports with the data and information required in this Monitoring and Reporting Program and as required in Order No. R5-2008-0188 and the Standard Provisions and Reporting Requirements, April 2000. Reports which do not comply with the required format will be **REJECTED** and the Discharger shall be deemed to be in noncompliance with the waste discharge requirements. In reporting the monitoring data required by this program, the Discharger shall arrange the data in tabular form so that the date, the constituents, the concentrations, and the units are readily discernible. The data shall be summarized in such a manner so as to illustrate clearly the compliance with waste discharge requirements or the lack thereof. Data shall also be submitted in a digital format acceptable to the Executive Officer.

Each monitoring report shall include a compliance evaluation summary as specified in Section E.3, below.

Field and laboratory tests shall be reported in each monitoring report. Monthly, quarterly, semiannual, and annual monitoring reports shall be submitted to the Regional Water Board in accordance with the following schedule for the calendar period in which samples were taken or observations made.

Sampling Frequency	Reporting Frequency	Reporting Periods End	Report Date Due
Monthly	Semiannually	Last Day of Month	**by Semiannual Schedule**
Quarterly	Semiannually	30 June	**by Semiannual Schedule**
		31 December	**by Semiannual Schedule**
Semiannually	Semiannually	31 March	**by Semiannual Schedule**
		30 June	**by Semiannual Schedule**
		30 September	**by Semiannual Schedule**
		31 December	**by Semiannual Schedule**
Annually	Annually	31 December	**31 January**
5-Year*	Every 5 years	31 December	**31 January**

* Last 5-year sampling was completed in 2005

The Discharger shall submit an **Annual Monitoring Summary Report** to the Regional Water Board covering the previous monitoring year. The annual report shall contain the information specified in E. Reporting Requirements, below, and a discussion of

compliance with the waste discharge requirements and the Water Quality Protection Standard.

The results of **all monitoring** conducted at the site shall be reported to the Regional Water Board in accordance with the reporting schedule above for the calendar period in which samples were taken or observations made.

C. WATER QUALITY PROTECTION STANDARD AND COMPLIANCE PERIOD

1. Water Quality Protection Standard Report

For each waste management unit (Unit), the Water Quality Protection Standard shall consist of all constituents of concern, the concentration limit for each constituent of concern, the point of compliance, and all water quality monitoring points for each monitored medium.

The Water Quality Protection Standard for naturally occurring waste constituents consists of the constituents of concern, the concentration limits, and the point of compliance and all monitoring points. The Water Quality Protection Standard, or any modification thereto, shall be submitted in a report for review and approval.

The report shall:

a. Identify **all distinct bodies of surface and ground water** that could be affected in the event of a release from a Unit or portion of a Unit. This list shall include at least the uppermost aquifer and any permanent or ephemeral zones of perched groundwater underlying the facility.

b. Include a map showing the monitoring points and background monitoring points for the surface water monitoring program, groundwater monitoring program, and the unsaturated zone monitoring program. The map shall include the point of compliance in accordance with §20405 of Title 27.

c. Evaluate the perennial direction(s) of groundwater movement within the uppermost groundwater zone(s).

The Water Quality Protection Standard shall be certified by a California-registered civil engineer or geologist as meeting the requirements of Title 27. If subsequent sampling of the background monitoring point(s) indicates significant water quality changes due to either seasonal fluctuations or other reasons unrelated to waste management activities at the site, the Discharger may request modification of the Water Quality Protection Standard.

If subsequent sampling of the background monitoring point(s) indicates significant water quality changes due to either seasonal fluctuations or other

reasons unrelated to waste management activities at the site, the Discharger may request modification of the Water Quality Protection Standard.

2. Constituents of Concern

The constituents of concern include all the waste constituents, their reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit. The constituents of concern for all Units at the facility are those listed in Tables I through VI for the specified monitored medium, and Table X. The Discharger shall monitor all constituents of concern every five years, or more frequently as required.

The last 5-year Constituent-of-Concern (COC) monitoring event was conducted during 2005; therefore, the next COC event is scheduled to take place in 2010. The Discharger shall monitor all constituents of concern every five years, or more frequently as required in accordance with a Corrective Action Program.

a. **Monitoring Parameters**

Monitoring parameters are constituents of concern that are the waste constituents, reaction products, hazardous constituents, and physical parameters that provide a reliable indication of a release from a Unit. The monitoring parameters for all Units are those listed in Tables I through VI for the specified monitored medium.

3. Concentration Limits

For a naturally occurring constituent of concern, the detection monitoring and corrective action concentration limit for each constituent of concern shall be determined as follows:

a. By calculation in accordance with a statistical method pursuant to §20415(e)(8) of Title 27; or

b. By an alternate statistical method meeting the requirements of §20415(e)(8)(E) of Title 27.

c. Concentration limits greater than background (CLGB) for corrective action may be proposed by the discharger in accordance with §20430 of Title 27 if, after proposed corrective action measures reveal that it is technically and economically infeasible to achieve background levels.

The Discharger shall establish concentration limits for the following monitored mediums as follows:

1. Unsaturated Zone – With the exception of VOCs and certain biosolids

monitoring parameters (for which a non-statistical method is used to determine concentration limits), the concentration limits for COCs in the unsaturated zone shall be based on statistical evaluation of historical monitoring data for each monitoring point, as proposed by the Discharger. These concentration limits shall be updated semi-annually and included in each monitoring report.

2. Groundwater - With the exception of VOCs (for which a non-statistical method is used to determine concentration limits), the concentration limits for groundwater monitoring shall be based on a statistical evaluation of detection monitoring data.

   a. Western Portion of Site (Intrawell) - The Discharger conducts detection monitoring using the method of intrawell comparisons on the western portion of the site where the groundwater gradient is influenced by borrow pit pumping. The Discharger's concentration limits for the monitoring wells in this area are based on historical water quality data of each well rather than up gradient wells.

   b. Eastern Portion of Site (Interwell) - For the eastern portion of the site, where the regional gradient prevails, the Discharger conducts detection monitoring using an interwell approach. Under this approach, concentration limits will be developed from a statistical evaluation of up gradient well data.

3. Surface Water - As proposed by the Discharger (per 29 November 2000 letter responding to staff comments on Joint Technical Document), with the exception of VOCs, the concentration limits for surface water monitoring shall be based on historical water quality data at each upstream monitoring point, but shall take into consideration seasonality. Concentration limits for VOCs will be non-statistical.

4. Point of Compliance

The point of compliance for the water standard at each Unit or portion of a Unit is a vertical surface located at the hydraulically down-gradient limit of the Unit that extends through the uppermost aquifer underlying the Unit. All point of compliance monitoring wells established for the detection monitoring program shall constitute the monitoring points for the groundwater Water Quality Protection Standard.

5. Compliance Period

The compliance period for each Unit shall be the number of years equal to the active life of the Unit plus the post-closure period. The compliance period is the

minimum period during which the Discharger shall conduct a water quality monitoring program subsequent to a release from the Unit. The compliance period shall begin anew each time the Discharger initiates an evaluation monitoring program.

D. MONITORING

The Discharger shall comply with the detection monitoring program provisions of Title 27 CCR for groundwater, surface water, and the unsaturated zone, in accordance with Detection Monitoring Specification E.2 and E.4 of Waste Discharge Requirements, Order No. R5-2008-0188. Detection monitoring for a new Unit shall be installed, operational, and one year of monitoring data collected **prior to** the discharge of wastes. All monitoring shall be conducted in accordance with a Sample Collection and Analysis Plan, which includes quality assurance/quality control standards, that shall be submitted for review and approval.

All point of compliance monitoring wells established for the detection monitoring program shall constitute the monitoring points for the groundwater Water Quality Protection Standard. All detection monitoring and corrective action monitoring program groundwater monitoring wells, unsaturated zone monitoring devices, leachate, and surface water monitoring points shall be sampled and analyzed for monitoring parameters and constituents of concern as indicated and listed in Tables I through VI, and Table X.

Method detection limits and practical quantitation limits shall be reported. All peaks shall be reported, including those which cannot be quantified and/or specifically identified. Metals shall be analyzed in accordance with the methods listed in Table X.

The Discharger may use alternative analytical test methods, including new USEPA approved methods, provided the methods have method detection limits equal to or lower than the analytical methods specified in this Monitoring and Reporting Program.

For any given monitored medium, a sufficient number of samples shall be taken from all Monitoring Points and Background Monitoring Points to satisfy the data analysis requirements for a given Reporting Period, and shall be taken in a manner that ensures sample independence to the greatest extent feasible. Collection of samples shall be in accordance with procedures set forth in the Sampling and Analysis Plan (SAP) and summarized in the Annual Monitoring. The revised SAP dated April 2002 was approved by Regional Water Board staff on 6 May 2002. The SAP included a Regional Water Board-approved statistical (or non-statistical) procedure to determine whether there has been a measurably significant increase in a constituent over the water quality protection standard, as set forth in Title 27 CCR Section 20415(e)(7).

1. Groundwater

The Discharger shall operate and maintain a groundwater detection monitoring

system that complies with the applicable provisions of Title 27 CCR Sections 20415 and 20420 in accordance with an approved Detection Monitoring Program. The detection monitoring system shall be certified by a California-licensed professional civil engineer or geologist as meeting the requirements of Title 27. The Discharger shall collect, preserve, and transport groundwater samples in accordance with an approved Sampling and Analysis Plan.

The current groundwater monitoring program (Attachment B) distinguishes between wells on the western half of the site where the groundwater gradient direction is controlled by pumping from the borrow pit, and wells on the eastern half of the site where the natural gradient prevails.

Groundwater beneath the western portion of the site, which consists of modules DM-1, DM-2.2, DM-2.1, DM-11.1, and DM-11.2, is analyzed using the method of "intrawell" comparisons where each well operates as its own background well. Western area monitoring wells include G-1, G-2, G-6, G-8, G-9, G-10M, G-10R (only if G-10M is dry), G-11, G-11M, G-11R (only if G-11 and G-11M are dry), G-12, G-13, G-27, 4B, P-1 (replaced damaged MW-3), and MW-4. Samples from the western portion of the site shall be collected and analyzed for the monitoring parameters in accordance with the methods and frequency specified in Table I-A.

