CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

**Draft**

CLEANUP AND ABATEMENT ORDER R5-2014-XXXX
FOR

RECOLOGY HAY ROAD AND JEPSON PRAIRIE ORGANICS
HAY ROAD LANDFILL
SOLANO COUNTY

This Order is issued to Recology Hay Road and Jepson Prairie Organics (hereafter jointly referred to as Discharger) based on provisions of California Water Code section 13304, which authorizes the California Regional Water Quality Control Board, Central Valley Region, (hereafter Central Valley Water Board or Board) to issue a Cleanup and Abatement Order (CAO), Water Code Section 13267, which authorizes the Board to require the submittal of technical or monitoring program reports, and Water Code Section 13260 which authorizes the Board to require submittal of a Report of Waste Discharge.

The Assistant Executive Officer of the Central Valley Water Board finds, with respect to the Discharger's acts, or failure to act, the following:

1. The Discharger operates an active landfill and composting operation regulated by the Water Board under the name of "Hay Road Landfill" (facility). The facility consists of two Class III landfills (LF-1 and LF-2), one Class II landfill (LF-3), a Class II sewage sludge waste pile, a Class II sewage sludge land treatment unit (LTU), green-waste and food-waste composting areas, and two lined leachate ponds, as shown on Attachment A. The landfill covers 256 acres, and the entire property includes a 160 acre borrow pit area and a 224 acre habitat preserve. The Hay Road Landfill is located about eight miles east of Vacaville on Hay Road in Solano County.

2. Waste Discharge Requirements (WDRs) Order R5-2008-0188 were adopted on 5 December 2008, and regulate the operation, closure, and post-closure maintenance of the facility. In addition, the WDRs require corrective actions relating to releases or discharges of waste to groundwater. The facility operations must comply with Title 27 of the California Code of Regulations.

3. Recology Hay Road and Jepson Prairie Organics are wholly owned subsidiaries of Recology. Jepson Prairie Organics operates the composting portion of the Hay Road landfill. In its 1 August 2012 Initial Study/Mitigated Negative Declaration[1], the Discharger[2] stated that *"The disposal and composting operations both operate under Waste Discharge Requirement (WDR) Order No. R5-2008-0188."* However, Jepson Prairie Organics is not named as a permittee in the current WDRs, as neither Recology Hay Road nor Jepson Prairie Organics has formally informed the Board that Jepson Prairie Organics operates the composting portion of the landfill. This Order requires that Jepson Prairie Organics

[1] *Initial Study/Mitigated Negative Declaration, Recology Hay Road Land Use Permit Application No. U-11-09,* prepared for Solano County

[2] Recology Hay Road and Jepson Prairie Organics jointly authored the document.

comply with Standard Provision III.A of the WDRs and submit a State Water Board Form 200 for a change of name to allow the Board to add Jepson Prairie Organics as an operator of the facility and permittee in the WDRs.

4. The facility is also regulated under the State Water Resources Control Board's Water Quality Order No. 97-03-DWQ, the *Statewide Industrial Storm Water General Permit* (General Permit). Recology Hay Road has enrolled its landfill operations under the General Permit but Jepson Prairie Organics has failed to submit a Notice of Intent (NOI) to comply with the terms of the General Permit related to the composting activities. This Order requires that Jepson Prairie Organics file an NOI and prepare a Storm Water Pollution Prevention Plan (SWPPP) and that Recology Hay Road submit a revised SWPPP.

5. Recology Hay Road is also enrolled under the Central Valley Water Board's NPDES Limited Threat General Order R5-2013-0073 for dewatering of a borrow pit during the dry season. Extracted groundwater is discharged through ditches to the A-1 Channel, a surface water drainage. Dewatering is required both to lower the groundwater under the landfill and to allow the Discharger access to excavate soil to use in landfill operations.

6. This CAO addresses numerous violations and issues at the facility, including the failure to comply with the WDRs composting specifications, nitrate contamination in groundwater, inadequate storm water management, slope stability, and flood control. The term "Discharger", as used throughout this document, applies to both Recology Hay Road and to Jepson Prairie Organics.

## COMPOSTING OPERATIONS AND LEACHATE

7. The WDRs regulate the Discharger's green-waste and food-waste composting operations, which include pre-sorting of incoming material, active composting, curing, and storage of finished product. The WDRs state that the Discharger accepts food-waste and green-waste at a 54-acre area located east of disposal module (DM) DM-1, which is composed of 22-acres of an impervious (concrete, asphalt, or similar) working surface for active composting. The WDRs state that the remaining unlined 32-acres is used for finished-product storage.

Food Waste Violations

8. Discharge Specification B.27 of the WDRs requires that food waste composting be limited to "in-vessel" composting, as defined in Title 14 of the California Code of Regulations (CCR). Specifically, Title 14 section 17852 subdivision (a)(41) defines "within vessel composting" as a *"means a process in which compostable material is enclosed in a drum, silo, bin, tunnel, reactor or other container for purposes of producing compost . . .*". Finding 88 of the WDRs states "[l]*eachate from the in-vessel composting is collected and returned to within the system*."

9. The Discharger ceased using in-vessel composting prior to April 2010[3], in violation of the WDRs. Presently, active food waste composting is performed in the active composting area using an aerated static pile system, which is open to the elements. This system includes pulling atmospheric air through the pervious outer layer of food-waste stockpiles. The current system does not satisfy the within-vessel containment requirements of Title 14 or the WDRs nor does it keep leachate within the vessel system, as required by the WDRs. This Order requires the Discharger to either return to in-vessel composting or to submit a Report of Waste Discharge showing that non in-vessel composting is protective of water quality.

10. In addition to the 22-acres of all-weather surface for active composting described above, Finding 88 of the WDRs states that "an additional 32-acres is used to store finished compost product." However, finished compost has been stored other than on the unlined 32 acres that the WDRs designate for compost storage (i.e., finished product is stored on the eastern portion of the facility). This Order requires the Discharger remove all compost product that is not within the allowed area and submit a map defining the extent of its compost operations relative to the 22 acres and 32 acres.

Leachate Pond Violations

11. WDRs Prohibition A.18 states "*The discharge of … leachate to surface waters, surface water drainage courses, or groundwater is prohibited."*

12. Finding 88 of the WDRs states that leachate from the 22-acre active composting area flows to the 60-mil HDPE lined "low-flow" pond where it is stored and then recirculated on the compost. The Finding also states that during "significant precipitation events" runoff from the active composting area flows to "a lined high-flow pond so that it does not mix with leachate in the low-flow pond." The high-flow pond is designed to hold stormwater from a 100-year, 24-hour storm; excess stormwater is allowed to overflow into the A-1 Channel and from there to surface water, as allowed by the general industrial stormwater permit.

13. The process water applied to the active food waste stockpiles, and the rain falling onto the stockpiles, forms a leachate which is high in nitrate, TDS, and biological oxygen demand. The leachate drains out of the eastern stockpiles and flows east across the all-weather surface to a concrete-lined ditch, sump with pump, and into the low-flow pond. Contrary to the WDRs, the low-flow pond overflows to the high-flow pond. The high-flow pond then overflows to the A-1 Channel. The Discharger has changed the configuration of the ponds from that described in the WDRs, causing a discharge or threatened discharge of leachate to surface waters, in violation of Prohibition A.19 of the WDRs.

Unauthorized Leachate Pond Violations

14. Leachate and stormwater generated on the western section of the compost area flows south through dirt ditches to an unlined stormwater pond known as the "green waste pond". The pond is designed to overflow to an unlined drainage course, which discharges to the A-1 Channel and surface waters. The depth of the pond is unknown, and therefore it is

[3] 7 April 2010 Water Board staff inspection.

unknown whether the pond intersects the groundwater table. The unlined ditches, unlined pond, and off-site discharge of leachate are not described, nor permitted, by the WDRs. Use of this pond to store leachate is a violation of the WDRs.

15. Because this pond is not described in the WDRs, Monitoring and Reporting Program (MRP) R5-2008-0188 does not require the Discharger to analyze its contents. However, it assumed that the pond would contain high strength waste, similar in content to the high-flow pond (see Table 1 below). The use of this pond for storage of leachate and stormwater has likely caused or contributed to groundwater pollution in the eastern portion of the landfill.

16. This Order requires that the Discharger reconfigure leachate and stormwater flows from the compost area to return to compliance with the WDRs. Specifically, leachate may only be discharged to the low-flow pond. The low-flow pond may not overflow and mix with the high-flow pond. The high-flow pond may only collect stormwater runoff from the composting area. Neither leachate nor stormwater may flow through unlined ditches, and may not be collected in any pond not described by the WDRs. In addition, this Order requires that the Discharger prepare a water balance for the two authorized ponds to show whether or not the low-flow pond has the capacity to store all leachate without overflowing, and whether the high-flow pond has the capacity to store all stormwater generated on the compost area during a 100-year, 24-hour storm. If the water balance shows inadequate capacity, then this Order requires the Discharger to propose adequately sized ponds.

Leachate Pond Liner Leaks

17. Prohibition A.19 of the WDRs states ". . . *the discharge of solid or liquid waste or leachate to surface water, surface water drainage courses, or groundwater is prohibited*." The pond bottom elevation was reported as 22 feet above mean sea level (MSL), which is only a few feet higher than the groundwater elevation reported at wells G-19R and G-26.

18. Finding 28 of the WDRs require that an electronic leak detection survey be conducted on the low-flow and high-flow pond liners every five years, beginning in 2012. However, the first survey was conducted in 2010, and the Discharger identified 65 leaks in the high-flow pond liner and 43 leaks in the low-flow pond liner. The Discharger reported that liquids were present under the entire bottom liner of the high-flow pond. The liner leaks, combined with the liquids beneath the liner of the high-flow pond, are a potential source of nitrate in groundwater near the ponds. In a report dated 26 January 2011, the Discharger certified that the liners had been repaired and that all repairs had been tested with an electrical leak location survey.

19. Pursuant to Finding 28 of the WDRs, the next electronic leak detection survey is scheduled to be completed in 2017. However, this Order requires that a survey also be completed in 2015. This Order requires that the Discharger install point of compliance wells at the hydraulically downgradient limit of the low-flow and the high-flow ponds to provide the earliest possible indication of a discharge from the two lined ponds.

High Strength Waste

20. Historical analysis of the high-flow pond contents shows elevated concentrations of inorganic constituents, as shown in Table 1 below. According to the WDRs, the high-flow pond is only to contain stormwater runoff from the active composting area, not leachate, which is why it is allowed to overflow to surface waters. However, the data below show that high-strength waste is contained in the high-flow pond, and that it is not appropriate to allow this waste to overflow and discharge to surface waters.

Table 1

| **High-Flow Pond Waste Constituent** | **Concentration (Nov 2013)** | **Water Quality Goals** |
|---|---|---|
| Specific Conductance | 9,395 umhos/cm | 900 umhos/cm (CA secondary MCL) |
| Total Dissolved Solids | 6,900 mg/L | 500 mg/L (CA secondary MCL) |
| Chloride | 1,600 mg/L | 250 mg/L (CA secondary MCL) |
| Total Kjeldahl Nitrogen | 320 mg/L | NA |
| Sulfate | 320 mg/L | 250 mg/L (CA secondary MCL) |
| Lead | 150 mg/L | 0.015 mg/L (USEPA Primary MCL) |
| Phosphorous | 150 mg/L | NA |
| Nitrate | 14 mg/L | 10 mg/L (CA secondary MCL) |
| Ammonia as N | 11 mg/L | 30 mg/L (USEPA Health Advisory) |
| Nitrite as N | 0.66 mg/L | 1 mg/L (USEPA Primary MCL) |

21. The MRP does not require sampling of the low-flow pond, nor does it require freeboard measurements for either pond. The Revised MRP, which is a component of this Order and authorized pursuant to Water Code section 13267, contains these requirements.

Leachate Removal Violations

22. As reported in the Discharger's 26 January 2011 *Report of Remedial Actions High-Flow and Low-Flow Ponds*, approximately 10 million gallons of leachate was removed from the ponds either through evaporation or used "for dust control over lined portions of the landfill."

23. The use of compost pond leachate for dust control on the landfill units is a violation of Discharge Specification D.13 which states "*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….*" The application of compost pond leachate as dust control to a unit that it was not generated from is a violation of the WDRs.

24. This Order requires that the Discharger comply with Discharge Specification D.13 and to provide a plan for removing compost pond leachate from the landfill, in the event that the water balance shows that the low-flow pond does not have enough capacity.

## NITRATE-RELATED COMPOUNDS RELEASED TO GROUNDWATER

25. Nitrate is both soluble and mobile. It can pass easily through soil with infiltrating water[4] and is mobile in groundwater. Nitrate dissolves rapidly in water, and once dissolved, is difficult to remove. Evidence suggests that once nitrate enters groundwater it can remain there for decades[5].

26. This section of the Order focuses on the discharge of nitrate[6] to groundwater. Potential sources include nitrate-impacted liquids in the pan lysimeters, leachate from composting operations, leaking and unlined leachate storage ponds, sewage sludge operations, storage tanks containing leachate, and contaminated storm water.

27. Section 20400 of Title 27 uses the term "concentration limit" to define a value for each waste constituent which is protective of beneficial uses of the groundwater and provides protection against water quality impairment. Concentration limits must be developed as part of the Water Quality Protection Standard, and are used to determine whether there has been a discharge of waste. If groundwater testing verifies that a concentration limit has been exceeded, then the Discharger is in violation of the WDRs and must initiate corrective actions to control the source and remediate the discharge.

28. Concentration limits for naturally occurring compounds such as nitrate are calculated using statistical methods. For this facility, the Discharger determines the nitrate concentration limits using two different statistical methods. For the eastern half of the facility, the inter-well method is used, in which the analytical results from compliance (downgradient) wells are compared to the concentration limits calculated from background (upgradient) wells. For the western half of the facility, the intra-well method is used, in which each compliance well is compared against a background composed of its own historical data. . As landfill units are developed, the Discharger abandons the compliance monitoring wells that will be covered by the new unit. Some of the original wells have been replaced with new wells that are much further away from the original well or are constructed in a different manner than the original well. The lack of a consistent groundwater monitoring network complicates the interpretation of concentration data for both inter-well and intra-well methods.

29. Pursuant to Table I-A of the MRP, groundwater monitoring is conducted twice per year; the most recent groundwater monitoring data used in development of this Order was collected during the fourth quarter of 2013.

30. According to Finding 28 of the WDRs, groundwater under the Hay Road Landfill is found at a depth of 2 to 23 below ground surface (bgs). Section 20240 subdivision (c) of Title 27 requires a minimum of 5 feet of separation between the bottom of the waste and the highest anticipated groundwater, unless a discharger can show that an engineered

[4] USGS, Vulnerability of Shallow Groundwater and Drinking-Water Wells to Nitrate, Bernard T. Noval and Kerie J. Hitt, 2006.
[5] *Groundwater Information Sheet-Nitrate*, State Water Resources Control Board, August 2010.
[6] For the remainder of this Order, the term "nitrate" will refer to nitrate as nitrogen.

alternative provides equivalent or better protection. Findings 69 and 70 of the WDRs state that the Board has previously approved an engineered alternative design for separation for this facility, and allows a separation to groundwater of 2.5 to 3 feet under the majority of the landfill[7].

Eastern Area Groundwater

31. In the eastern area of the facility, the Discharger stores finished-product compost, stores leachate and stormwater in the low-flow and high-flow ponds[8], performs sewage sludge storage and drying operations, performs soil manufacturing operations, and discharges waste into Class II landfills. All of these activities are potential sources of the nitrate found in groundwater.

32. The sewage sludge storage area (Waste Pile 9.1) covers seven acres and is double lined. As stated previously, the WDRs allow an engineered alternative to the standard five feet of separation between the bottom of the unit and groundwater; for this particular unit, the Discharger must maintain 2.5 feet of separation pursuant to Discharge Specification B.15. In 2000, liquid was detected in pan lysimeters located under Waste Pile 9.1 and samples confirmed the presence of high concentrations of nitrate/nitrite as nitrogen. An Evaluation Monitoring Program concluded that a leak in the liner caused discharges of nitrates to groundwater beneath Waste Pile 9.1. The Discharger took several remedial actions, including installing a groundwater extraction well. The well has been extracting groundwater since 2004, at a rate of approximately 0.6 gallons per minute (gpm). As described below, the nitrate plume has not been remediated, and therefore this Order requires that additional corrective action be implemented.

33. For the eastern area, the Discharger calculated an inter-well concentration limit for nitrate of 5 mg/L. In this area, 9 of the wells have nitrate concentrations which exceed the calculated concentration limit, as shown in Table 2 and discussed below.

Table 2: Eastern Area Wells Exceeding the Nitrate Concentration Limit of 5 mg/L

| Well ID | Nitrate Range (mg/L) | Date Range | Fourth Quarter 2013 Concentration, Unless Otherwise Noted (mg/L) | Year of Highest Concentration |
|---|---|---|---|---|
| G-4R | 5.7 - 14 | 2009-2013 | 11 | 2010 |
| G-14 | 0.022 – 210 | 2001-2011 | 150 (2011[1]) | 2011 |
| G-18 | ND<0.0081 – 12 | 2001 - 2013 | 5.5 | 2008 |
| G-19 | 0.021 – 11 | 2001-2008 | 11 (2008[2]) | 2008 |
| G-21 | 2.5 – 220 | 2001 - 2013 | 2.5 | 2008 |
| G-22 (extraction well) | 1.8 – 89 | 2003 - 2013 | 11 | 2008 |
| G-24 | 3.6 – 34 | 2003 - 2011 | 19 (2011[3]) | 2011 |
| G-26 | 0.02 – 5.2 | 2004-2013 | 5.2 | 2013 |
| G-31 | 26 – 32 | 2012-2013 | 32 (2013)[4] | 2013 |

1. G-14 abandoned July 2011
2. G-19 abandoned Dec 2008
3. G-24 abandoned July 2011
4. G-31 abandoned June 2013

[7] The "Pan Lysimeter" section of this Order contains additional information regarding the depth to groundwater.
[8] The storage of finished product in this area and the collection of leachate in the high-flow pond are both violations of the WDRs.

34. MRP R5-2008-0188 states that groundwater monitoring well G-18 is a background well for the eastern area of the landfill. This well was installed on 6 June 2001, and at that time had a nitrate concentration of non-detect (<0.061 mg/L). However, beginning in 2005, the well exhibited an increasing trend in nitrate concentrations, which peaked at 12 mg/L in October 2008. More recently, the fourth quarter 2013 monitoring event found nitrate levels in monitoring well G-18 at 5.5 mg/L, which is above the concentration limit. The inclusion of analytical data beyond 2004 as part of the inter-well statistical calculations for nitrate is not appropriate due to the increasing trend in nitrate.

35. To date, the Board has not required corrective action for the groundwater surrounding well G-18, although the well has exceeded the nitrate concentration limit during 17 of the last 21 sampling events. This Order requires the Discharger to take corrective action regarding the nitrate concentrations historically found at monitoring well G-18, including defining the vertical and horizontal extent of contamination[9]. If the Discharger believes that the nitrate is originating from an off-site source, then it must submit a work plan to obtain site-specific evidence to demonstrate this fact. Otherwise, the Discharger must evaluate the potential for additional discharges from DM-5.1 and institute corrective actions. In addition, the Discharger must re-evaluate the background monitoring wells and propose/install an updated background monitoring network that is free of site influences.

36. Board staff issued a Notice of Violation (NOV) on 8 March 2013 for nitrate impacts to groundwater in the eastern and the western areas of the facility. The NOV required, in part, that the Discharger define the horizontal and vertical extent of nitrate contamination in groundwater. The Discharger performed a site investigation for the eastern area in April and June 2013.

37. The investigation included installation of 19 temporary borings in the eastern area. Table 3 summarizes the Discharger's seven boring locations with grab groundwater samples exceeding the inter-well calculated nitrate concentration limit of 5 mg/L. These boring locations are downgradient of the active food waste composting area, the food waste leachate storage ponds, and the sewage sludge waste pile and LTUs.

Table 3: Eastern Area Site Investigation
Grab Groundwater Samples Exceeding 5 mg/L

| Sample Location | Nitrate (mg/L) | Location[10] |
|---|---|---|
| B3S (shallow) | 18 | Downgradient of extraction well G-22 and the sewage sludge operations |
| B-5S (shallow) | 5.9 | Downgradient of sewage sludge operations and extraction well G-22 |

[9] One possible source of contamination for well G-18 is the soil admixing operations which occur at module DM-5.1. Soil admixing includes mixing dried sewage sludge and compost with borrow-source soil. Sewage sludge and compost are typically high in nitrate. The pan lysimeter beneath module DM-5.1 has historically contained liquid with high nitrate concentrations (e.g., 81 mg/L in 2006 and 23 mg/L in 2013). The nitrate concentration in well G-18 appears to increase in response to the nitrate-contaminated water in the lysimeter.

[10] Figures 2 and 4, M*onitoring Well G-31 Nitrate Investigation*, 22 May 2013, Recology.

| | | |
|---|---|---|
| B-6S (shallow) | 18 | Downgradient of extraction well G-22, and sewage sludge operations |
| B-7S (shallow) | 28 | Downgradient of well G-26 and sewage sludge operations |
| B-8S (shallow) | 10 | Downgradient of well G-26 and sewage sludge operations |
| TW-14 (shallow) | 7 | Downgradient of the compost area high-flow pond and sewage sludge operations |
| TW-19 (shallow) | 7.7 | Downgradient of extraction well G-22 and sewage sludge operations |
| Concentration Limit | 5 | |

38. Board staff's review of the data finds that the extraction well, as described above in Finding 32, has not fully captured nor contained the nitrate plume. The extent of nitrate contamination in the eastern area of the facility has not been completely defined at G-4R, G-31, G-16, and G-18, the compost ponds, and the boring locations shown above. In addition, the nitrate iso-concentration maps submitted with the investigation results contain only a subset of data and are therefore inaccurate[11]. This Order requires that the Discharger fully define the plume using all relevant available data.

39. In 2009, in response to the detection of nitrate in the now-abandoned downgradient monitoring well G-14, the Discharger stated that stockpiled sludge on the LTU was believed to be the source of the nitrate in groundwater. The Discharger completed an engineering feasibility study and considered installing a wood-chip permeable reactive trench. In 2011, the eastern portion of the LTU was clean closed to allow for the construction of DM-6 and the dried sludge stockpile was moved onto lined units. In December 2012, the Discharger submitted an amended Report of Waste Discharge and proposed monitored natural attenuation as the corrective action for the nitrate contaminated groundwater in the eastern area. Board staff responded that an alternative corrective action should be implemented.

40. In late 2013 and early 2014, staff met with the Discharger several times to discuss, among other items, the nitrate contamination in the groundwater. In a 12 March 2014 letter, the Discharger proposed enhanced corrective actions including injection of a carbon source to promote nitrate reduction and additional sampling. This Order implements and expands upon the Discharger's 12 March 2014 proposal.