The "interwell" approach is used on the eastern portion of the site, including WP-9.1, the LTU, DM-4.1, and DM-5, with background wells installed along the northern periphery of the landfill and detection wells installed immediately downgradient of each landfill module. Eastern area monitoring wells include background wells G-4, G-6, G-17, and G-18, and down-gradient wells G-14, G-16, G-19, G-20, G-21, G-25, G-26, G-28, G-29, and G-30. Samples from the eastern portion of the site shall be collected and analyzed for the monitoring parameters in accordance with the methods and frequency specified in Table I-B.

Monitoring well G-21 is currently in corrective action due to a release from WP-9.1. The Discharger installed a new groundwater extraction well (G-22) approximately 10 feet downgradient of G-21 to remove the impacted groundwater. To address the effectiveness of the groundwater extraction on the next deeper sand layer, a new groundwater monitoring well (G-23) was installed adjacent to well G-21. To address the effectiveness of groundwater extraction near the down-gradient limit, one new monitoring well (G-24) was installed approximately 200 feet downgradient of well G-21. Monitoring wells G-21, G-23, G-24, and extraction well G-22 shall be analyzed for the listed constituents in accordance with the methods and frequency specified in Table I-C. G-21 shall also be monitored semi-annually for the eastern area routine detection monitoring parameters as shown in Table I-B.

As the landfill expands, additional detection monitoring shall be installed at the approximate locations near the boundaries of the landfill. In addition, interim

monitoring wells shall be installed and monitored to provide the earliest possible detection of a release to groundwater. The wells may be considered interim because they may be located within the permitted landfill footprint. As new landfill cells are constructed, the wells shall be properly destroyed prior to landfill cell construction following approval.

The Discharger shall determine the groundwater flow rate and direction in the uppermost aquifer and in any zones of perched water and in any additional zone of saturation monitored pursuant to this Monitoring and Reporting Program, and report the results semi-annually, including the times of highest and lowest elevations of the water levels in the wells.

The Discharger shall determine the separation of groundwater from the lowest point of each unit and/or module.

Hydrographs of each well shall be submitted showing the elevation of groundwater with respect to the elevations of the top and bottom of the screened interval and the elevation of the pump intake. Hydrographs of each well shall be prepared quarterly and submitted annually.

Groundwater samples shall be collected from the point-of-compliance wells, background wells, and any additional wells added as part of the approved groundwater monitoring system. Samples shall be collected and analyzed for the monitoring parameters in accordance with the methods and frequency specified in Tables I-A, I-B, and I-C.

The monitoring parameters shall also be evaluated each reporting period with regards to the cation/anion balance, and the results shall be graphically presented using a Stiff diagram, a Piper graph, or a Schueller plot. Concentration limits are not required for calcium, magnesium, potassium and sodium.

The last 5-year Constituent-of-Concern (COC) groundwater monitoring event was conducted during 2005; therefore, the next COC event is scheduled to take place in 2010. Samples for the constituents of concern specified in Tables I-A, I-B and I-C shall be collected and analyzed in accordance with the methods listed in Table X.

Borrow Pit Pumping

a. Water quality monitoring of extracted groundwater shall be conducted pursuant to applicable WDRs for land or surface water discharge. A National Pollution Discharge Elimination System (NPDES) Permit would be required for discharge to surface waters.

b. The borrow pit pump shall be automated and equipped with a meter which continuously records flows. Procedures for maintenance of the pumps shall be included in and implemented per the Operation and Maintenance Plan developed for leachate monitoring.

c. The Discharger shall calculate monthly volumes of groundwater extracted from the borrow pit and include this information in the Semi-annual monitoring reports.

2. Unsaturated Zone Monitoring

The Discharger shall operate and maintain an unsaturated zone detection monitoring system that complies with the applicable provisions of Title 27 CCR Sections 20415 and 20420 in accordance with an approved Detection Monitoring Program. The Discharger shall collect, preserve, and transport samples in accordance with the quality assurance/quality control standards contained in an approved Sample Collection and Analysis Plan.

Unsaturated zone samples shall be collected from the monitoring devices of the approved unsaturated zone monitoring system (Attachment B). There is no unsaturated zone monitoring system for DM-1. There is one suction lysimeter, VZ-2.1, which monitors below DM-2.1. The remaining modules and waste pile have pan lysimeters, PL-2.2A, PL-2.2B, PL-11.1, PL-11.2, PL-5.1, PL-5.2, PL-4.1, PL-3.1, PL-9.1A (waste pile), and PL-9.1B (waste pile). These pan lysimeters provide monitoring access to the secondary drainage layer (capillary break) under the corresponding disposal modules. PL-9.1A, PL-9.1B, PL-11.1, and PL-11.2 are in corrective action.

Future expansion modules will be equipped with a leak detection zone that will be monitored as described in D.5, below.

The collected samples shall be analyzed for the listed constituents in accordance with the methods and frequency specified in Tables II-A and II-B. All monitoring parameters shall be graphed so as to show historical trends at each monitoring point. Samples for the constituents of concern specified in Tables II-A and II-B shall be collected and analyzed in accordance with the methods listed in Table X every five years.

Pan lysimeters shall be checked **monthly** for liquid and monitoring shall also include the total volume of liquid removed from the system, except for pan lysimeters in corrective action monitoring. Pan lysimeters in corrective action shall be monitored **weekly** and shall also include the total volume of liquid removed from the system. Any liquid detected in a previously dry pan lysimeter shall be sampled immediately in accordance with Detection Monitoring Specifications E.21.b.

Unsaturated zone monitoring reports shall be included with the corresponding semi-annual groundwater monitoring and shall include an evaluation of potential impacts of the facility on the unsaturated zone and compliance with the Water Quality Protection Standard.

The last 5-year Constituent-of-Concern (COC) unsaturated zone monitoring event was conducted during 2005; therefore, the next COC event is scheduled to take place in 2010.

Land Treatment Unit (LTU)

Unsaturated zone monitoring of the LTU shall be conducted in accordance with Title 27 CCR Section 20435 at locations UZ-1 through UZ-16. LTU monitoring will be conducted by installing one soil boring per acre of the (16-acre) LTU area. Background borings to be installed at the beginning of the drying season (prior to application of sludge). Detection borings to be installed at end of drying season (after sludge is removed) immediately beneath the treatment zone (no deeper than 6 feet below ground surface due to the location of groundwater – 14 May 2003 LTU re-sample report). Samples shall be analyzed in accordance with Tables II-C-1 and II-C-2.

3. Landfill Gas Monitoring

Landfill gas samples shall be also collected from all pan lysimeters and gas probes (Attachment B) on a semi-annual basis as a part of the unsaturated zone landfill gas detection monitoring program and monitored for methane, carbon dioxide, oxygen content and organic vapors using field instruments (Table III). Probes to be monitored include GP-1, GP-2, GP-4 through GP-7, GP-9, GP-10, and GP-11. It should be noted that probes GP-2, GP-4, and GP-5 are proposed to be replaced with new probes that shall be monitored in accordance with this MRP. Pan lysimeters include PL-2.2A, PL-2.2B, PL-3.1, PL-4.1, PL-5.1A, PL-5.1B, PL-11.1, and PL-11.2.

If the photoionization detector indicates the presence of organic vapors at 1 part per million (ppm) or greater or methane at 1.0 percent or greater in a monitoring probe or pan lysimeter, then a gas sample shall be obtained and analyzed for VOCs using EPA Method TO-15. The Discharger shall conduct verification testing (see Detection Monitoring Specification E.21.b in WDRs Order No. R5-2008-0188) if the data meet either of the trigger conditions of Detection Monitoring Specifications E.21. in WDRs Order No. R5-2008-0188, to determine whether a release of VOCs has occurred.

4. Leachate Monitoring/Seeps

All Unit leachate collection and removal system sumps and leachate monitoring wells shall be inspected **monthly** for leachate generation. Upon detection of leachate in a previously dry leachate collection and removal system, leachate shall be sampled **immediately** and analyzed for the constituents listed in Table IV-A (landfill) or IV-B (waste pile). Leachate shall then be sampled and analyzed annually during the fourth quarter thereafter, with a retest during the following second quarter if constituents are detected that have not been previously detected. Leachate samples shall be collected and analyzed for the listed constituents in accordance with the methods and frequency specified in Table IV-A or IV-B. The constituents of concern list shall include all constituents listed in Table X. The quantity of leachate pumped from each sump shall be measured and reported monthly as Leachate Flow Rate (in gallons).

Leachate sumps for the landfill modules include S-1, S-2.1, S-2.2A, S-2.2B, S-3.1, S-4.1, S-5.1A, S-5.1B, S-11.1, and S-11.2. The waste pile sumps are designated S-9.1A and S-9.1B. Leachate monitoring wells for DM-1 include LW-1, LW-2, and LW-3.

Leachate which seeps to the surface from the Unit shall be sampled and analyzed for the Monitoring Parameters and Constituents of Concern listed in Table IV-A upon detection. The quantity of leachate shall be *estimated* and reported as Leachate Flow Rate (in gallons/day). Also, refer to Sections D.6 and E.4, below.

5. Leak Detection Monitoring

Leak detection layer sumps LD-3.1, LD-4.1, and leak detection sumps for future expansion modules shall be checked **semi-annually** for the presence of liquid and the Discharger shall notify the Regional Water Board within **one week** if liquid has been observed. Liquid samples shall be analyzed for Total Dissolved Solids (TDS), chloride and bicarbonate (Table V) to determine the origin of the liquid. If sampling indicates evidence of a release, then confirmation activities described in Detection Monitoring Specifications E.21 and Title 27 Section 20420(j) shall be performed. All remaining liquid shall be pumped out of the leak detection layer within 48 hours.