Western Area Groundwater

41. At the western area of the facility, activities include presorting compost materials; composting food-waste and green-waste; storage of compost for curing and future sales; unpermitted storage of leachate in an unlined pond; stockpiling of dried sewage sludge and contaminated soil on disposal units; and discharge of waste to Class II and Class III landfills. All of these sources have the potential to impact groundwater. The borrow pit is

[11]The map does not include the concentrations for wells G-14, G-4R, G-16, and G-18. G-14 had nitrate concentrations of 210 and 150 mg/L just prior to being abandoned on 22 July 2011. Wells G-18 and G-16 exhibit an increasing trend of nitrate over time.

immediately to the west of this portion of the landfill.

42. In 1985, the Discharger constructed an underground slurry wall around this portion of the landfill. The purpose of the slurry wall was to lower the groundwater elevation beneath the waste and therefore prevent waste migration into groundwater. Groundwater was pumped from a dewatering trench until subsequent monitoring showed that the impact of the slurry wall was negligible. In 1996, the Discharger began dewatering the borrow pit during the summer to allow soil material to be excavated. The Discharger reports that dewatering has also lowered the groundwater table and changed the shallow gradient in the western area during the summer.

43. For the western area, the Discharger uses the intra-well statistical method to calculate the concentration limits. The intra-well method involves comparing recent data from a particular well to a background of historical data collected from that same well. However, the use of the intra-well method at this site is in conflict with US EPA guidance[12]. The intra-well method should not be used at the Hay Road Landfill because intra-well comparisons are only appropriate when pre-disposal data is available and when it can be demonstrated that the discharge of waste has not affected that well in the past.[13] These conditions do not appear to have been met at the Hay Road Landfill. The following items provide examples of the apparent inappropriate use of the intra-well method on the western portion of the landfill:

- In the first half of 2012, the Discharger calculated the nitrate intra-well concentration limit as 24 mg/L at well G-1 and 26 mg/L at well G-11M. In the second half of 2012 and first half of 2013, the concentration limits at G-1 and G-11M were reduced to 3.5 mg/L and 2.6 mg/L. It is unclear to Board staff how these limits could be reduced so significantly over the course of a single sampling event, other than if there was nitrate plume which has moved beyond those wells.

- The nitrate concentration at well 4B has ranged from ND<0.03 to 7.8 mg/L. In 1990, the concentration was 1.7 mg/L. The concentration peaked at 7.8 mg/L in June 2011. Just prior to abandonment in May 2012, the concentration had decreased to 1.7 mg/L. It appears that a nitrate plume has passed through the area monitored by the well.

- Well 4BR was installed in 2012 as a replacement for well 4B[14], and was installed about 200 feet south of the original well. In the two monitoring events of 2013, the nitrate concentrations at 4BR were 27 and 18 mg/L, which is significantly greater than the concentrations in well 4B prior to its abandonment.

- Well G-1 was installed in 1987, and had a nitrate concentration of 0.75 mg/L. This well shows an increasing trend from approximately 1990 through 1995, with a maximum

[12] US EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance, 2009
[13] From Nielsen and Nielsen, 2006, *The Essential Handbook of Groundwater Sampling*

[14] It is likely that well 4BR is not a true replacement well since it was drilled to 25 feet bgs while well 4B was drilled to only 8 feet bgs.

value of 38 mg/L in 1995. Since 2005, this well has exhibited a decreasing trend from 5.7 in April 2005 to 1.6 in November 2013. The data set for this well fluctuates and is unstable.

- Well G-11M has been sampled 16 times for nitrate since installation in November 2005, with 15 of the concentrations ranging from 0.18 to 1.8 mg/L. One outlier sample, in December 2005, had a reported nitrate concentration of 32 mg/L. In the first 2012 semiannual monitoring report, the concentration limit for G-11M was reported as 26 mg/L. In the 2012 annual monitoring report, the limit was reported as 2.6 mg/L, which is an order of magnitude change. This appears to be an inappropriate use of intra-well comparisons.

- Well G-6 was installed in 1985, and has nitrate concentrations ranging from 0.0081 to 8 mg/L. The well has been sampled 78 times, with 65 samples showing nitrate less than 1 mg/L; however, the fourth quarter 2013 concentration limit for this well is 8 mg/L. It is unclear why the concentration limit should be so high.

44. To summarize, it appears that regardless of the Discharger's intra-well calculated concentration limits, there have been, and continue to be, discharges of nitrate to groundwater on the western side of the landfill. As described in the above examples, a number of western-area monitoring wells have exhibited an increasing nitrate trend which is an indication of an unstable data set, contamination, and/or a discharge to groundwater. In addition, the historical data shows that the western area has an unstable data set for nitrate in groundwater at some wells. Use of data with an increasing trend or unstable data set is not suitable for inclusion in an intra-well method for concentration limits. This Order requires the Discharge to evaluate the use of intra-well versus inter-well analysis on the western side of the landfill.

45. Board staff issued a Notice of Violation (NOV) on 8 March 2013 for nitrate impacts to groundwater at the facility. The NOV required, in part, that the Discharger define the horizontal and vertical extent of nitrate contamination in groundwater. The Discharger performed a site investigation for the western area in May and June 2013.

46. The investigation included installation of 11 temporary borings in the western area. Table 4 below summarizes the eight locations with groundwater exceeding a nitrate concentration of 5 mg/L[15]. All samples are downgradient of the unpermitted leachate storage pond as well as downgradient of DM-11 and DM-2.1.

Table 4: Western Area Site Investigation
Grab Groundwater Samples Exceeding 5 mg/L

| Sample Location | Nitrate (mg/L) |
|---|---|
| TW-2 (shallow) | 6.0 |
| TW-3 (shallow) | 7.1 |

[15] Because the intra-well concentration limits calculated by the Discharger for the western portion of the facility are inappropriate, staff elected to compare the results to a nitrate concentration of 5 mg/L (equivalent to the inter-well concentration limits for the eastern portion of the facility.

| | |
|---|---|
| TW-4 (shallow) | 35 |
| TW-5 (shallow) | 32 |
| TW-9 (shallow) | 8.7 |
| TW-20 (shallow) | 7.0 |
| TW-8 (deep) | 7.5 |
| TW-21 (deep) | 5.7 |

47. In 2011, over 8,000 gallons of liquids were pumped from the DM-11 pan lysimeter, which has historical nitrate concentrations up to 113 mg/L. Nitrate concentration data from borings TW-4, TW-5, TW-9, and TW-20 appear to be indicative of a plume from DM-11. The vertical and lateral extent of this plume has not been defined. Board staff are unaware of the volume of the pan lysimeter and do not know whether liquids overflowed from the lysimeter into the vadose zone. In 2013, Board staff learned that the Discharger has been allowing composting leachate to flow into an unlined pond just north of DM-11. Collecting and storing composting leachate in this unlined pond is a violation of the WDRs and may have impacted groundwater, as shown by monitoring data from borings TW-2 and -3.

48. As discussed in Findings 39 and 40, in December 2012, the Discharger submitted an amended Report of Waste Discharge and proposed monitored natural attenuation as the corrective action for the nitrate in the groundwater. Board staff responded that an alternative corrective action should be implemented. In late 2013 and early 2014, staff met with the Discharger several times to discuss, among other items, the nitrate contamination in the groundwater. In a 12 March 2014 letter, the Discharger proposed enhanced corrective actions for both the eastern and western portions of the landfill. This Order implements and expands upon the Discharger's proposal.

## Pan Lysimeter Liquids

49. Prohibition A.4 of the WDRs states "[t]*he discharge of waste constituents to the unsaturated zone or to groundwater is prohibited.*" To provide the earliest possible detection of a release from a waste unit to the unsaturated zone, section 20415 of Title 27 and the WDRs require the use of lysimeters placed into the unsaturated zone. The presence of liquids in a pan lysimeter may indicate that the unsaturated zone has been affected by a release from a unit to the unsaturated zone or that there is a lack of separation between groundwater and waste.

<u>Separation Between Waste and Groundwater</u>

50. Section 20240 subdivision (c) of Title 27 requires a minimum of five feet of separation between waste and the highest anticipated elevation of underlying groundwater, unless a discharger can show that an engineered alternative provides equivalent or better protection. The Discharger proposed an engineered alternative of either a 1-foot or ½-foot gravel layer to serve as a capillary break and underdrain. Construction Specification D.2 of the WDRs allows this engineered alternative for the separation distance between "*wastes or leachate and the highest anticipated elevation of groundwater*" and states that the following minimum separations in Table 5 must be met:

Table 5: Construction Specification D.2

| Module | Required Separation |
|---|---|
| DM-1[16] | 5 feet |
| DM-2.1 | 3 feet |
| DM-2.2 through DM-16 | 2.5 feet |
| Sludge storage (WP-9.1) | 2.5 feet |
| Land treatment unit (LTU) | 5 feet |

51. The WDRs require that the Discharger report the separation distance between the disposal module leachate collection and removal system (LCRS) sumps (i.e., the bottom of the waste) and groundwater. Groundwater is typically highest in the spring. The separation reported for the spring monitoring events from 2011 through 2013 is summarized below in Table 6

Table 6: Separation Data for Spring-time Monitoring, 2011 to 2013

| Module | Required Separation | March 2011 | May 2011 | Jan 2012 | May 2012 | Feb 2013 | Apr 2013 |
|---|---|---|---|---|---|---|---|
| DM-1 | 5 feet | **0** | **3** | 7 | 6 | 6 | 6 |
| DM-2.1 | 3 feet | 8 | 8 | 12 | 10 | 10 | 12 |
| DM-2.2 through DM-16 | 2.5 feet | 3-17 | 3-17 | 4-26 | 3-26 | 3-23 | 4-26 |
| Sludge storage (WP-9.1 A, B) | 2.5 feet | 4, 5 | 6, 7 | 7, 8 | 6, 7 | 6, 7 | 6, 8 |
| Land treatment unit (LTU) | 5 feet | Not reported | Not reported | Not reported | Not reported | Not reported | Not reported |

52. As shown above, the Discharger was in violation of Construction Specification D.2 at DM-1 for the March and May 2011 monitoring events. It is unknown if there were other violations as, in general, the monitoring reports do not clearly show whether the Discharger is complying with Construction Specification D.2. For example, the Discharger rounds the groundwater elevation to the nearest foot, groundwater data is interpolated from site-wide gradient maps, some of the monitoring wells that appear to be used for compliance are on the other side of the slurry wall from the pan lysimeters, and the Discharger does not monitor for groundwater elevation at the LTU. In addition, references for the source of the sump elevations (i.e., as-built drawings with final survey data) and the elevations of the lowest point in the modules (i.e., the pan lysimeters) are not provided in the Discharger's monitoring reports. The Discharger's monitoring network makes it difficult for staff to ascertain compliance with the required separation to groundwater.

53. This Order requires that (a) the Discharger install a groundwater monitoring device (well or piezometer) as close as possible to each LCRS sump (the point of compliance) and within the slurry wall, (b) that compliance with Construction Specification D.2 be reported using the closest well to the LCRS, (c) that data be reported in units of 0.1 foot, and (d) the Discharger propose a method to immediately lower the groundwater in the event that a violation of the WDRs is reported. This Order also requires that the Discharger submit as-

[16] Per Finding 65.

built drawing records which document the surveyed elevation of the bottom of each disposal module sump.

Liquid in Pan Lysimeters

54. The WDRs state that liquids have been detected and removed from the pan lysimeters at DM-11, DM-2, DM-5, and WP-9.1. These releases occurred between 1999 and 2005.

55. More recently, the Discharger's annual 2011 through 2013 monitoring reports show that liquids have been consistently released into the pan lysimeter at DM-4 for all three years (with over 4,300 gallons removed) and liquids have again been released into the two lysimeters at DM-11 in 2011 (with over 8,000 gallons removed). This Order requires that the Discharger determine the source and stop the release of liquids into the pan lysimeters.

56. In its monitoring and technical reports, the Discharger states that liquid in pan lysimeters is due to storm water intrusion and not due to a release from a disposal unit. For example, the Discharger states that pan lysimeter PL-4.1, PL-11, PL-5, and PL-2.2 tend to contain water following a rainstorm. The Discharger states that "As a continued corrective action measure, any water that enters the pan lysimeters is pumped out immediately and discharged into the adjacent leachate sump for later removal by the leachate extraction system[17]." Because the pan lysimeters are designed to demonstrate whether there is a release from a unit and whether the separation to groundwater is being maintained, any liquid in the lysimeters is a potential violation of the WDRs. Board staff is not convinced that the liquid in the lysimeters is due to rain events, but if it is, this source must cease in order for the lysimeters to function as designed. This Order requires the Discharger to take all steps necessary to stop any intrusion of stormwater into the pan lysimeters, and requires the Discharger to conduct additional monitoring to show whether the groundwater separation is being maintained as required by the WDRs.

57. The Discharger states that "any water that enters the pan lysimeter is pumped out immediately and discharged to the adjacent leachate collection sump for later removal by the leachate extraction system[18]." This is not appropriate. The design parameters for the LCRS, which includes anticipated volumes of leachate, are part of the evaluation and approval process. Only leakage from the overlying waste unit is included in the design. The addition of liquid from the pan lysimeter was never included in the estimated volume capacity of the LCRS. This Order requires the Discharger to immediately remove liquids from the pan lysimeter and cease discharging pan lysimeter liquids to the LCRS, as well as present a liquid management disposal plan for the pan lysimeters.

Monitoring and Reporting Deficiencies

58. The Discharger is sampling pan lysimeters according to the requirements of the MRP, which requires semiannual sampling if liquid is present. However, liquids are removed from pan lysimeters when detected and are not sampled at that point in time[19]. As a result, the historical record of pan lysimeter lab analysis may not be representative of the liquids

[17] 12 March 2014 letter *Response to February 27, 2014 RWQCB Meeting Comments, Recology Hay Road*
[18] 12 March 2014 *Response to February 27, 2014 RWQCB Meeting Comments, Recology Hay Road*
[19] The 2008 MRP does not require that liquids be sampled when removed.

which are removed during pumping events. This Order includes a revised MRP with requires that analytical samples be obtained when liquid is removed from pan lysimeters.

59. The Discharger does not tabulate the volume of liquids pumped from pan lysimeters in its monitoring reports. The Discharger's hand-written logs are in an appendix, and the data has not been transferred from the field reports to tables, as required by the MRP. This Order requires that the volume of liquids pumped from pan lysimeters be tabulated in each monitoring report, as required.

60. Item D.2 of the MRP requires unsaturated zone monitoring using pan lysimeters. While the Discharger has installed and monitored these devices, the unsaturated monitoring network is inadequate because the Discharger has not established background unsaturated zone monitoring points for data comparison. Therefore, the Discharger has not complied with section 20415 subdivision (d)(2)(A) of Title 27 which states: *"the unsaturated zone monitoring system shall include a sufficient number of Background Monitoring Points established at appropriate locations and depths to yield soil pore liquid samples or soil pore liquid measurements that represent the quality of soil pore liquid that has not been affected by a release from the Unit".* This Order requires the Discharger to establish a background monitoring network for the facility's unsaturated zone monitoring network.

Source Control

61. Nitrate concentrations in pan lysimeter liquids at DM-11 have ranged up to 113 mg/L; WP-9.1 has ranged up to 395 mg/L, and DM-5 has ranged up to 81 mg/L.

62. The Discharger has reported that stockpiles of dried sewage sludge, which have been stored on top of DM-11[20] under interim cover since 2009[21], may be a contributing factor to the high nitrate concentrations in the area of well 4BR. This Order requires that any stockpile of alternate daily cover, including dry sewage sludge, be isolated to prevent contact with direct precipitation and stormwater run-on/run-off.

## Sewage Sludge Operations at WP-9.1 and LTU

63. Sewage sludge operations occur in the eastern area of the facility at WP-9.1 and at the LTU. The WDRs allow de-watered sewage sludge (with a minimum of 15 percent or 20 percent solids, depending on the source) to be stored in the 7-acre WP-9.1 during the wet season and then spread on the 20-acre LTU for drying between April 16th and October 15th each year. Providing that the Discharger has demonstrated that dried sewage sludge does not pose a threat to water quality, the WDRs allow dried sludge to be used for alternate daily cover. After drying, the sludge may be used for alternate daily cover, in the composting operation, as soil amendment over interim cover, or in soil manufacturing.

64. As stated in the WDRs, sewage sludge operations at WP-9.1 are under corrective action for nitrate impacts to groundwater due to a leak in the liner. Leachate analysis of the pan

[20] 2010 and 2011 Winterization Plans, Recology.
[21] *Monitoring Well 4BR Nitrate Investigation*, Section 4.0, Recology Hay Road. 22 July 2013.

lysimeter liquids indicates that nitrate concentrations in PL-9.1A have ranged up to 395 mg/L in 2000 to 27 mg/L in November 2013.

65. Part of the WDRs corrective action includes groundwater extraction at well G-22. The extraction process began in 2004, and groundwater is extracted at an average rate of 0.6 gpm. Nitrate concentrations have been reduced; however, the inter-well calculated nitrate concentration limit of 5 mg/L is still exceeded at the extraction well. During 2013, the concentrations in well G-22 ranged from 7.2 to 23 mg/L. As indicated by downgradient wells, and discussed more fully in the Groundwater section of this Order, the nitrate plume has not been fully captured by the Discharger's corrective action measures.

66. The site investigation performed in April and June 2013 to define the extent of nitrate contamination in groundwater in the eastern area of the landfill indicates that nitrate exceeds the inter-well calculated 5 mg/L concentration limit at a distance of more than 1,000 feet downgradient of extraction well G-22. Borings closer to extraction well G-22 exhibited higher nitrate concentrations. This Order requires enhanced corrective actions to remediate the nitrate plume.

67. Leachate with high nitrogen concentrations is still detected in the pan lysimeters under the sewage sludge waste pile. The source of nitrogen contributing to these detections must be controlled in order to fully remediate the plume. Therefore, this Order requires the Discharger to perform an electronic leak location survey on the liner of WP-9.1 and if leaks are found, they must be repaired. In addition, the Discharger's proposed in-situ bioremediation injection points must be expanded to include injection at this source.

## RUNOFF COLLECTION/DRAINAGE SYSTEM AND LANDFILL SLOPES

68. During the 31 January 2014 site inspection, Water Board staff observed that the landfill side slopes at DM-1, DM-2.1, and DM-11 appeared to be steeper than allowed by the WDRs[22], and that the storm water down drains and ditches appeared to be undersized and/or inadequately anchored.

Slope Stability

69. Facility Specifications C.2 and C.3 require waste fill slopes and stockpiles to be stable in the event of an earthquake. Specifically,

> C.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."*
>
> C. 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*."

[22] WDRs Facility Specification C2 and C3 and Construction Specification F3.

70. Disposal Module DM-11 is a Class II unit, and Construction Specification D.3 of the WDRs requires construction according to Title 27 requirements for Class II units. Specifically, "*All Class II units and modules shall be designed and constructed for a maximum credible earthquake per Title 27 CCR Section 20370."* Because the landfill will be closed as one unit, the entire landfill must meet this criterion.

71. Section 21750 of Title 27 *Fault Identification and Proximity* states: *After July 18, 1997, dischargers required to submit a slope stability report, under ¶(f)(5), shall provide a review of historical seismicity within a 100 km (62 mile) radius of the facility, including the name of the fault, type of faulting, activity on the fault, design event for the fault (for Class II Units, the fault's MCE, for Class III Units, the fault's MPE), distance from the facility, the expected ground motions (horizontal and vertical) at the facility resulting from the fault's design event, the expected duration of strong motion at the site resulting from the fault's design event, and an estimation of the cumulative duration of strong motion from aftershocks.*

72. Section 21750 subdivision (f)(5) of Title 27 requires that "[t]*he peak ground acceleration so determined shall be the stability and factors of safety for all embankments, cut slopes, and associated landfills during the design life of the unit."*

73. Figure 1 of the Discharger's 2013 Winterization Plan indicates that the uppermost slopes and/or stockpiles at DM-1, DM-2.2, and DM-11 are in the range of approximately 2.5H:1V, which may not meet the stability requirements of Facility Specifications C.2 and C.3, and/or Construction Specification D.3.

74. Staff reviewed the stability analysis included in the 2007 Post Closure and Post Closure Maintenance Plan (PCPCMP). The results of the stability analysis in the state the "static" factor of safety for final closure slopes is 1.7. However, section 21750(f)(5)(C) of Title 27 requires that "… *the report must indicate a factor of safety for the critical slope of at least 1.5 under "dynamic" conditions*." The Discharger needs to revise its stability analysis to meet a dynamic condition and 1.5 factor of safety. In addition, section 21750(f)(5)(A) of Title 27 states that the analysis must apply to the entire life of the unit, not just at closure[23]. Staff has measured the slopes using the site maps provided by the Discharger, and the interior slopes exceed the parameters (4H:1V) used for the stability analysis. Therefore, this Order requires the Discharger to submit a revised slope stability analysis that complies with Title 27 for all slopes during operation, under interim cover, final closure and post closure conditions that meets the critical slope of at least 1.5 under "dynamic" conditions.

Runoff Collection

75. Facility Specification C.10 of the WDRs requires that "*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."*

[23] "*The stability analysis shall ensure the integrity of the Unit, including its foundation, final slopes, and containment systems under both static and dynamic conditions throughout the Unit's life, closure period, and post-closure maintenance period*."

Inadequate drainage may result in oversaturation of the slopes potentially resulting in a slope failure prior to final closure. Inadequate drainage may also allow stormwater to percolate into the waste mass. The Discharger has reported that following periods of heavy rainfall[24,25], liquids have been detected in the pan lysimeters at DM-2.2, DM-4, DM-5.1, and DM-11. The Discharger also states that liquid found in pan lysimeters is due to stormwater infiltration. This Order requires the Discharger to re-evaluate its drainage control systems to ensure that they comply with Specification C.10. The Discharger shall provide a technical engineering report with the current facility grading plan, and calculations determining the required size/length/anchoring of each drainage control component.

## FLOOD PROTECTION

76. Finding 11 of the WDRs states that about one-half of the existing landfill and 80% of the expansion area are within the 100 year floodplain, which is estimated to be at an elevation of 25 feet MSL. Federal regulations, as incorporated by State Water Board Resolution 93-62, require that a discharger whose new or existing landfills are located within a 100 year floodplain must demonstrate that the landfill does not among other items, "result in the washout of solid waste so as to pose a hazard to human health or the environment". The Discharger has stated that there is a 40 foot MSL exterior perimeter berm around most of the landfill, except for portions of module DM-1. This berm is intended to prevent the washout of waste in a 100-year flood.

77. The WDRs require that the facility be protected from a 100-year flood. Specifically,

    Construction Specification D.9 states: *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.*

    Facility Specification C.12 states: *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.*

78. The Discharger's 2013 topographic site plan (i.e., the *Recology Hay Road 2013 Winterization Plan*) indicates that some exterior berms along the north side of the facility may not meet the flood protection requirements in the WDRs of a berm height of at least 40 feet MSL around the site. This Order requires that the Discharger submit a site drawing which indicates the location, distance, and height of all flood-control berms and whether the berm meets the requirements of the WDRs. If not, this Order requires that the Discharger install berms that comply with the WDRs.

[24] Investigations for Pan Lysimeters PL-2.2A, PL-5.1A, and PL-5.1B, Hay Road Landfill, Inc., July 2005.
[25] WDRs R5-2008-0188, Finding 42.

## GROUNDWATER MONITORING NETWORK

79. The groundwater monitoring well network appears to be insufficient to monitor the uppermost saturated zones and potential releases to groundwater.