The leak detection layer shall be monitored for VOCs using a portable photoionization detector (PID) and for methane on a quarterly basis. If the monitoring results in detected concentrations of 1.0 percent methane OR 1.0 parts per million by volume (ppmv) of VOCs or greater then a gas sample shall be collected from that location and analyzed for speciated VOCs by EPA Method TO-15 (Table V). The PID monitoring for VOCs shall be conducted with calibration to a hexane standard or other straight-chain, fuel-related hydrocarbon. Conversion to benzene-equivalents shall be conducted using a response factor for benzene provided by the manufacturer. Gas control measures shall be implemented for a Class II module upon the detection of

gas-phase concentrations of VOCs as specified in Facility Specification C.14 of WDRs Order No. R5-2008-0188.

6. Surface Water Monitoring

The Discharger shall maintain an approved surface water detection monitoring system where appropriate that complies with the applicable provisions of Title 27 CCR Sections 20415 and 20420 in accordance with an approved Detection Monitoring Program.

For all monitoring points assigned to surface water detection monitoring, samples shall be collected and analyzed for the monitoring parameters in accordance with the methods and frequency specified in Table VI. The surface water monitoring points shall consist of the following (at locations shown on Attachment B):

a. Background monitoring points **SW-3** (south side of the culvert that carries the A-1 Channel under Hay Road) and **SW-4** (approximately 600 feet upstream of the landfill drainage discharge point).

b. Discharge points **SW-5** (monitors the bird sanctuary pond), and **SW-7** (monitors the A-1 Channel after the culvert from the bird sanctuary pond joins the channel).

All surface water monitoring samples shall be collected and analyzed for the constituents of concern specified in Table X every five years. All monitoring parameters shall be graphed so as to show historical trends at each sample location.

Surface water samples shall also be collected and analyzed for the Monitoring Parameters and Constituents of Concern listed in Table VI when leachate seeps are observed that may have impacted surface water quality. If leachate seeps are identified extending out of the disposal area or that potentially impact on-site drainages, those drainages shall be sampled as close to the leachate as possible (in addition to sampling of the actual leachate seep as required in Section D.4, above).

The last 5-year Constituent-of-Concern (COC) surface water monitoring event was conducted during 2005; therefore, the next COC event is scheduled to take place in 2010.

7. Storm Water Monitoring

Storm water monitoring shall be conducted in accordance with the NPDES General Permit for Storm Water Discharges Associated with Industrial Activities (Water Quality Order No. 97-03-DWG, NPDES No. CAS000001). The Discharger shall submit a copy of the storm water Annual Report with the first

semi-annual monitoring report for each year submitted under this program.

8. Semi-Solid Waste Monitoring

Semi-solid wastes discharged to the waste pile and LTU shall be monitored in accordance to the methods and frequency specified in Table VII.

9. Composting Area Pond Monitoring

The Discharger shall monitor the high-flow runoff pond for the composting area semiannually during the wet season in accordance with Table VIII.

10. Facility Monitoring

a. Facility Inspection

Annually, prior to the anticipated rainy season, but no later than **15 August**, the Discharger shall conduct an inspection of the facility. The inspection shall assess damage to the drainage control system and groundwater monitoring equipment (including wells, etc.). By **15 September of each year**, the Discharger shall submit to the Regional Water Board a Winterization Plan describing measures planned to prepare the site and conduct operations during the wet season.

Any necessary erosion control measures shall be implemented, and any necessary construction, maintenance, or repairs of precipitation and drainage control facilities shall be completed to prevent erosion or flooding of the facility and to prevent surface drainage from contacting or percolating through wastes by **15 October**. The Discharger shall submit an Annual Winterization Report (AWR) to the Regional Water Board describing the results of the inspection, implementation of the Winterization Plan, and measures taken to comply with this specification report, including photographs of the problem and the repairs. The AWR may be included in the Annual Report submitted under Monitoring and Reporting Program No. R5-2008-0188.

b. Storm Events

The Discharger shall inspect all precipitation, diversion, and drainage facilities for damage **within 7 days** following *major storm events*. Necessary interim repairs shall be completed **within 10 days** of the inspection and permanent repairs shall be completed when feasible. The Discharger shall report any damage and subsequent repairs within 45 days of completion of the repairs, including photographs of the problem and the repairs.

c. Standard Observations

Each monitoring report shall include a summary and certification of completion of all Standard Observations for the waste management unit, for the perimeter of the landfill module, and for the receiving waters. The standard observations shall include those elements identified in Section E.3.f, below, and shall be performed at the required frequencies.

E. REPORTING REQUIREMENTS

1. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records, all original strip chart recordings of continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained throughout the life of the facility including the post closure period.

   Such legible records shall show the following for each sample:

   a. Sample identification and the monitoring point or background monitoring point from which it was taken, along with the identity of the individual who obtained the sample;

   b. Date, time, and manner of sampling;

   c. Date and time that analyses were started and completed, and the name of the personnel and laboratory performing each analysis;

   d. Complete procedure used, including method of preserving the sample, and the identity and volumes of reagents used;

   e. Calculation of results; and

   f. Results of analyses, and the MDL and PQL for each analysis.

2. A transmittal letter explaining the essential points shall accompany each report. At a minimum, the transmittal letter shall identify any violations found since the last report was submitted, and if the violations were corrected. If no violations have occurred since the last submittal, this shall be stated in the transmittal letter. The transmittal letter shall also state that a discussion of any violations found since the last report was submitted, and a description of the actions taken or planned for correcting those violations, including any references to previously submitted time schedules, is contained in the accompanying report.

3. Each monitoring report shall include a compliance evaluation summary. The summary shall contain at least:

a. For each monitoring point and background monitoring point addressed by the report, a description of:

   1) The time of water level measurement;

   2) The type of pump - or other device - used for purging and the elevation of the pump intake relative to the elevation of the screened interval;

   3) The method of purging (the pumping rate; the equipment and methods used to monitor field pH, temperature, and conductivity during purging; the calibration of the field equipment; results of the pH, temperature, conductivity, and turbidity testing; and the method of disposing of the purge water) to remove all portions of the water that was in the well bore while the sample was being taken;

   4) The type of pump - or other device - used for sampling, if different than the pump or device used for purging; and

   5) A statement that the sampling procedure was conducted in accordance with the approved Sampling and Analysis Plan.

b. A map or aerial photograph showing the locations of observation stations, monitoring points, and background monitoring points.

c. For each groundwater body, a description and graphical presentation of the gradient and direction of groundwater flow under/around the Unit, and the groundwater flow rate, based upon water level elevations taken prior to the collection of the water quality data submitted in the report.

d. Laboratory statements of results of all analyses evaluating compliance with requirements.

e. An evaluation of the effectiveness of the leachate monitoring and control facilities, and of the run-off/run-on control facilities.

f. A summary and certification of completion of all **Standard Observations** for the Unit(s), for the perimeter of the Unit, and for the receiving waters. Standard observations for ACTIVE landfill units shall be conducted **weekly** during the wet season (1 October to 30 April) and **monthly** during the dry season (1 May to 30 September). Standard observations for INACTIVE or CLOSED landfill units shall be conducted **monthly** during the wet season (1 October to 30 April) and **quarterly** during the dry season (1 May to 30 September). The Standard Observations shall include:

   1) For the Unit:

a) Evidence of ponded water at any point on the facility (show affected area on map);

b) Evidence of odors - presence or absence, characterization, source, and distance of travel from source; and

c) Evidence of erosion and/or of day-lighted refuse.

2) Along the perimeter of the Unit:

a) Evidence of liquid leaving or entering the Unit, estimated size of affected area, and flow rate (show affected area on map);

b) Evidence of odors - presence or absence, characterization, source, and distance of travel from source; and

c) Evidence of erosion and/or of day-lighted refuse.

3) For receiving waters:

a) Floating and suspended materials of waste origin - presence or absence, source, and size of affected area;

b) Discoloration and turbidity - description of color, source, and size of affected area;

c) Evidence of odors - presence or absence, characterization, source, and distance of travel from source;

d) Evidence of water uses - presence of water-associated wildlife;

e) Flow rate; and

f) Weather conditions - wind direction and estimated velocity, total precipitation during recent days and on the day of observation.

g. The quantity and types of wastes discharged and the locations in the Unit where waste has been placed since submittal of the last such report.

4. The Discharger shall report by telephone any seepage from the disposal area **immediately** after it is discovered. A written report shall be filed with the Regional Water Board **within seven days**, containing at least the following information:

a. A map showing the location(s) of seepage;

b. An estimate of the flow rate;

c. A description of the nature of the discharge (e.g., all pertinent observations and analyses);

d. Verification that samples have been submitted for analyses of the Constituents of Concern and Monitoring Parameters, and an estimated date that the results will be submitted to the Regional Water Board; and

e. Corrective measures underway or proposed, and corresponding time schedule.

5. The Discharger shall submit an **Annual Monitoring Summary Report** to the Regional Water Board covering the reporting period of the previous monitoring year. This report shall contain:

a. All monitoring parameters and constituents of concern shall be graphed so as to show historical trends at each monitoring point and background monitoring point, for all samples taken within at least the previous five calendar years. Each such graph shall plot the concentration of one or more constituents for the period of record for a given monitoring point or background monitoring point, at a scale appropriate to show trends or variations in water quality. The graphs shall plot each datum, rather than plotting mean values. For any given constituent or parameter, the scale for background plots shall be the same as that used to plot down-gradient data. Graphical analysis of monitoring data may be used to provide significant evidence of a release.

b. Unless otherwise exempted, all monitoring analytical data obtained during the previous two six-month reporting periods, shall be submitted in tabular form as well as in a digital file format. The Regional Water Board regards the submittal of data in hard copy and in digital format as "...the form necessary for..." statistical analysis [§20420(h)], in that this facilitates periodic review by the Regional Water Board.

c. A comprehensive discussion of the compliance record, and the result of any corrective actions taken or planned which may be needed to bring the Discharger into full compliance with the waste discharge requirements.

d. A map showing the area and elevations in which filling has been completed during the previous calendar year and a comparison to final closure design contours.

e. A written summary of the monitoring results, indicating any changes made or observed since the previous annual report.

f. An evaluation of the effectiveness of the leachate monitoring/control facilities, including the results of the annual testing of leachate collection and removal systems required under VIII.P of the Standard Provisions and Reporting Requirements.