80. Detection Monitoring Specification E.2 and E.4 of the WDRs state the Discharger shall comply with the detection monitoring program provisions of Title 27 CCR for groundwater, surface water, and the unsaturated zone. Upon review of the Discharger's boring logs for groundwater monitoring wells as well as landfill gas probes, it appears that the Discharger is monitoring a deeper interval rather than the first encountered groundwater. The data in Table 7 below summarizes a series of gas probe boring logs that were installed around the site boundary in April 2009. During drilling and construction of these probes, groundwater was encountered within a few feet of the ground surface. The data also shows that while these probes are spaced around the facility; there is only minor variation in the elevation at which groundwater was encountered. This suggests that there is a very shallow water bearing zone beneath the site which is not being monitored. For comparison, Table 7 also shows that the nearest groundwater monitoring well experienced similar conditions during installation, yet the detection monitoring wells were completed with screens well below the water table.

Table 7: Comparison of Water Bearing Interval during Installation of Gas Probes and Adjacent Groundwater Monitoring Wells

| Monitoring Location | Adjacent to WMU | Citation from Discharger's Boring Log | Estimated Elevation of Water Table | Adjacent Detection Monitoring Well | Compliance issue |
|---|---|---|---|---|---|
| Gas Probe G-18 | DM-11.2 | "Water Bearing Zone starts at 7-13' bgs" | ~18 to 13 ft msl | G-1; 15 ft screen interval estimated 'between -5 and -20 msl, "Shallow zone" | G-1 is screened too deep to identify a release at its earliest possible moment and measure the fluctuation in the water table. |
| Gas Probe G-19 | DM-2.1 | "Increased sand in the water bearing zone starting around 9.5' bgs." | ~17.5 ft msl | G-13; A saturated sand was intersected at 11 feet bgs, estimated 16 ft msl | G-13 is screened too deep to identify a release at its earliest possible moment and measure the fluctuation in the water table |
| Monitoring well 4BR | DM-11.1 | | Water encountered at ~ 13.8 msl. Well completed 4 feet below the water table.. No open screen. | Monitoring well 4B | Field measurements from the bottom of the well at 8 feet bgs, or approximately 17 ft msl |
| Gas Probe GP-15 | DM-3.2 | "Homogeneous clay-rich water bearing zone starting around | ~15 feet msl | G-29, Water bearing interval intersected at ~15 msl | Well does not account for fluctuation water table. |

| Monitoring Location | Adjacent to WMU | Citation from Discharger's Boring Log | Estimated Elevation of Water Table | Adjacent Detection Monitoring Well | Compliance issue |
|---|---|---|---|---|---|
| | | 6' bgs." | | | |
| Gas Probe GP-15 | DM-1 | "Some sand lenses in clay-rich water bearing zone starting around 7-9' bgs." | ~17 feet msl | G5R: Intersected water bearing zone at 17 to 15.5 feet, yet the well was screened ~13 to -2 msl | G5R is screened too deep to identify a release at its earliest possible moment and measure the fluctuation in the water table |

81. The current groundwater monitoring network does not comply with section 20415 subdivision (b)(1)(B)(2) of Title 27 which states: *" This ground water monitoring system shall include a sufficient number of Monitoring Points installed at additional locations and depths to yield ground water samples from the uppermost aquifer to provide the best assurance of the earliest possible detection of a release from the Unit".* Furthermore, since the well screens are below the water table they don't allow for monitoring an accurate measurement of the water table. Therefore, the current groundwater monitoring network does not comply with section 20415 subdivision (e)(13) of Title 27 which states: "*The ground water portion of the monitoring program shall include an accurate determination of the ground water surface elevation and field parameters (temperature, electrical conductivity, turbidity, and pH) at each well each time ground water is sampled."* As presented, the Discharger's monitoring network does not meet this criterion therefore is in violation of the WDRs and Title 27. This Order requires the Discharger to install appropriate monitoring devices within this shallow interval.

82. The "Point of Compliance" is defined in the MRP and Title 27 as a vertical surface located at the hydraulically downgradient limit of a Unit that extends through the uppermost aquifer underlying the Unit. The concentration limits apply at the Point of Compliance. The Discharger's "Groundwater Elevation Contours" figure in the 2013 Annual Monitoring report, presents groundwater flow direction and monitoring wells. Staff's review finds that the site needs additional wells at the Point of Compliance for many units. For instance, there are no monitoring wells located at the downgradient limit of the waste for DM-1, the compost area pond, the low flow pond, DM-4.3, the LTU, or DM-2.2. Without adequate monitoring devices in correct locations, staff is unable to evaluate if the concentration limits are being exceeded at the Point of Compliance. Consequently, the Discharger's monitoring network is in violation of the WDRs and Title 27. This Order requires the Discharger to install monitoring devices along the downgradient edge of each individual waste management unit.

83. The MRP requires, in part, that groundwater monitoring wells on both the eastern and western portion of the site be sampled semi-annually for volatile organic compounds (VOCs). Tables 1-A and 1-B of the MRP require that USEPA method 8260B be used, and these tables refer to Table IX of the MRP for the listing of the 70 constituents to be analyzed with method 8260B. However, a review of the Discharger's 2009 through 2012 monitoring reports show that for some sampling events the Discharger directed the analytical laboratory to analyze with an "8260 short list" and therefore the laboratory only

reported the results of 67 of the 70 required constituents. In addition, the laboratory used an elevated practical quantitation limit. The failure to comply with the MRP is a violation of the WDRs and has prevented staff from fully evaluating the groundwater impacts at this site. A Notice of Violation was issued on 2 May 2014 and this Order requires the Discharger to fully comply with the MRP.

## BASIS FOR CLEANUP AND ABATEMENT ORDER

84. Water Code section 13304(a) states, in relevant part: *Any person who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirement or other order or prohibition issued by a regional board or the state board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance, shall upon order of the regional board, clean up the waste or abate the effects of the waste, or, in the case of threatened pollution or nuisance, take other necessary remedial action, including, but not limited to, overseeing cleanup and abatement efforts.*

85. As discussed in the Findings above, the Discharger has discharged waste into waters of the state in violation of WDRs Order R5-2008-0188.

## REGULATORY CONSIDERATIONS

86. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Board. These requirements implement the Basin Plan.

87. 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, which is an agricultural drainage canal that flows along 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. Water from the bird sanctuary discharges to the A-1 Channel.

88. The designated beneficial uses of the underlying groundwater, 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.

89. Water Code section 13267 subdivision (b) states, in relevant part: *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 proposes to discharge waste 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 report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.*

90. The technical reports required by this CAO are necessary to ensure compliance with this CAO and WDRs Order R5-2008-0188, and to ensure the protection of water quality. Recology Hay Road and Jepson Prairie Organics, wholly owned subsidiaries of Recology, own and operate the facility that discharges waste subject to this CAO and WDRs Order R5-2008-0188.

91. The issuance of this Order is being taken for the protection of the environment and as such is exempt from provisions of the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) pursuant to California Code of Regulations, title 14, sections 15061 subdivision (b)(3), 15306, 15307, 15308, and 15321subdivision (a)(2). This Order generally requires the Discharger to submit plans for approval prior to implementation of cleanup activities at the site. Mere submittal of plans is exempt from CEQA as submittal will not cause a direct or indirect physical change in the environment and/or is an activity that cannot possibly have a significant effect on the environment. CEQA review at this time would be premature and speculative, as there is simply not enough information concerning the Dischargers' proposed remedial activities and possible associated environmental impacts. If the Central Valley Water Board determines that implementation of any plan required by this Order will have a significant effect on the environment, the Central Valley Water Board will conduct the necessary and appropriate environmental review prior to Executive Officer's approval of the applicable plan. The Discharger will bear the costs, including the Central Valley Water Board's costs, of determining whether implementation of any plan required by this Order will have a significant effect on the environment and, if so, in preparing and handing any documents necessary for environmental review. If necessary, the Discharger and a consultant acceptable to the Central Valley Water Board shall enter into a memorandum of understanding with the Central Valley Water Board regarding such costs prior to undertaking any environmental review.

**IT IS HEREBY ORDERED** that, pursuant to Water Code sections 13304 and 13267, Recology Hay Road and Jepson Prairie Organics shall cleanup and abate the Hay Road Landfill in accordance with the scope and schedule set forth below, in order to comply with WDRs Order R5-2008-0188 (or subsequent Order) and the State Water Resources Control Board's Water Quality Order 97-03-DWQ, the *Statewide Industrial Storm Water General Permit* (or subsequent Order).

Technical reports shall contain the information and decisions required by the following paragraphs. If a report is submitted without the required information or decision, then the Discharger is in violation of this Order and subject to additional enforcement action.

1. **Effective immediately upon issuance of this Order**, the Discharger shall:

   a. Comply with all requirements of WDRs Order R5-2008-0188, which includes Revised Monitoring and Reporting Requirements Order R5-2008-0188 (Attachment B to this Order) and the April 2000 Standard Provisions and Reporting Requirements (Standard Provisions).

   b. Remove all raw compost material or product that is not stored within the 54-acre area designated in the WDRs. Conduct only active composting operations on the 22-acre all-weather surface, as described in Finding 88 of the WDRs. Only store raw compost material or product within the 54-acre area.

   c. Cease the discharge of compost area stormwater and leachate to any ditch, pond, or low area other than those authorized in the WDRs to accept compost stormwater or leachate. In addition, cease the disposal of compost stormwater or leachate on the landfill units.

   d. Only discharge and store compost leachate in the low-flow pond. Only discharge and store compost stormwater in the high-flow pond.

   e. Maintain the groundwater elevation to achieve the required separation between the wastes or leachate[26] and the highest anticipated elevation of groundwater, as required by Construction Specification D.2 of the WDRs. Compliance with Construction Specification D.2 shall be determined using the monitoring well closest to each LCRS and data shall be reported to at least an accuracy of 0.1 foot.

   f. Operate the pan lysimeters as designed and according to the WDRs as an unsaturated zone detection monitoring device. If water is detected in the pan lysimeters, the Discharger shall implement corrective actions to prevent additional water from entering the unsaturated zone. Upon detection of any liquid in a pan lysimeter, regardless if liquid had been previously present, the Discharger shall immediately notify the Water Board staff by phone and email, sample the liquid, and remove the liquid.[27] Within seven days of detection, the Discharger shall submit a written notification. Within 30 days of the detection, the Discharger shall submit a written report with tabulated and descriptive information of the monitoring data, volume, field parameters, temporary storage location and disposal method of removed

[26] Defined as the bottom of the LCRS sump.

[27] Liquids removed from pan lysimeters may not be discharged to a leachate collection sump, onto any landfill unit, or used in the compost are for dust control. However, the liquids may be temporarily stored in an above ground tank prior to off-site disposal at a permitted facility.

liquid, laboratory reports, a description of the corrective action(s) implemented, and proposed monitoring to demonstrate the success of the corrective action(s).

g. Comply with section 20365(c) of Title 27 and isolate all sewage sludge, alternate daily cover, and admixed soil stockpiles such that these wastes meet the performance standards for precipitation and drainage control. In particular, the Discharger shall install stormwater run-on and run-off controls for these waste piles.

h. Implement the groundwater corrective action measures proposed in the Discharger's 4 April 2014 *Notice of Intent and Corrective Action Program, General WDRs R5-2008-0149, Recology Hay Road Landfill* and as conditionally approved by Board staff.

i. Take all steps necessary to stop the intrusion of stormwater into the pan lysimeters.

j. **By 15 June 2014,** the Discharger shall submit a written report describing the changes it has implemented such that it will continuously comply with items 1.a through 1.i, above.

**Composting Operations**

2. **By 1 June 2014,** Jepson Prairie Organics shall submit a State Water Board Form 200 *Change of Name* to allow the Board to add Jepson Prairie Organics as an operator of the facility and permittee in the WDRs.

3. **By 1 June 2014,** Jepson Prairie Organics shall submit (a) a Notice of Intent to comply with Water Quality Order 97-03-DWQ, the *Statewide Industrial Storm Water General Permit* (General Permit) and (b) a Storm Water Pollution Prevention Plan (SWPPP) for the composting operation. In addition, Recology Hay Road shall submit a revised SWPPP that includes both the landfill and the shop/maintenance yard.

4. By **30 June 2014**, the Discharger shall submit a *Composting Operations* technical report which includes the following elements:

   a. ***Section I - Water Balance Report.*** Water balances for the low-flow and high-flow ponds shall be prepared using the parameters identified in Attachment D to this Order. A minimum of 2-feet of freeboard shall be maintained at all times, and contents of the low-flow pond may not overflow or discharge into the high-flow pond. In addition to that in Attachment D, the *Water Balance Report* shall include the following elements:

      (1) *Low-Flow Pond*: The low-flow pond water balance shall meet the requirements specified in Table 4.1 of Title 27 for the design event of a surface impoundment. Results of the water balance shall be used to determine if the low-flow pond has adequate capacity under the design conditions.

      (2) *High-Flow Pond*: The high-flow pond water balance shall be calculated for a normal year with a 100-year 24-hour storm event, and shall be used to determine if this pond has adequate capacity under the design conditions.

(3) *Capacity*: The Discharger shall state whether the ponds have adequate capacity under the design conditions in (1) and (2), above.

(4) *Plan for Removal and Disposal of Leachate from Low-Flow Pond:* If the water balance shows inadequate storage capacity in the low-flow pond, then the Discharger shall submit a workplan for the removal and disposal of compost pond leachate. Leachate shall be removed prior to 1 October each year, and may not be discharged to any waste management unit.

b. ***Section II – Food Waste Composting*.** Either (a) document that all food waste composting takes place using in-vessel composting methods (as required by the WDRs and defined in Title 14 CCR) or (b) submit a Report of Waste Discharge proposing an alternate method of composting food waste, and demonstrate that the proposed non in-vessel composting method is protective of surface water and groundwater quality.

c. ***Section III -Compost Area and Waste Pile Evaluation and Workplan.*** This portion of the technical report shall include the following elements:

(1) 54-Acre Compost Area Map: Stamped as-built drawing indicating the aerial extent of each type of compost activity (e.g. food-waste, active, green waste, sorting, storage, curing), and the locations of all drainage channels, sumps, and ponds into which water from the 54 acre area could flow. The map shall delineate the perimeter of the all-weather pad, and shall identify which activities occur on and off the all-weather pad. The map shall include the type of lining, if any, installed in any ponds, drainage system, sump, and channels associated with the composting operations.

(2) Reconfiguration of Leachate Drainage and Storage System: A workplan to reconfigure the leachate and stormwater flows from the compost area. This plan shall ensure:

- Leachate contained in the low-flow pond does not discharge or overflow to the high-flow pond; and
- Neither leachate nor stormwater flows through unlined ditches.

The plan shall include a timeline such that the work will be accomplished prior to 1 October 2014.

(3) Electrical Leak Location Survey: A workplan and schedule to complete an electrical leak location survey in 2015 and to repair any identified defects in the low-flow pond liner, high-flow pond liner, and the WP-9.1 liner system prior to 1 October 2015.

**Groundwater Monitoring**

5. By **1 August 2014,** the Discharger shall submit a *Groundwater Monitoring Network Upgrade and Nitrogen Site Investigation Workplan* to address the following items:

   a. ***Section I - Detection Monitoring Network***. The Discharger shall submit a workplan proposing the establishment of new detection monitoring points to ensure compliance with the WDRs, Title 27, and this Order***.*** The updated monitoring system shall comply with the requirements of Section 20415, and shall be certified according to 20415(e) of Title 27. In addition to the information required by Attachment C to this Order, the following information shall be included for each item listed below:

      (1) New Background Monitoring Wells. Proposed locations for new background groundwater monitoring wells in accordance with section 20415(b)(1)(A) of Title 27. The proposed locations must be free of site influences and increasing trends (as described for existing background wells in Findings 33, 34, 35, 38, 43). Therefore, new background wells shall be proposed to replace background wells G-6, G-18, G-4R, 4BR, G-1, and G-11M. All wells shall be suitable for calculation of inter-well statistical analysis. Staff recommends that the Discharger consider locations to the northwest of the borrow pit and out of the zone of influence of the borrow pit pumping.

      (2) New Background Lysimeters. Proposed locations for new background lysimeters, as described in Finding 60. The proposal shall be in accordance with section 20415(d)(2)(A) of Title 27 for background unsaturated zone monitoring points.

      (3) New Point of Compliance, Shallow Zone, and LCRS Wells. Installation of new shallow zone wells shall be proposed as described below.

      - As described in Finding 19 of this Order, new monitoring wells shall be installed immediately downgradient of the low-flow and the high-flow ponds.
      - As described in Finding 53 of this Order, groundwater monitoring devices (wells or piezometers) shall be installed as close as possible to each LCRS. In the western area of the facility, these devices shall be within the slurry wall.
      - As described in Findings 80 and 81 of this Order, appropriately-constructed monitoring devices, including a design for replacement of well 4B, shall be installed within the shallow groundwater interval.
      - As described in Finding 82 of this Order, new point of compliance groundwater monitoring devices shall be installed along the downgradient edge of each individual waste management unit.

   b. ***Section II- Nitrate-N Site Investigation Workplan.*** The workplan shall be designed to delineate the nitrate-N release in order to establish both corrective action and an

evaluation monitoring program that complies with the WDRs and Title 27. The Discharger shall collect and analyze all data necessary to assess the nature and extent of the nitrate-N releases. The workplan shall include the following elements:

(1) Procedures, methods, and analysis to define the vertical and horizontal extent of contamination throughout the zones of nitrate-N contamination, including all areas where groundwater concentrations are equal to or exceed 5 mg/L, which includes existing and abandoned monitoring wells (e.g., G-4R, G-18, G-31, and extraction well G-22), site investigation grab groundwater locations, and any other areas described in the Findings of this Order. Lab turn-around time shall be sufficient so that decisions can be made for additional step-out of borings as necessary to define the plume. A contingency step-out plan shall be included.

(2) All evaluation monitoring work proposed in the Discharger's 4 April 2014 *Notice of Intent and Corrective Action Program, General WDRs R5-2008-0149, Recology Hay Road Landfill*.

(3) A site-wide comprehensive map showing all existing and abandoned groundwater monitoring points and all 2013 site investigation boring/grab-sample locations. For clarity and readability, the map shall only include groundwater monitoring points. The most current nitrate-N concentrations shall be posted for each well and boring/grab-sample locations. Iso-concentration lines shall be included.

(4) Proposed locations for the investigation, which shall be based on the iso-concentration map required above, and shall be shown on a site-wide map. If desired, the proposed locations may be included on the site-wide map comprehensive map required above.

(5) A schedule with dates for the start and completion of field work and receipt of analytical results.

**Compliance with Facility Specifications (slope stability, flood protection, drainage)**

6. By **30 August 2014**, the Discharger shall submit a *Facility Specifications* technical report containing the following information:

a. Updated Slope Stability Analysis: The slope stability analysis shall be updated to come into compliance with Facility Specifications C.2 and C.3 and Sections 20370 and 21750 of Title 27. The following shall be included for all current and future slopes, and shall include operation, under interim cover, final closure, and post closure maintenance :

- Identification of all the information and variables used in the analysis.
- Current information regarding the closest faults.
- A factor of safety of 1.5 for the pseudo-static analysis.
- Other current geotechnical data and information.

- Current information regarding the closest faults (e.g., Midland and Great Valley Fault Zones), the pseudo-static factor of safety (1.5), and other geotechnical data and information[28] for all current and future slopes of the landfill.
- If the slopes do not meet the pseudo-static safety factor of 1.5 cannot be achieved, then a workplan with schedule shall be submitted to realign any existing slopes and/or benches that do not conform to the updated analysis and the WDRs.

b. Evaluation of Landfill Exterior Berm Heights:

- An engineering evaluation of whether all berm heights meet the requirements of Construction Specification D.9 for the 100-year flood.
- If the berm heights do not meet the requirements of Construction Specification D.9 of the WDRs, a workplan and schedule shall be provided to achieve compliance with the WDRs.

c. Drainage System Evaluation:

- Calculations, results, and a discussion of engineering evaluations to update the size, length, and dimensions of all drainage channels, pipes, and inlets/outlets throughout the site to comply with the requirements of the Facility Specification C.10 of the WDRs under the 1,000-year 24-hour precipitation condition.
- If necessary, a workplan and timeline to complete the improvements prior to the 2014-2015 wet season.

**Groundwater Investigation Results and Enhanced Corrective Action**

7. By **1 July 2015**, the Discharger shall submit one document containing the following items:

a. ***Section I – Updated Detection Monitoring Report of Results.*** The Discharger shall show that it implemented the Water Board staff-approved work plan. In addition, the report shall include the information required by Attachment C to this CAO; certification that the updated network complies with section 20415 of Title 27 for a detection monitoring program; complies with section 20405 of Title 27 for Point of Compliance Wells; a site-wide map showing the locations of all existing and abandoned wells; and a narrative describing whether the new monitoring points comply with the CAO (i.e., new background wells, background lysimeters, and point of compliance, shallow zone, and LCRS wells). All data shall be tabulated and cross-referenced to maps.

b. ***Section II - Nitrate-N Investigation Report of Results.*** This portion of the technical document shall delineate the nature and extent of contamination of nitrate-N contamination. The report shall include information whether the site investigation borings were installed and sampled according to the Water Board staff-approved

[28] Solano County General Plan, Adopted August 2008. http://solanocountygeneralplan.net

work plan and whether all conditions of approval were met. The information required by Attachment C to this CAO shall be included. In addition, the Discharger shall define the sources and delineate the releases with a detailed assessment of the nature and extent of the releases. All data shall be tabulated and cross-referenced to site-wide maps. Shallow and deep zones shall be depicted on separate maps. All abandoned wells with the most recent nitrate-N concentration data shall be included on maps and in tables. Grab-groundwater sample results (including the results from the 2013 and 2014 investigations) shall be included on maps and in tables, and shall be discussed in the corresponding text. Tabulated data with groundwater elevations shall be included. Calibration logs shall be included. Conceptual models for the shallow zone and for the deep zone shall be included.

c. ***Section III- Initial Corrective Action Report of Results*** The Discharger shall submit a Nitrate-N report with the progress of the corrective action implemented under Item number 1.h of this CAO (i.e., the Discharger's 4 April 2014 *Notice of Intent and Corrective Action Program, General WDR R5-2008-0149 for In-situ Groundwater Remediation, Recology Hay Road Landfill*). The report shall include technical evaluations of the progress of the work, tabulated data, maps, figures, laboratory reports, and time-series charts of concentrations over time. Field logs shall be included. All field and analytical data shall be tabulated to clearly show compliance with the WDRs and CAO or lack thereof.

d. ***Section IV - Nitrate-N Enhanced Corrective Action Workplan***. Based on the results of the Nitrate-N Investigation, the Discharger shall propose expanding the current in-situ corrective action measure such that all groundwater impacted nitrate exceeding a concentration of 5 mg/L nitrate-N is actively remediated. The workplan shall include the following elements:

- Details and plans for an expansion of the in-situ bioremediation (proposed by the Discharger in the 4 April 2014 *Notice of Intent and Corrective Action Program*) wherever groundwater concentrations are greater than or equal to 5 mg/L nitrate-N (e.g., 4BR G-14, G-4R, G-18, G-19, extraction well G-22,.G-24, G-31, and any temporary borings/grab groundwater samples that exceeded 5 mg/L), including WP-9.1.
- A proposal to isolate all sources of nitrate-N from groundwater, surface water, and the unsaturated zone.
- A proposal to cease the intrusion of liquids into the pan lysimeters.
- A proposal to establish, and install if necessary, a corrective action monitoring network in compliance with the WDRs and Title 27 to evaluate the success of the on-going corrective action measures.
- A proposal for sampling and analysis of surface water runoff from all potential nitrate-N source areas and the A-1 channel.