6. The Discharger shall submit a report on the effectiveness of the corrective action program in accordance with Title 27 CCR Section 20430(h) to the Regional Water Board semi-annually. This report may be included in the Semi-Annual Monitoring Report submitted under Monitoring and Reporting Program No. R5-2008-0188.

7. Annually, prior to the anticipated rainy season but no later than **15 October**, any necessary erosion control measures shall be implemented, and any necessary construction, maintenance, or repairs of precipitation and drainage control facilities shall be completed to prevent erosion or flooding of the facility and to prevent surface drainage from contacting or percolating through wastes. By **15 September of each year**, the Discharger shall submit to the Board a Winterization Plan describing measures planned to prepare the site and conduct operations during the wet season. The Discharger shall submit an Annual Winterization Report (AWR) to the Regional Water Board describing implementation of the Winterization Plan and measures taken to comply with this specification. The AWR may be included in the Annual Report submitted under Monitoring and Reporting Program No. R5-2008-0188.

The Discharger shall implement the above monitoring program on the effective date of this Program.

Ordered by:_____
PAMELA C. CREEDON, Executive Officer

5 December 2008
(Date)

WLB

TABLE I-A

GROUNDWATER MONITORING PROGRAM – WESTERN PORTION OF SITE

Parameter	Units	Frequency
Field Parameters		
Groundwater Elevation	Ft. & hundredths, M.S.L.	Quarterly
Temperature	^{o}C	Semi-Annual
Electrical Conductivity	µmhos/cm	Semi-Annual
pH	pH units	Semi-Annual
Turbidity	Turbidity units	Semi-Annual
Monitoring Parameters		
Total Dissolved Solids (TDS)[1]	mg/L	Semi-Annual
Chloride[1]	mg/L	Semi-Annual
Sulfate[1]	mg/L	Semi-Annual
Nitrate/nitrite as Nitrogen	mg/L	Semi-Annual
Arsenic	mg/L	Semi-Annual
Chromium	mg/L	Semi-Annual
Calcium[1]	mg/L	Annual
Magnesium[1]	mg/L	Annual
Potassium	mg/L	Annual
Sodium[1]	mg/L	Annual
Carbonate[1]	mg/L	Semi-Annual
Bicarbonate[1]	mg/L	Semi-Annual
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Semi-Annual
Constituents of Concern (see Table X)		
Ammonia-Nitrogen	mg/L	5 years
Total Kjedahl Nitrogen	mg/L	5 years
Phosphate	mg/L	5 years
Fecal Coliform	MPN/100 ml	5 years
Total Alkalinity	mg/L	5 years
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

1. These parameters have been excluded from detection monitoring in order to reduce the risk of false positive indications and to therefore increase the reliability of detecting a leachate release. They are included as supplemental parameters for water quality trend analysis.

TABLE I-B

GROUNDWATER MONITORING PROGRAM – EASTERN PORTION OF SITE

Parameter	Units	Frequency
Field Parameters		
Groundwater Elevation	Ft. & hundredths, M.S.L.	Quarterly
Temperature	^{o}C	Semi-Annual
Electrical Conductivity	µmhos/cm	Semi-Annual
pH	pH units	Semi-Annual
Turbidity	Turbidity units	Semi-Annual
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Semi-Annual
Chloride	mg/L	Semi-Annual
Sulfate	mg/L	Semi-Annual
Nitrate/nitrite as Nitrogen	mg/L	Semi-Annual
Arsenic	mg/L	Semi-Annual
Chromium	mg/L	Semi-Annual
Lead	mg/L	Semi-Annual
Ammonia-Nitrogen	mg/L	Semi-Annual
Total Kjedahl Nitrogen	mg/L	Semi-Annual
Calcium[1]	mg/L	Annual
Magnesium[1]	mg/L	Annual
Potassium[1]	mg/L	Annual
Sodium[1]	mg/L	Annual
Carbonate	mg/L	Semi-Annual
Bicarbonate	mg/L	Semi-Annual
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Semi-Annual
Constituents of Concern (see Table X)		
Phosphate	mg/L	5 years
Fecal Coliform	MPN/100 ml	5 years
Total Alkalinity	mg/L	5 years
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

1 These parameters have been excluded from detection monitoring in order to reduce the risk of false positive indications and to therefore increase the reliability of detecting a leachate release. They are included as supplemental parameters for water quality trend analysis.

TABLE I-C

GROUNDWATER CORRECTIVE ACTION MONITORING PROGRAM

Parameter	Units	Frequency
Field Parameters		
Groundwater Elevation	Ft. & hundredths, M.S.L.	Quarterly
Electrical Conductivity	µmhos/cm	Quarterly
pH	pH units	Quarterly
Turbidity	Turbidity units	Quarterly
Volume Extracted[1]	gallons	Quarterly
Monitoring Parameters		
Nitrate/Nitrite as Nitrogen	mg/L	Quarterly

Notes:

1. For extraction well G-22 only.

2. Corrective action monitoring wells include G-21, G-22, G-23, and G-24.
3. G-21 shall also be monitored semi-annually for the eastern area routine detection monitoring parameters (Table I-B).

TABLE II-A

UNSATURATED ZONE DETECTION MONITORING PROGRAM - LANDFILL

Parameter	Units	Frequency
Field Parameters		
Depth to Water	feet	Monthly[1]
Flow Rate/volume	gallons	Monthly[1]
Electrical Conductivity	µmhos/cm	Semi-Annual
pH	pH units	Semi-Annual
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Semi-Annual
Chloride	mg/L	Semi-Annual
Sulfate	mg/L	Semi-Annual
Nitrate/nitrite as Nitrogen	mg/L	Semi-Annual
Calcium[2]	mg/L	Semi-Annual
Magnesium[2]	mg/L	Semi-Annual
Potassium[2]	mg/L	Semi-Annual
Sodium[2]	mg/L	Semi-Annual
Carbonate	mg/L	Semi-Annual
Bicarbonate	mg/L	Semi-Annual
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Semi-Annual
Constituents of Concern (see Table X)		
Ammonia – Nitrogen	mg/L	5 years
Nitrite-Nitrogen	mg/L	5 years
Total Kjeldahl Nitrogen	mg/L	5 years
Phosphate	mg/L	5 years
Fecal Coliform	MPN/100 ml	5 years
Total Alkalinity	mg/L	5 years
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Phosphorus	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

Notes:

1. Pan lysimeters in corrective action shall be monitored weekly for these parameters.
2. These parameters have been excluded from detection monitoring in order to reduce the risk of false positive indications and to therefore increase the reliability of detecting a leachate release. They are included as supplemental parameters for water quality trend analysis.

TABLE II-B

UNSATURATED ZONE DETECTION MONITORING PROGRAM - WASTE PILE

Parameter	Units	Frequency
Field Parameters		
Depth to Water	feet	Monthly[1]
Flow Rate/volume	gallons	Monthly[1]
Electrical Conductivity	µmhos/cm	Semi-Annual
pH	pH units	Semi-Annual
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Semi-Annual
Chloride	mg/L	Semi-Annual
Sulfate	mg/L	Semi-Annual
Nitrate/nitrite as Nitrogen	mg/L	Semi-Annual
Calcium[2]	mg/L	Semi-Annual
Magnesium[2]	mg/L	Semi-Annual
Potassium[2]	mg/L	Semi-Annual
Sodium[2]	mg/L	Semi-Annual
Carbonate	mg/L	Semi-Annual
Bicarbonate	mg/L	Semi-Annual
Ammonia Nitrogen	mg/L	Semi-Annual
Nitrite - Nitrogen	mg/L	Semi-Annual
Total Kjeldahl Nitrogen	mg/L	Semi-Annual
Arsenic	µg/L	Semi-Annual
Chromium	µg/L	Semi-Annual
Lead	µg/L	Semi-Annual
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Semi-Annual
Constituents of Concern (see Table X)		
Phosphate	mg/L	5 years
Fecal Coliform	MPN/100 ml	5 years
Total Alkalinity	mg/L	5 years
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Phosphorus	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

Notes:

1. Pan lysimeters in corrective action shall be monitored weekly for these parameters.
2. These parameters have been excluded from detection monitoring in order to reduce the risk of false positive indications and to therefore increase the reliability of detecting a leachate release. They are included as supplemental parameters for water quality trend analysis.

TABLE II-C-1

UNSATURATED ZONE DETECTION MONITORING PROGRAM – LAND TREATMENT UNIT- Soil Pore Water[1]

Parameter	Units	Frequency
Field Parameters		
pH	pH units	Twice per year[2]
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Twice per year[2]
Chloride	mg/L	Twice per year[2]
Sulfate	mg/L	Twice per year[2]
Nitrate/nitrite as Nitrogen	mg/L	Twice per year[2]
Ammonia Nitrogen	mg/L	Twice per year[2]
Total Kjeldahl Nitrogen	mg/L	Twice per year[2]
Arsenic	µg/L	Annual[2]
Chromium	µg/L	Annual[2]
Dissolved Lead	µg/L	Annual[2]
Phosphate	mg/L	Annual[2]
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Annual[2]
Constituents of Concern (see Table X)		
Bicarbonate & Carbonate	mg/L	5 years
Calcium	mg/L	5 years
Magnesium	mg/L	5 years
Potassium	mg/L	5 years
Sodium	mg/L	5 years
Phosphate	mg/L	5 years
Fecal Coliform	100 MPN/ml	5 years
Total Alkalinity	mg/L	5 years
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Phosphorus	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

Note:

1. If pore water cannot be extracted from samples, proceed with soil analysis per Table II-C-2.
2. One sample shall be taken at each monitoring location before the drying season (prior to sludge application) and one at the end of the drying season (after sludge is removed).