**Landfill Gas Monitoring**

8. By **1 August 2015**, The Discharger shall submit an *Evaluation of the Landfill Gas Monitoring* System, which shall certify whether the landfill gas monitoring system is sufficient to evaluate the effectiveness of the gas extraction system and whether the additional monitoring points or instruments are necessary to monitor and control the system in order to prevent groundwater impacts. System monitoring shall include methods and means to ensure a negative pressure is achieved throughout the entire unit. If current methods and measurement devices do not meet the requirements to maintain a negative pressure, then the *Evaluation* shall include a workplan and proposed schedule to update the gas system such that a negative pressure is constantly maintained.

**Completion Reports**

9. By **30 February 2015**, the Discharger shall submit one comprehensive ***Completion Report for the Compost Operations and for the Facility Specifications*** documenting that all approved workplans have been implemented, and that all conditions of the approved workplans in Items 4.a(4), 4.c(2), and 6.a through 6.c of the this Order have been completed. This report shall include completion of the following work:

    - Final disposition and volumes of leachate removed from the low-flow pond prior to 1 October 2014, per Item 4.a(4) of the CAO.
    - Reconfiguration of the Leachate Drainage and Storage System, per Item 4.c(2) of the CAO.
    - Realignment of slopes and/or benches that do not conform to the updated slope-stability analysis and the WDRs, per item 6.a of the CAO.
    - Modification of exterior berm heights to comply with the WDRs, per item 6.b of the CAO.
    - Improvements to the drainage channels, pipes, and inlets/outlets throughout the site, per Item 6.c of the CAO.

10. By **1 December 2015**, the Discharger shall submit an

    - *Electrical Leak Location Survey and Liner Repair Completion Report,* which shall document whether the leak location surveys of the low-flow, high-flow, and Waste Pile liners were completed according to the approved work plan and whether any leaks were detected and repaired. This completion report shall provide documentation of the completed survey and repairs, and shall include the associated quality control/quality assurance documentation for the repairs.

    - *Expansion of the In-situ Bioremediation Corrective Action Program Completion Report*, per item 7.d of this CAO. The Discharger shall document whether the expansion includes all locations where nitrate-N exceeds 5 mg/L and whether all sources of nitrate-N have been isolated. The Discharger shall also document whether the corrective action monitoring wells were installed. The Discharger shall include text, tables, maps, laboratory reports, and figures to documenting whether

the completed work complied with the CAO, the approved work plans, and any conditions of approval.

11. By **30 September 2017**, a revised *Water Quality Protection Standard Report* (Water Standard) must be submitted, which shall propose statistical methods and procedures to calculate concentration limits. The Water Standard shall include the results from eight sampling events for the new background wells and points, and shall propose site-wide inter-well concentration limits using Board staff-approved background wells and points and the statistical methods recommended in the USEPA's March 2009 *Unified Guidance*.

**Restoration of Beneficial Uses**

12. The following schedule shall be met to document efficacy of the installed corrective action measures and the restoration of beneficial uses:

    a. By **30 April 2016**, the Discharger shall submit a ***2015 Groundwater Concentration Report*** documenting that a significantly decreasing trend in nitrate-N concentrations has occurred in all the downgradient wells of the nitrate-N evaluation monitoring program. If a decreasing trend has not been established, the Discharger shall submit and immediately implement a *Revised Corrective Action Workplan* to aggressively remediate nitrate-N in groundwater.

    b. By **30 April 2020,** the Discharger shall submit a ***Nitrate-N Corrective Action Completion Report*** documenting that nitrate-N concentrations have been reduced to below the concentration limit at each well in the nitrate-N evaluation monitoring program.

**Other Requirements**

13. **Effective immediately,** all data, technical reports and plans, and monitoring reports shall be uploaded to the State Water Resources Control Board's web-based Geotracker database system (http://geotracker.waterboards.ca.gov), in compliance with the requirements of Title 23 Section 3890 et seq. This includes uploading all reports, plans, and data required under this Cleanup and Abatement Order and under any Order or permit issued by the State Water Quality Control Board.

14. **Beginning with the second quarter 2014,** the Discharger shall submit quarterly progress reports describing the work completed to date to comply with each of the above requirements , as well as what work which will be conducted in the next quarter. The Quarterly Progress Reports shall be submitted by the **30$^{th}$ day of the month following the end of the quarter** (e.g. by 30 April, 30 July, 30 October, and 30 January).

15. In addition to the above, the Discharger shall comply with all applicable provisions of the Water Code and Title 27 that are not specifically referred to in this Order.

16. As required by the California Business and Professions Code sections 6735, 7835, and 7835.1, all reports shall be prepared by, or under the supervision of, a California Registered Engineer or Professional Geologist and signed by the registered professional.

17. As required by Provision G.6a and G.6e of WDRs Order R5-2008-0118, all reports and transmittal letters shall be signed by a principal executive officer of the corporation with at least the level of senior vice-president, and any person signing a document submitted to comply with this Cleanup and Abatement Order 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 knowledge and 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.*

If the Discharger is unable to perform any activity or submit any document in compliance with the schedule set forth herein, or in compliance with any work schedule submitted pursuant to this Order and approved by the Assistant Executive Officer, the Discharger may request, in writing, an extension of the time specified. The extension request shall include justification for the delay. Any extension request shall be submitted as soon as a delay is recognized and prior to the compliance date. An extension may be granted by revision of this Order or by a letter from the Assistant Executive Officer.

If the Discharger fails to comply with the provisions of this Order, the Assistant Executive Officer may refer this matter to the Attorney General for judicial enforcement or may issue a complaint for administrative civil liability. Failure to comply with this Order may result in the assessment of administrative civil liability up to $10,000 per violation per day, pursuant to the Water Code sections 13268, 13350, and/or 13385. The Central Valley Water Board reserves its right to take any enforcement actions authorized by law.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

This Order is effective upon the date of signature.

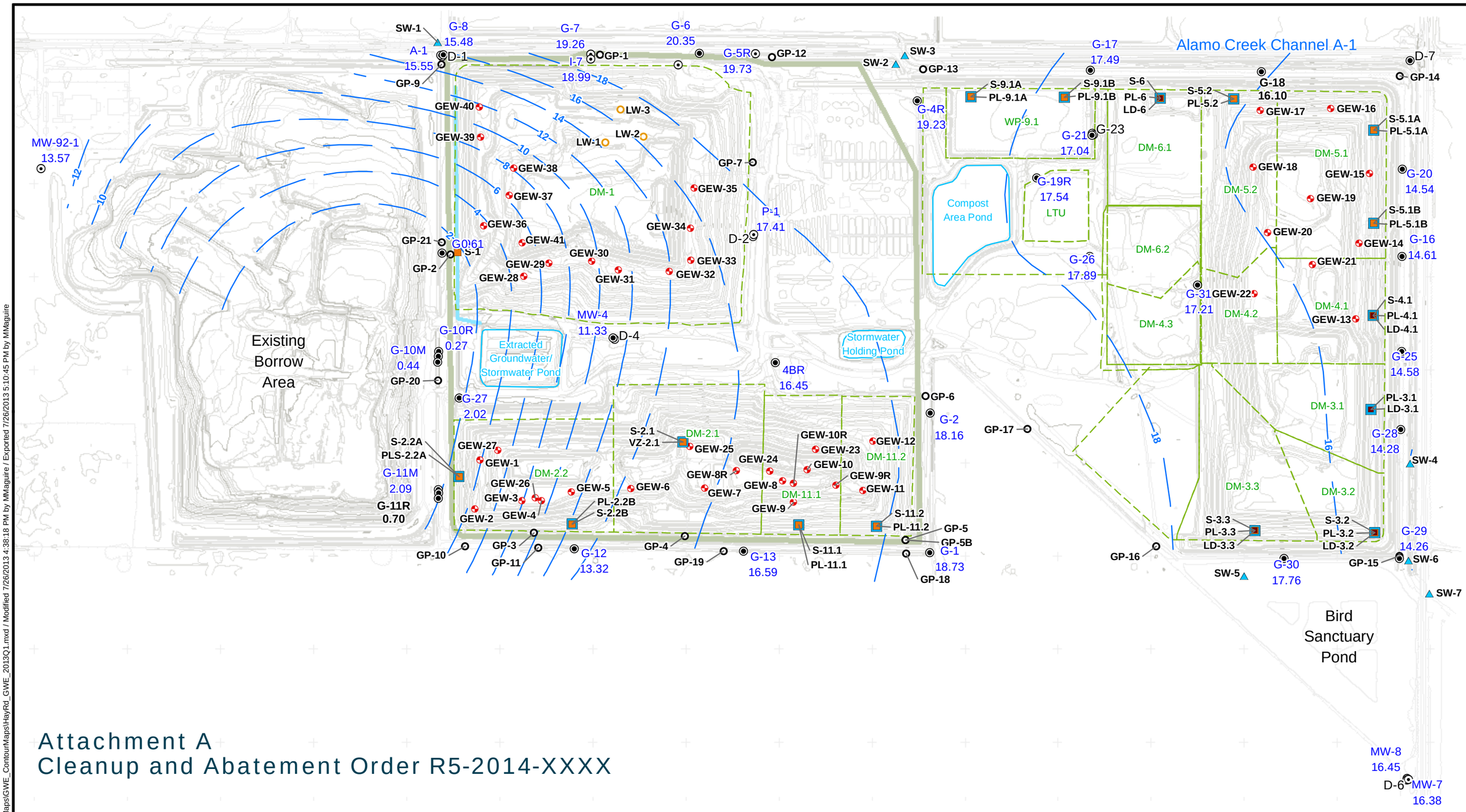
Andrew Altevogt, Assistant Executive Officer

XX YYY 2014

(Date)

MB/HDH/WSW: 5 May 2014

Attachments:
A: Site Map
B: Revised Monitoring and Reporting Program R5-2008-0188 (REV 1)
C: Monitoring Well and Landfill Gas Well Installation Work Plan and Report Requirements
D: Water Balance Requirements




Attachment A
Cleanup and Abatement Order R5-2014-XXXX

## LEGEND

- Groundwater Monitor Well
- Piezometer
- Landfill Gas Extraction/Leachate Well
- Leak Detection Sump
- Leachate Sump
- Lysimeter
- Gas Extraction Well
- Compliance Gas Probe
- Surface Water Sample Location
- Groundwater Elevation Contour (ft amsl)
- Pond
- Disposal Module
- Groundwater Extraction Trench
- Perimeter Slurry Wall
- Ground Surface Topography (2013)

500 0 500 Feet

## NOTES AND REFERENCES

1) Groundwater elevations shown as feet above mean sea level.
2) Deep wells (D-) not included in contouring.
3) Site topography April 2013
4) Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

PROJECT
RECOLOGY HAY ROAD
GROUNDWATER MONITORING
SOLANO COUNTY, CALIFORNIA

TITLE
**GROUNDWATER ELEVATION CONTOURS FEBRUARY 2013**

Golder Associates

| | | | | | |
|---|---|---|---|---|---|
| PROJECT No. | | 123-97608 | FILE No. | HayRd_GWE_2013Q1.mxd | |
| DESIGN | MM | 7/26/2012 | SCALE: | AS SHOWN | REV. 0 |
| GIS | MM | 7/26/2013 | | | |
| CHECK | KJ | 7/26/2013 | | | |
| REVIEW | KJ | 7/26/2013 | | | |

**FIGURE 2**

# Attachment B

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM NO. R5-2008-0188 (REV 1)
FOR
RECOLOGY HAY ROAD
HAY ROAD LANDFILL AND JEPSON PRAIRIE ORGANICS

CLASS II & III LANDFILLS, CLASS II WASTE PILE, CLASS II LAND TREATMENT UNIT, AND COMPOSTING OPERATIONS
CONSTRUCTION, OPERATION, CLOSURE,
POST-CLOSURE MAINTENANCE AND CORRECTIVE ACTION
SOLANO COUNTY

This Revised Monitoring and Reporting Program (MRP) is issued pursuant to California Water Code section 13267 and incorporates requirements for groundwater, unsaturated zone, landfill gas, leachate, surface water, storm water, semisolid, pond, and facility monitoring; maintenance; and reporting contained in California Code of Regulations, Title 27, section 20005, et seq. (hereafter Title 27), Waste Discharge Requirements (WDRs) Order No. R5-2008-0188, the *Standard Provisions and Reporting Requirements* (SPRRs) dated April 2000, and Cleanup and Abatement Order (CAO) R5-2014-XXXX. The Discharger shall not implement any changes to this MRP unless a revised MRP is issued by the Central Valley Water Board or the Executive Officer.