TABLE II-C-2

UNSATURATED ZONE DETECTION MONITORING PROGRAM – LAND TREATMENT UNIT - Soil

Parameter	Units	Frequency
Field Parameters		
Moisture	percent	Twice per year[1]
pH	pH units	Twice per year[1]
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Twice per year[2]
Chloride	mg/L	Twice per year[2]
Nitrate/nitrite as Nitrogen	mg/L	Twice per year[2]
Sulfate	mg/L	Twice per year[2]
Ammonia Nitrogen	mg/L	Twice per year[2]
Nitrite Nitrogen	mg/L	Twice per year[2]
Total Kjeldahl Nitrogen	mg/L	Twice per year[2]
Arsenic	µg/L	Annually[2]
Chromium	µg/L	Annually[2]
Dissolved Lead	µg/L	Annually[2]
Constituents of Concern (see Table X)		
Bicarbonate & Carbonate	mg/L	5 years
Calcium	mg/L	5 years
Magnesium	mg/L	5 years
Potassium	mg/L	5 years
Sodium	mg/L	5 years
Phosphate	mg/L	5 years
Fecal Coliform	100 MPN/ml	5 years
Total Alkalinity	mg/L	5 years
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Phosphorus	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

Notes:

1. One sample shall be taken at each monitoring location before the drying season (prior to sludge application) and one at the end of the drying season (after sludge is removed).
2. Samples shall be taken at end of drying season after sludge removal immediately below the treatment zone of 5 feet but not to exceed 6 feet in depth. Monitor soil for these constituents only when pore water samples cannot be extracted from soil. Use WET test for extraction and see Table X for constituent test methods.

TABLE III

LANDFILL GAS MONITORING PROGRAM

Landfill Gas Detection Monitoring Program

Location	Landfill Gas Monitoring Parameters				VOCs By
	Methane	Carbon Dioxide	Oxygen	Organic vapors	EPA TO-15
All constructed gas probes and pan lysimeters	Semi Annual	Semi Annual	Semi Annual	Semi Annual	If detected*

Legend:

LFG Field Monitoring using GEM 500 (or approved equivalent) for LFG and portable Photo Ionization Detector (PID) Meter for VOCs. The PID shall be calibrated and results presented as benzene equivalents.

* If the photoionization detector indicates the presence of organic vapors at 1 part per million or greater or methane at 1.0 percent or greater in a monitoring probe or pan lysimeter, then a gas sample shall be obtained and analyzed for speciated VOCs using EPA Method TO-15.

TABLE IV-A

LEACHATE DETECTION MONITORING PROGRAM - LANDFILL

Parameter	Units	Frequency
Field Parameters		
Depth to Water	feet	Monthly[1]
Total Volume Pumped	Gallons	Monthly[1]
Flow Rate	Gallons/Day	Monthly[1]
Electrical Conductivity	µmhos/cm	Annual
pH	pH units	Annual
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Annual
Chloride	mg/L	Annual
Sulfate	mg/L	Annual
Nitrate/nitrite as Nitrogen	mg/L	Annual
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Annual
Carbonate	mg/L	Annual
Bicarbonate	mg/L	Annual
Calcium	mg/L	Annual
Magnesium	mg/L	Annual
Potassium	mg/L	Annual
Sodium	mg/L	Annual
Phosphate	mg/L	Annual
Phosphorus	mg/L	Annual
Fecal Coliform	100 MPN/ml	Annual
Total Alkalinity	mg/L	Annual
Total Organic Carbon	mg/L	Annual
Constituents of Concern (see Table XI)		
Ammonia-Nitrogen	mg/L	5 years
Nitrite-Nitrogen	mg/L	5 years
Total Kjeldahl Nitrogen	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

Note.
1. Sumps whose pan lysimeters are in a corrective action monitoring program shall be monitored weekly.

TABLE IV-B

LEACHATE DETECTION MONITORING PROGRAM – WASTE PILE

Parameter	Units	Frequency
Field Parameters		
Depth to Water	feet	Monthly[1]
Total Volume Pumped	Gallons	Monthly[1]
Flow Rate	Gallons/Day	Monthly
Electrical Conductivity	µmhos/cm	Annual
pH	pH units	Annual
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Annual
Chloride	mg/L	Annual
Sulfate	mg/L	Annual
Nitrate/nitrite as Nitrogen	mg/L	Annual
Arsenic	mg/L	Annual
Chromium	mg/L	Annual
Lead	mg/L	Annual
Ammonia-Nitrogen	mg/L	Annual
Nitrite-Nitrogen	mg/L	Annual
Total Kjeldahl Nitrogen	mg/L	Annual
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Annual
Carbonate	mg/L	Annual
Bicarbonate	mg/L	Annual
Calcium	mg/L	Annual
Magnesium	mg/L	Annual
Potassium	mg/L	Annual
Sodium	mg/L	Annual
Phosphate	mg/L	Annual
Phosphorus	mg/L	Annual
Fecal Coliform	100 MPN/ml	Annual
Total Alkalinity	mg/L	Annual
Total Organic Carbon	mg/L	Annual
Constituents of Concern (see Table X)		
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

Note.
1. Sumps whose pan lysimeters are in a corrective action monitoring program shall be monitored weekly for these parameters, and any time daily rainfall exceeds one inch.

TABLE V

LEAK DETECTION MONITORING
(Semi-Annual)

Location	Liquid Analysis (if present)	Gas Analysis*
All leak detection layer sumps	Total Dissolved Solids	Organic vapors using PID
	Chloride	Methane
	Bicarbonate	

* If the monitoring results in detected concentrations of 1.0 percent methane OR 1.0 parts per million by volume (ppmv) of VOCs or greater then a gas sample shall be collected from that location and analyzed for speciated VOCs by EPA Method TO-15. The PID monitoring for VOCs shall be conducted with calibration to a hexane standard or other straight-chain, fuel-related hydrocarbon. Conversion to benzene-equivalents shall be conducted using a response factor for benzene provided by the manufacturer.

TABLE VI

SURFACE WATER DETECTION MONITORING PROGRAM

Parameter	Units	Frequency
Field Parameters		
Turbidity	Turbidity units	Semi-Annual
Temperature	^{o}C	Semi-Annual
Electrical Conductivity	µmhos/cm	Semi-Annual
pH	pH units	Semi-Annual
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Semi-Annual
Chloride	mg/L	Semi-Annual
Sulfate	mg/L	Semi-Annual
Nitrate/nitrite as Nitrogen	mg/L	Semi-Annual
Total Suspended Solids	mg/L	Semi-Annual
Arsenic	mg/L	Semi-Annual
Chromium	mg/L	Semi-Annual
Lead	mg/L	Semi-Annual
Ammonia-Nitrogen	mg/L	Semi-Annual
Nitrite-Nitrogen	mg/L	Semi-Annual
Total Kjeldahl Nitrogen	mg/L	Semi-Annual
Volatile Organic Compounds (USEPA Method 8260B, see Table IX)	µg/L	Semi-Annual
Constituents of Concern (see Table X)		
Bicarbonate	mg/L	5 years
Carbonate	mg/L	5 years
Calcium	mg/L	5 years
Magnesium	mg/L	5 years
Potassium	mg/L	5 years
Sodium	mg/L	5 years
Phosphate	mg/L	5 years
Fecal Coliform	100 MPN/ml	5 years
Total Alkalinity	mg/L	5 years
Total Organic Carbon	mg/L	5 years
Phosphorus	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260B, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270C)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8151A)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141A)	µg/L	5 years
PCBs (USEPA Method 8082)	µg/L	5 years

TABLE VII

SEMISOLID WASTE MONITORING PROGRAM

Waste Pile

Parameter	Units	Frequency
Type of material discharged	-----	Semi-Annual
Quantity discharged	cubic yards, wet tons	Semi-Annual
Moisture Content[1]	percent	Semi-Annual
Capacity of unit/module remaining	percent	Semi-Annual

1. Biosolids discharged to WP 9.1 shall not contain any free liquids per Prohibition A.16 of WDRs.

Land Treatment Unit

Parameter	Units	Frequency
Initial sludge depth	inches and # of lifts	Monthly
Quantity discharged	cubic yards, wet tons	Monthly
Moisture Content	percent	Monthly
Location within LTU	quadrant	Monthly
Quantity removed	cubic yards, wet tons	Monthly
Moisture content	percent	Monthly
Location within LTU	quadrant	Monthly
Disposition	-----	Monthly
Final sludge depth	inches and # of lifts	Monthly
Area covered	acres	Monthly
Total drying cycles during period	-----	Monthly
Cumulative LTU area covered	acres	Monthly

TABLE VIII

COMPOSTING AREA POND MONITORING

Parameter	Units	Frequency
Field Parameters		
Turbidity	Turbidity units	Semi-Annual[1]
Electrical Conductivity	µmhos/cm	Semi-Annual[1]
pH	pH units	Semi-Annual[1]
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Semi-Annual[1]
Total Fixed Dissolved Solids (TFDS)	mg/L	Semi-Annual[1]
Chloride	mg/L	Semi-Annual[1]
Sulfate	mg/L	Semi-Annual[1]
Nitrate as Nitrogen	mg/L	Semi-Annual[1]
Ammonia as Nitrogen	mg/L	Semi-Annual[1]
Total Kjeldahl Nitrogen	mg/L	Semi-Annual[1]
Total Phosphorous	mg/L	Semi-Annual[1]
Total Lead	µg/L	Semi-Annual[1]

[1] Samples shall be collected twice annually during the wet season. Cumulative sample results shall be reported in each semiannual and annual report.

TABLE IX

MONITORING PARAMETERS FOR DETECTION MONITORING & APPROVED USEPA ANALYTICAL METHODS

Field Parameters	**Method**
Temperature	2550
Turbidity	2130B
pH	150.1
Electrical Conductivity	2510

Biosolids Parameters	**Method**
Ammonia Nitrogen	4500-NH_3
Nitrite Nitrogen	300 (anion scan)
Total Kjeldahl Nitrogen	4500-N-org

General Minerals	**Method**
Bicarbonate	2310B
Carbonate	2310B
Calcium	300 (anion scan)
Chloride	300 (anion scan)
Magnesium	200.7 (trace method)
Nitrate – Nitrogen	300 (anion scan)
Phosphate	300 (anion scan)
Potassium	200.7 (trace method)
Sodium	200.7 (trace method)
Sulfates	300 (anion scan)
Total Dissolved Solids (TDS)	2540C

Other Parameters	**Method**
Phosphate	300 (anion scan)

Inorganics [1]	**Method**
Arsenic	200.9/200.8
Lead	200.9/200.8
Chromium	200.7/6010

1. Leachate, groundwater, and unsaturated zone samples shall be analyzed and reported as dissolved.

Surrogates for Metallic Constituents:

pH
Total Dissolved Solids
Electrical Conductivity
Chloride
Sulfate
Nitrate nitrogen

TABLE IX

MONITORING PARAMETERS FOR DETECTION MONITORING & APPROVED USEPA ANALYTICAL METHODS

Continued

Constituents included in VOC:

USEPA Method 8260B

Acetone
Acrylonitrile
Tert-Amyl ethyl ether
Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform (Tribromomethane)
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane (Ethyl chloride)
Chloroform (Trichloromethane)
Dibromochloromethane (Chlorodibromomethane)
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene dibromide; EDB)
o-Dichlorobenzene (1,2-Dichlorobenzene)
m-Dichlorobenzene (1,3-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
trans- l ,4-Dichloro-2-butene
Dichlorodifluoromethane (CFC-12)
1,1-Dichloroethane (Ethylidene chloride)
1,2-Dichloroethane (Ethylene dichloride)
1,1 -Dichloroethylene (1,1 -Dichloroethene; Vinylidene chloride)
cis- 1,2-Dichloroethylene (cis- 1,2-Dichloroethene)
trans-1,2-Dichloroethylene (trans-1,2-Dichloroethene)
1,2-Dichloropropane (Propylene dichloride)
cis- 1,3-Dichloropropene
trans- 1,3-Dichloropropene
Di-isopropylether (DIPE)
1,4 Dioxane
Ethanol
di-Isopropyl ether
Ethyltertiary butyl ether
Ethylbenzene
2-Hexanone (Methyl butyl ketone)
Hexachlorobutadiene
Hexachloroethane

TABLE IX

MONITORING PARAMETERS FOR DETECTION MONITORING & APPROVED USEPA ANALYTICAL METHODS

Continued

Methyl bromide (Bromomethene)
Methyl chloride (Chloromethane)
Methylene bromide (Dibromomethane)
Methylene chloride (Dichloromethane)
Methyl ethyl ketone (MEK: 2-Butanone)
Methyl iodide (Iodomethane)
Methyl t-butyl ether (MTBE)
4-Methyl-2-pentanone (Methyl isobutylketone)
Naphthalene
2-Nitropropane
n-Propylbenzene
Styrene
Tertiary amyl methyl ether
Tertiary butyl alcohol
1,1,1,2-Tetrachloroethane
1,1.2,2-Tetrachloroethane
Tetrachloroethylene (Tetrachloroethene; Perchloroethylene)
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloethane (Methylchloroforrn)
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene)
Trichlorofluoromethane (CFC- 11)
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl acetate
Vinyl chloride
Xylenes (total)

TABLE X

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Field Parameters	**Method**
pH	150.1
Electrical Conductivity	2510

Biosolids Parameters	**Method**
Fecal Coliform	9221B
Total Alkalinity	2310B
Ammonia Nitrogen	4500-NH_3
Nitrite Nitrogen	300
Total Kjeldahl Nitrogen	4500-N-org
Total Organic Carbon	415.1

General Minerals	**Method**
Bicarbonate	2310B
Carbonate	2310B
Calcium	300 (anion scan)
Chloride	300 (anion scan)
Magnesium	200.7 (trace method)
Nitrate – Nitrogen	300 (anion scan)
Phosphate	300 (anion scan)
Potassium	200.7 (trace method)
Sodium	200.7 (trace method)
Sulfates	300 (anion scan)
Total Dissolved Solids (TDS)	2540C

Inorganics (dissolved):	**Method**
Aluminum	200.7/6010
Antimony	200.7/7041
Barium	200.7/6010
Beryllium	200.7/6010
Cadmium	200.7/7131A
Chromium	200.7/6010
Cobalt	200.7/6010
Copper	200.7/6010
Silver	200.7/6010
Tin	200.7/6010
Vanadium	200.7/6010
Zinc	200.7/6010
Iron	200.7/6010
Manganese	200.7/6010
Arsenic	200.9/200.8
Lead	200.9/200.8
Mercury	7470A
Nickel	200.9/200.8
Selenium	200.9/200.8

TABLE X

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

Thallium	200.9/200.8
Cyanide	9010
Sulfide	9030

Other Parameters	**Method**
Phosphorus (ortho)	365.3

Volatile Organic Compounds (Method 8260B):

Acetone
Acetonitrile (Methyl cyanide)
Acrolein
Acrylonitrile
Allyl chloride (3-Chloropropene)
Tert-Amyl ethyl ether
Benzene
Bromobenzene
Bromochloromethane (Chlorobromomethane)
Bromodichloromethane (Dibromochloromethane)
Bromoform (Tribromomethane)
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane (Ethyl chloride)
Chloroform (Trichloromethane)
Chloroprene
Dibromochloromethane (Chlorodibromomethane)
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene dibromide; EDB)
o-Dichlorobenzene (1,2-Dichlorobenzene)
m-Dichlorobenzene (1,3-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
trans- 1,4-Dichloro-2-butene
Dichlorodifluoromethane (CFC 12)
1,1 -Dichloroethane (Ethylidene chloride)
1,2-Dichloroethane (Ethylene dichloride)
1,1 -Dichloroethylene (1, l-Dichloroethene; Vinylidene chloride)
cis- l ,2-Dichloroethylene (cis- 1,2-Dichloroethene)
trans- l ,2-Dichloroethylene (trans- 1,2-Dichloroethene)
1,2-Dichloropropane (Propylene dichloride)
1,3-Dichloropropane (Trimethylene dichloride)

TABLE X

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

2,2-Dichloropropane (Isopropylidene chloride)
1,1 -Dichloropropene
cis- 1,3-Dichloropropene
trans- l ,3-Dichloropropene
Di-isopropylether (DIPE)
1,4-Dioxane
Ethanol
Ethyltertiary butyl ether
Ethylbenzene
Ethyl methacrylate
Hexachlorobutadiene
Hexachloroethane
2-Hexanone (Methyl butyl ketone)
Isobutyl alcohol
Methacrylonitrile
Methyl bromide (Bromomethane)
Methyl chloride (Chloromethane)
Methyl ethyl ketone (MEK; 2-Butanone)
Methyl iodide (Iodomethane)
Methyl t-butyl ether (MTBE)
Methyl methacrylate
4-Methyl-2-pentanone (Methyl isobutyl ketone)
Methylene bromide (Dibromomethane)
Methylene chloride (Dichloromethane)
Naphthalene
2-Nitropropane
n-Propylbenzene
Propionitrile (Ethyl cyanide)
Styrene
Tertiary amyl methyl ether
Tertiary butyl alcohol
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Tetrachloroethene; Perchloroethylene; PCE)
Toluene
1,2,4-Trichlorobenzene
1,1,1 -Trichloroethane, Methylchloroform
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene; TCE)
Trichlorofluoromethane (CFC- 11)
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl acetate

TABLE X

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

Vinyl chloride (Chloroethene)
Xylene (total)

Semi-Volatile Organic Compounds (Method 8270 - base, neutral, & acid extractables):

Acenaphthene
Acenaphthylene
Acetophenone
2-Acetylaminofluorene (2-AAF)
Aldrin
4-Aminobiphenyl
Anthracene
Benzo[a]anthracene (Benzanthracene)
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzo[g,h,i]perylene
Benzo[a]pyrene
Benzyl alcohol
Bis(2-ethylhexyl) phthalate
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (Lindane)
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl) ether (Dichloroethyl ether)
Bis(2-chloro-1-methyethyl) ether (Bis(2-chloroisopropyl) ether; DCIP)
4-Bromophenyl phenyl ether
Butyl benzyl phthalate (Benzyl butyl phthalate)
Chlordane
p-Chloroaniline
Chlorobenzilate
p-Chloro-m-cresol (4-Chloro-3-methylphenol)
2-Chloronaphthalene
2-Chlorophenol
4-Chlorophenyl phenyl ether
Chrysene
o-Cresol (2-methylphenol)
m-Cresol (3-methylphenol)
p-Cresol (4-methylphenol)
4,4'-DDD
4,4'-DDE
4,4'-DDT
Diallate

TABLE X

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

Dibenz[a,h]anthracene
Dibenzofuran
Di-n-butyl phthalate
3,3'-Dichlorobenzidine
2,4-Dichlorophenol
2,6-Dichlorophenol
Dieldrin
Diethyl phthalate
p-(Dimethylamino)azobenzene
7,12-Dimethylbenz[a]anthracene
3,3'-Dimethylbenzidine
2,4-Dimehtylphenol (m-Xylenol)
Dimethyl phthalate
m-Dinitrobenzene
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octyl phthalate
Diphenylamine
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Ethyl methanesulfonate
Famphur
Fluoranthene
Fluorene
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorocyclopentadiene
Hexachloropropene
Indeno(1,2,3-c,d)pyrene
Isodrin
Isophorone
Isosafrole
Kepone
Methapyrilene
Methoxychlor
3-Methylcholanthrene
Methyl methanesulfonate
2-Methylnaphthalene

TABLE X

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

1,4-Naphthoquinone
1-Naphthylamine
2-Naphthylamine
o-Nitroaniline (2-Nitroaniline)
m-Nitroaniline (3-Nitroaniline)
p-Nitroaniline (4-Nitroaniline)
Nitrobenzene
o-Nitrophenol (2-Nitrophenol)
p-Nitrophenol (4-Nitrophenol)
N-Nitrosodi-n-butylamine (Di-n-butylnitrosamine)
N-Nitrosodiethylamine (Diethylnitrosamine)
N-Nitrosodimethylamine (Dimethylnitrosamine)
N-Nitrosodiphenylamine (Diphenylnitrosamine)
N-Nitrosodipropylamine (N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine)
N-Nitrosomethylethylamine (Methylethylnitrosamine)
N-Nitrosopiperidine
N-Nitrosospyrrolidine
5-Nitro-o-toluidine
Pentachlorobenzene
Pentachloronitrobenzene (PCNB)
Pentachlorophenol
Phenacetin
Phenanthrene
Phenol
p-Phenylenediamine
Polychlorinated biphenyls (PCBs; Aroclors)
Pronamide
Pyrene
Safrole
1,2,4,5-Tetrachlorobenzene
2,3,4,6-Tetrachlorophenol
o-Toluidine
Toxaphene
2,4,5-Trichlorophenol
0,0,0-Triethyl phosphorothioate
sym-Trinitrobenzene

TABLE X

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

Chlorophenoxy Herbicides (Method 8l51A):

2,4-D (2,4-Dichlorophenoxyacetic acid)
Dinoseb (DNBP; 2-sec-Butyl-4,6-dinitrophenol)
Silvex (2,4,5-Trichlorophenoxypropionic acid; 2,4,5-TP)
2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)

Organophosphorus Compounds (Method 8141A):

Atrazine
Chlorpyrifos
0,0-Diethyl 0-2-pyrazinyl phosphorothioate (Thionazin)
Diazinon
Dimethoate
Disulfoton
Ethion
Methyl parathion (Parathion methyl)
Parathion
Phorate
Simazine

INFORMATION SHEET

ORDER NO. R5-2008-0188
NORCAL WASTE SYSTEM HAY ROAD LANDFILL, INCORPORATED
HAY ROAD LANDFILL
SOLANO COUNTY

Background

The Norcal Waste System Hay Road Landfill is a Class II municipal solid waste landfill facility about eight miles east of Vacaville in Solano County. The landfill has been in operation since 1968 serving the incorporated and unincorporated areas of Solano County. The facility accepts nonhazardous and designated waste, including MSW to Class II and Class III waste management units at the landfill. These wastes include construction and demolition debris, household, commercial and industrial wastes, de-watered wastewater treatment plant sludge, industrial sludges, treated wood waste, dredge debris, slab/construction/demolition debris, commercial/industrial waste, glass cullet, asbestos containing waste, and other non-hazardous or designated wastes.

Existing Facilities and Expansion Area

The facility consists of three landfill units. Landfill 1 (LF-1) is an older partially lined Class III unit that consists of module DM-1; Landfill 2 (LF-2) is a lined Class III unit that consists of module DM-2.1, and Landfill 3 (LF-3) is a Class II expansion unit approved by the Regional Water Board in 1995 consisting of several modules. LF-3, the expansion landfill will ultimately consist of 15 Class II modules. LF-3 currently consists of four Class II modules DM-2.2, DM-3, DM-4, DM-5, and DM-11. The facility also includes a Class II waste pile (WP-9.1), and a Class II land treatment unit (LTU).

Waste Pile and Land Treatment Unit for Sludge

Waste pile WP-9.1 is used to contain de-watered wastewater treatment plant sludge accepted by the facility during the wet season, and the LTU is used to dry the sludge in during the dry season. After it is dry, the sludge is removed from the LTU area and used as alternative daily cover (ADC) in landfill modules. Dried sludge is also used in soil manufacturing operations conducted in the LTU area. WDRs Order No. 5-01-101 re-classified former landfill module DM-9.1 as a Class II waste pile (now WP-9.1) under Title 27, and prescribe requirements for sludge storage in the unit and closure. The WDRs also classified the sludge drying area as a Class II LTU and prescribed requirements for that discharge, including a requirement that all sludge be removed from the LTU prior to the wet season.

Alternative Daily Cover

The Discharger uses various non-hazardous and designated wastes accepted at the landfill as alternative daily cover (ADC) on landfill modules, including wood, green waste, compost materials, biosolids, sludge, ash, cement kiln dust, dredge spoils, shredded tires, processed construction and demolition debris, and contaminated soil. These WDRs include a discharge specification requiring that, for each type of waste, the Discharger first demonstrate that it does not pose a threat to water quality and meets the requirements for use as ADC under Title 27 CCR Section 20705.

Soil Manufacturing

It is estimated that there will be about a 3.7 million cubic yard deficit in the amount of soil needed for future module construction activities and operations and the available onsite supply from the borrow pit (estimated to be about 5.8 million cubic yards). The Discharger plans to make up the difference by importing soil and ADC, and from soil manufacturing operations. The soil manufacturing operations involve the mixing of borrow soil, sludge and other waste materials, so as to create a soil-type product suitable for cover and construction applications.

The soil manufacturing operations is conducted during the dry season within the LTU area. The manufactured soil generally consists of a mixture of dried sludge (60%), compost overs (oversized material screened from compost) (20%), and onsite soil (20%), or alternatively only dried sludge (70%) and soil (30%). Once mixed, the manufactured soil is stockpiled next to the module where it is needed for construction operations. For modules not scheduled for construction that year, the stockpiles are winterized prior to the wet season by grading and capping them (with a one-foot layer of clay) for drainage and erosion control. The JTD states that the manufactured soil is used for operations layer soil. The WDRs require that any manufactured soil used in module construction meet the desired specifications and performance standard for that application as demonstrated in a staff-approved design report. The WDRs also require that any stockpiles from soil manufacturing operations are adequately winterized to protect water quality.

Liner Performance Demonstration

The Discharger submitted a *Liner Performance Demonstration Report for DM-4.1 and Future Class II Liner Systems* dated 15 April 2003. The Disposal Module 4.1 (DM-4.1) base liner for Hay Road Landfill was proposed as follows (from bottom to top):

- Compacted subgrade comprised of fined-grained soils;
- 60-mil high density polyethylene (HDPE) geomembrane liner;
- Leak detection geocomposite;
- 2.5-foot thick compacted clay liner with a permeability of 1×10^{-7} cm/s or less;
- 60-mil HDPE geomembrane;
- Leachate collection and removal system (LCRS) gravel layer at least 6 inches thick;
- 8-oz. Geotextile filter layer; and
- 12-inch thick operations layer.

The side-slope liner system was proposed as follows (from bottom to top):

- Compacted subgrade comprised of fined-grained soils;
- Geosynthetic clay liner (GCL) with 30-mil geomembrane;
- 60-mil HDPE geomembrane;
- LCRS geocomposite; and
- 1.5-foot minimum operations layer.

The Discharger will provide comprehensive construction quality control during the liner system construction, complete an electrical leak location survey to verify the integrity of the primary liner system, and install landfill gas (LFG) collection pipes within the LCRS to control LFG in the future, if necessary.

The demonstration compared efficiencies and leakage potential of six different liner system designs. A total leakage potential of 1.04 gallons was calculated throughout the life of the landfill (operations and 30-year post-closure period) for the 14-acre (DM-4) cell. In addition, a cost-benefit analysis was performed which showed that additional liner components would cost significantly more without significantly less leakage potential. As such, the demonstration concluded that a more stringent liner system is not warranted since the proposed system will meet the performance requirements of Title 27 CCR because it exemplifies the prescriptive standard with an additional leak detection component.

Closure

During 2007, the Discharger submitted an updated *Preliminary Closure and Post-Closure Maintenance Plan* (PCPMP) for the facility. Under the plan, all three landfills will be closed contiguously as a single closed facility. Final cover will be installed as portions of the landfills reach final refuse grade. The crest elevation for the closed facility, including final cover, will be about 215 feet MSL compared to the base elevation of about 30 feet MSL. The final cover side slopes will have a maximum slope of 4:1 (horizontal-to-vertical), with 25-foot wide benches for every 50 vertical feet. The crest will have a minimum slope of five percent to ensure adequate drainage and control erosion.

The Discharger proposes an engineered alternative design (EAD) for the final cover, previously approved in WDRs R5-2003-0118, as follows:

For the top deck areas of the landfill consisting of (from top to bottom):

- A one-foot thick vegetative soil layer;
- A protective 10-oz/y geotextile cushion layer;
- A 60-mil HDPE geomembrane
- A low-permeability GCL; and
- A one-foot thick compacted soil foundation layer.

The side slope design includes (from top to bottom):

- A one-foot thick vegetative soil layer;
- A geocomposite drainage layer;
- A 60-mil HDPE geomembrane (textured on both sides); and
- A one-foot thick compacted soil foundation layer.

The Discharger made the demonstration that the EAD will provide equal or better performance than the prescriptive standard. The Discharger showed that the geosynthetic materials proposed can tolerate substantially higher strains up to 10 to 20 percent or greater before yielding and can tolerate strains 10 times larger than its soil components. As such, a

two-foot thick foundation is not necessary for geosynthetic materials and that a one-foot thick foundation layer is adequate to provide a clean, firm surface for its installation. In addition, the Discharger provided a hydraulic equivalency evaluation for the system using GCL that showed significantly improved infiltration performance over the previously approved 1993 EAD cover system, and provided equal or improved performance to the prescriptive cover system.

Groundwater Monitoring

The depth to groundwater varies from about 2 to 23 feet below ground surface (bgs), averaging about 10 feet bgs or 10 feet above mean sea level (MSL). The regional ground water flow direction is from northwest to southeast, but is altered over much of the site by groundwater pumping from the borrow pit. As a result, the shallow groundwater gradient direction over the western half of the site, including DMs-1, 2.2, 2.1 and 11 is to the south or southwest toward the borrow pit, while that on the eastern half of the site conforms more to the regional gradient direction.

The groundwater pumping appears to be causing groundwater to be drawn beneath the units on the western portion of the site. As such, detection monitoring using an interwell approach would not likely be effective in detecting a release of leachate from these units. The Discharger monitors the western portion of the site, including modules DM-1, DM-2.2, DM-2.1 and DM-11, using the method of "intrawell" comparisons. The eastern portion of the site is monitored using an interwell approach with background wells installed along the northern periphery of the landfill and detection wells installed immediately downgradient of each landfill module.

Evaluation Monitoring and Corrective Action for DM-11

The Discharger conducted an evaluation monitoring program (EMP) at DM-11 to investigate the nature and extent of VOC-impacts from two apparent release events, which were detected in October 1999 and April 2000, respectively. Liquid was detected in the two pan lysimeters that monitor the LCRS sumps at DM-11. Approximately 4,755 gallons of liquid was pumped from PL-11.1, and 16,850 gallons was pumped from PL-11.2 through early August 2000 as a result of the second release. Additional liquid was detected in PL-11.2 in late October 2000, but PL-11.1 has been dry since early August 2000. Confirmation analysis of the liquid indicated the presence of volatile organic compounds (VOCs), including Acetone (up to 585 µg/l), 2-Butanone (up to 1,500 µg/l), Chloroethane (up to 4.2 µg/l), 1,1-Dichloroethane (up to 6.8 µg/l), Methylene chloride (up to 60.1 µg/l), 1,1,1-Trichloroethane (up to 2.6 µg/l), and Trichlorofluoromethane (up to 8.2 µg/l).

An *Engineering Feasibility Study* (EFS) for DM-11.1 and DM-11.2, dated 30 May 2001, was submitted in accordance with Title 27 CCR Section 20420(k)(6), which includes the results of the EMP. The extent of impact was evaluated through an investigation, which included soil, soil gas, and groundwater sampling near and downgradient of the disposal modules. Based on the investigation, several potential sources for the water and VOCs were evaluated. The EFS concluded that the VOCs detected in the liquid was likely due to the surface water coming into contact with VOCs on the active landfill ground surface before entering the

gravel capillary break layer and possibly LFG. The corrective action measures implemented included covering the capillary break gravel layer during the rainy season and preventing surface water runoff from entering the gravel layer using improved surface runoff controls. On 21 March 2003, the Discharger submitted a LFG monitoring and corrective action alternatives for DM-11. To better define the occurrence and potential for gas migration, the Discharger proposed to install and monitor seven new LFG probes (GP-2 through GP-8) and monitor one existing probe (GP-1) for concentrations of combustible gas (as methane), oxygen, carbon dioxide, and barometric pressure. The monitoring intervals will target fine sand layers that underlie the site. Each pan lysimeter will also be monitored (PL-2.2A, PL-2.2B, PL-5.1A, PL-5.1B, PL-11.1 and PL-11.2).

The Discharger submitted a corrective action plan for DM-11.1 and DM-11.2 in May 2005 that was approved during August 2005. The plan consisted of installing additional probes along the perimeter to provide additional for the design of an in-fill landfill gas control system. A limited number of landfill gas extraction wells have been installed in DM-1, DM-2.1, DM-2.2, and DM-11 for passive venting; however, installation of the full system has not yet been completed due to delays in the permitting process with the local air district. The full system will consist of a landfill gas venting system and flare connected to nine new landfill gas wells, the existing landfill gas wells, and nine leachate sump risers. Startup of the full system is expected during the fall of 2008 following the completion of permitting with the local air district.

The monitoring program in the WDRs incorporates the EFS, including more frequent (weekly) monitoring of the pan lysimeters for liquid at DM-11 and other modules in corrective action, LFG monitoring, and other activities.

Evaluation Monitoring and Corrective Action for WP-9.1

During routine monitoring in July 2000, liquid was detected in pan lysimeters PL-9.1A and PL-9.1B located beneath WP-9.1. Grab water samples were obtained from both pan lysimeters and elevated concentrations of nitrate were detected (395 milligrams per liter (mg/L) in PL-9.1A and 153 mg/L in PL-9.1B). Liquid from each pan lysimeter was sampled during fourth quarter 2000, first quarter 2001, and second quarter 2001. Analytical results from these samples confirmed the presence of high concentrations of nitrate/nitrite as nitrogen.

The Discharger submitted an *Amendment to Report of Waste Discharge and Establishment of Evaluation Monitoring Program for Pan Lysimeters PL-9.1A and PL-9.1B* (EMP), dated 7 June 2001. The EMP concluded that a leak in the liner of WP-9.1 may have allowed leachate to enter the capillary break layer and/or the pan lysimeters. Approximately 3,200 gallons of liquid was removed from PL-9.1A and 3,700 gallons from PL-9.1B. The EMP includes the installation of two new downgradient groundwater monitoring wells, G-19 (southern side) and G-21 (eastern side) and daily monitoring of liquid levels in both pan lysimeters. Additional investigation was proposed which included a review of the landfill module design, construction, and operations and maintenance records as well as conducting an electrical leak location survey to locate liner leaks.

An EFS was submitted by the Discharger in November 2001 describing the results of the June 2001 EMP to define the nature of the release. Evaluation monitoring confirmed

degradation in new monitoring well G-21 with concentrations of nitrate of 30 mg/L and 22 mg/L in June and July 2001, respectively. A leak was detected using electrical leak location survey on the eastern half of WP-9.1. The hole measured approximately 4 inches by 6 inches and was repaired. Corrective action measures included repair of the liner leak and covering the exposed edges of the landfill module liner system with plastic sheeting to reduce the possibility of surface water from entering the capillary break layer.

Work was performed during April 2002 to further investigate the nature and extent of the release to the unsaturated zone and groundwater, and was reported in the EFS dated 9 May 2002. Soil samples were obtained below the landfill capillary break layer and in the soils surrounding WP-9.1 to investigate an overflow of leachate out of the module which likely occurred when leachate levels in the sumps exceeded the elevation of the WP-9.1 liner along the northeast and northwest perimeters. Soil analytical results indicated that leachate impacted the soil at and adjacent to an area of erosion observed near the northeast corner of WP-9.1. In response, the Discharger installed new pumps, larger leachate storage tanks, and improved off-site leachate disposal capabilities. Grab groundwater samples were also obtained downgradient of well G-21, and adjacent to the northeast corner of WP-9.1. The grab groundwater analytical results indicated that the nitrate/nitrite as nitrogen concentrations in downgradient groundwater are lower than in well G-21, but are above background concentrations.

On 14 November 2002 and 15 January 2003, the Discharger submitted a revised EFS and addendum, respectively, which presents the results of additional soil and groundwater sampling to complete the definition of the extent of soil and groundwater impacts in the area of WP-9.1. Soil samples were obtained below the landfill capillary break layer and in the soils surrounding the unit. Soil analytical results indicated that leachate had impacted the soil at and adjacent to an area of erosion observed near the northeast corner and in soils at the northwest corner of the unit. Interim corrective action was taken in October 2002, resulting in the excavation of approximately 1,500 cubic yards of nitrate-impacted soil, which was approved by the Regional Water Board staff on 23 September 2002, and lining the module containment berms to seal off the LCRS layer and prevent future overflow of leachate from the module.

Grab groundwater samples were also obtained downgradient of well G-21 and adjacent to the northeast corner of the unit. The grab groundwater analytical results indicated that the area of nitrate impact to groundwater is limited to the area immediately surrounding and approximately 150 feet downgradient of G-21. Corrective action measures included installing a new groundwater extraction well (G-22) that was installed approximately 10 feet downgradient of G-21 and screened across the entire depth-interval of the poorly-graded sand layer. The water would then be re-used as dust control for lined landfill modules or trucked and disposed of at the sewage treatment plant. To address the effectiveness of the groundwater extraction on the next deeper sand layer, a new groundwater monitoring well (G-23) was installed adjacent to well G-21. To address the effectiveness of groundwater extraction near the downgradient limit, one new monitoring well (G-24) was installed approximately 200 feet downgradient of well G-21. Monitoring wells G-21, G-23, G-24 and extraction well G-22 will be sampled quarterly and analyzed for depth to water, turbidity, pH, specific conductance, and nitrate-nitrite as nitrogen as part of corrective action monitoring program. G-21 is also monitored semi-annually for the routine detection monitoring

parameters. The nitrate concentrations in wells G-21 and G-22 have decreased significantly since groundwater extraction was implemented (G21: 26 mg/L decreasing to 11 mg/L and G-22: 37 mg/L decreasing to 3.2 mg/L). During 2007, approximately 312,000 gallons of impacted groundwater were pumped from G-22 and stored for dust control on lined modules. The average flow rate is approximately 0.6 gallons per minute, which is close to the design extraction rate.

The monitoring program in the WDRs incorporates the EFS and corrective action measures, including more frequent (weekly) monitoring of the pan lysimeters at WP-9.1 for liquid (or after rainfall of greater than one inch); sampling of any liquid; removal of any liquid detected in the pan lysimeters; groundwater extraction as a corrective action measure; additional groundwater monitoring wells to monitor the release; and other activities.

Leachate and Condensate Management

As part of the amended RWD/JTD submitted on 8 August 2008, the Discharger requested to be allowed to return leachate and landfill gas condensate to the units from which they came to reduce leachate and condensate management costs. These units are DM-4, DM-5, and DM-11. Title 27 CCR 20340(g) requires that leachate be returned to the unit from which it came or be discharged in a manner approved by the Regional Water Board. This section also references State Water Board Resolution No. 93-62 regarding liquids restrictions in 40CFR 258.28 for MSW landfills. 40CFR 258.28 states that liquid waste may not be placed in MSW landfill units unless the waste is leachate or gas condensate derived from the landfill unit and it is designed with a composite liner and leachate collection system. Therefore, leachate and landfill gas condensate from composite lined units at the landfill may be returned to the unit from which they came. This Order includes requirements for returning leachate and landfill gas condensate back to the units such that it is not exposed to surface water runoff, will not cause instability of the landfill, and will not seep from the edges of the units.

Surface Water Drainage

The site is in the Putah plain, which is drained by natural and man-made watercourses. The nearest surface water is the Alamo Creek A-1 Channel, an agricultural drainage canal which flows by the north and east sides of the site. The A-1 Channel drains to Ulatis Creek about three miles southeast of the site, then to Cache Slough and the Sacramento-San Joaquin Delta. Alamo Creek formerly ran through the site but in the 1960s was diverted northeast of the site to Ulatis Creek. There is also a pond in the southeast corner of the site, referred to as “the bird sanctuary”, which collects site storm water flows and groundwater pumped from the borrow pit.

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