## A. REQUIRED MONITORING REPORTS

| Monitored Medium/System | | Parameters and Frequencies |
|---|---|---|
| 1. | Groundwater Monitoring (Section D.1) | **Tables I-A, I-B, I-C & A-1** |
| 2. | Unsaturated Zone Monitoring (Section D.2) | **Tables II-A, II-B, & A-2** |
| 3. | Landfill Gas Monitoring (Section D.3) | **Table III & A-3** |
| 4. | Leachate Sump Monitoring/Seeps (Section D.4) | **Table IV** |
| 5. | Leak Detection Monitoring (Section D.5) | **Table V** |
| 6. | Surface Water Monitoring (Section D.6) | **Table VI** |
| 7. | Storm Water Monitoring (Section D.7) | **Table VII** |
| 8. | Semisolid Waste Monitoring (Section D.8) | **Table VIII** |
| 9. | Composting Area Pond Monitoring (Section D.9) | **Table IX** |
| 10. | Facility Monitoring (Section D.10) | **As necessary** |
| 11. | Annual Monitoring Summary Report (Section E.5) | **Annually** |
| 12. | Response to a Release | **Per Standard Provisions and Reporting Requirements** |

## B. REPORTING

The Discharger shall submit semiannual and annual monitoring reports by the date shown in the table, below. Semiannual and annual monitoring reports shall be submitted with the data and information required in this MRP, and as required in WDRs R5-2008-0188, CAO R5-2014-XXXX, and the Standard Provisions and Reporting Requirements. Reports which do not comply with the required format or content shall be deemed to be in noncompliance with the WDRs and/or Cleanup and Abatement Order (CAO) R5-2014-XXXX.

In reporting the monitoring data required by this MRP, the Discharger shall arrange the data in tabular form so that the date, the constituents, the concentrations, the units, flow rates, volumes, and other required parameters are readily discernible. The data tabulated shall be summarized and evaluated in such a manner so as to illustrate clearly the compliance or the lack thereof with the waste discharge requirements and/or the CAO. Data shall also be submitted in a digital format acceptable to the Executive Officer. All reports must be uploaded to Geotracker[1] no later than the report due date. 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.

Reporting Schedule

| Sampling Frequency | Reporting Frequency | Reporting Periods End | Report Date Due |
|---|---|---|---|
| Monthly | Semiannual | Last Day of Month | **31 July**<br>**31 January** |
| Quarterly | Semiannual | 31 March<br>30 June | **31 July** |
| | | 30 September<br>31 December | **31 January** |
| Semiannually | Semiannual | 30 June<br>31 December | **31 July**<br>**31 January** |
| Annually | Annual | 31 December | **31 January** |
| 5-Year | Every 5 years | 31 December | **31 January** |

[1] http://geotracker.waterboards.ca.gov

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

Twice per year, the Discharger shall submit a *Semiannual Monitoring Report*. The first semiannual monitoring report is due no later than 31 July of each year, and the second semiannual monitoring report is due no later than 31 January of each year. Each semiannual monitoring report shall include the field and monitoring data required in this MRP, and shall include a compliance evaluation summary as specified in Section E.3 of this MRP. Each semiannual monitoring report shall include a discussion of compliance, or lack thereof, with the WDRs, the CAO, and the Water Quality Protection Standard.

By 31 January of each year, 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 required in this MRP and shall include a discussion of compliance, or lack thereof, with the WDRs, the CAO, and the Water Quality Protection Standard.

The Discharger shall monitor all Constituents of Concern (COCs) for all Monitoring Points and for each monitored medium every fifth year (5-year sampling frequency). The last 5-year COC monitoring event occurred in the fourth quarter of 2010. Subsequent COC monitoring efforts shall be carried out every fifth year thereafter beginning in the fourth quarter **2015,** and reporting of the 5-year COCs will next be due on **31 January 2016**. The report for the COC monitoring shall be submitted with, or reported in, the Annual Report for that year.

## 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, the point of compliance, and all monitoring points. A Water Quality Protection Standard, or any modification thereto, shall be submitted in a report for review and approval.

As described in the CAO, the Discharger is required to install new site-wide background well(s) and lysimeters that represent the groundwater and unsaturated zone which is un-impacted by the landfill, composting, and sewage sludge operations at the facility, and is required to calculate new concentration

limits. New background concentration limits shall be calculated for the shallow, perched, unsaturated, current deep zones, and for surface water. Under the CAO, the Discharger is also required to install new background lysimeters, new point of compliance wells, and shallow zone monitoring wells. By **30 September 2017**, a revised Water Quality Protection Standard Report (Water Standard) must be submitted, which shall propose statistical methods and procedures to calculate concentration limits. The Water Standard shall include the results of eight sampling events completed for the new background locations installed under CAO R5-2014-XXXX and shall propose site-wide inter-well concentration limits using Board staff-approved background wells and points and the statistical methods recommended in the USEPA's March 2009 Unified Guidance.

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. The report shall also include the deeper zone which the Discharger is currently monitoring.

b. Include maps showing the monitoring points and background monitoring points for the surface water monitoring program, groundwater monitoring program, and the unsaturated zone monitoring program. The maps shall include the points of compliance in accordance with §20405 of Title 27. For clarity and readability, a separate map shall be provided for groundwater monitoring points, which shall include all existing and abandoned wells and piezometers.

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

d. Evaluate the vertical gradient of groundwater movement from the uppermost aquifer to the deeper zone.

e. Include a proposed statistical method for calculating concentration limits for monitoring parameters and constituents of concern that are detected in 10% or greater of the background data (naturally-occurring constituents) using a statistical procedure from Title 27, section 20415(e)(8)(A-D)] or section 20415(e)(8)(E).

f. Provide tabulated data of the proposed concentration limits and all data, graphs, tables, and statistical evaluations to support the Discharger's proposed limits.

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.

**2. Constituents of Concern (COCs)**

The COCs 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 IX for the specified monitored medium and Table X for the constituents of concern analytical methods. The Discharger shall monitor all COCs every five years, or more frequently as required in accordance with a Corrective Action Program.

**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 VIII for the specified monitored medium, and Tables IX and IX for the analytical methods and constituents.

**3. Concentration Limits**

For a naturally occurring constituent of concern, the concentration limit for each constituent of concern shall be determined as follows:

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

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

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

a. Groundwater – with the exception of VOCs
b. Unsaturated Zone – with the exception of VOCs.
c. Surface water – with the exception of VOCs.
d. Corrective action – according to the values defined in the CAO.

The concentration limits for VOCs shall be as outlined in Section E, Detection Monitoring, of the WDRs, with the laboratory's method detection limits (MDLs) and Practical Quantitation Limits (PQLs) approved by Water Board staff.

**4. Point of Compliance**

The point of compliance for the water standard at each Unit is a vertical surface located at the hydraulically downgradient limit of the Unit that extends through the uppermost aquifer underlying the Unit. For Units within the cutoff wall, the

point of compliance must be between the cutoff wall and the Unit.

**5. Monitoring Points**

a. Groundwater: With the exception of VOCs, the concentration limits for groundwater monitoring shall be based on the statistical evaluation of historical data from background wells for each monitored zone, including the background wells required under Cleanup and Abatement Order R5-2014-00XX, and as approved by Water Board staff. Groundwater monitoring points include all those listed in Table A-1 and any additional groundwater monitoring wells installed subsequent to adoption of this MRP.

b. Unsaturated Zone: With the exception of VOCs, the concentration limits for unsaturated monitoring shall be based on the statistical evaluation of historical data from the unsaturated background points, which are required to be installed under Cleanup and Abatement Order R5-2014-00XX, and any additional points installed subsequent to adoption of this MRP and as approved by Water Board staff. Unsaturated zone monitoring points include all those listed in Table A-2 and any additional monitoring points installed subsequent to adoption of this MRP.

c. Surface Water: With the exception of VOCs, the concentration limits for surface water monitoring shall be based on the statistical evaluation of historical data from background locations, and as approved by Water Board staff. Surface monitoring points include SW-3, SW-4, SW5, SW-7, and any additional monitoring locations installed subsequent to adoption of this MRP.

**6. Compliance Period**

The compliance period for each Unit shall be the number of years equal to the active life of the Unit plus the 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 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 disposal module or a new Unit[2] shall be installed, operational, and one year of monitoring data with at least eight sampling events collected **prior to** the discharge of waste. All monitoring, sample

[2] This includes expansion.

collection, preservation, transportation, and analysis shall be conducted in accordance with a Board staff-approved Sample Collection and Analysis Plan, which includes MDLs, PQLs, and field quality assurance/quality control standards.

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 groundwater, unsaturated zone, landfill gas, leachate, leak detection, surface water, storm water, semisolid, and pond monitoring points shall be sampled and analyzed for monitoring parameters as indicated and listed in Tables I through VIII for the specified media. All parameters shall be analyzed in accordance with the methods listed in Tables IX and X. Table IX provides the analytical methods for the monitoring parameters. Table X contains the analytical methods for the five year constituents of concern sampling events. 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 MRP and the methods have been approved by Water Board staff. 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.

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 a Board staff-approved Sampling and Analysis Plan (SAP).

**1. Groundwater**

The Discharger shall operate and maintain a groundwater monitoring system that complies with the applicable provisions of §20380 (*Applicability*), 20385 (*Required Programs*), 20390 (*Water Quality Protection Standards*), 20395 (*Constituents of Concern*), 20400 (*Concentration Limits*), 20405 (*Monitoring Points and Point of Compliance*), 20415 (*General Water Quality Monitoring and System Requirements*), 20420 (*Detection Monitoring Program*), 20425 (*Evaluation Monitoring Program*), and 20430 (*Corrective Action Monitoring Program*) of Title 27 in accordance with an approved Detection, Evaluation, and Corrective Action Monitoring Program. The monitoring system shall be certified by a California-licensed professional civil engineer or geologist as meeting the requirements of Title 27. The current monitoring system does not meet the requirements of Title 27 and is being modified under a time schedule in the CAO.

After review and approval by Central Valley Water Board staff, the Discharger shall revise the groundwater detection monitoring system each time a new landfill cell or module is constructed. As the landfill expands, additional

detection monitoring points 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. Upon Water Board staff approval of a workplan, the Discharger may abandon or construct a monitoring well.

The current groundwater monitoring well network consists of the wells shown in Table A-1 to this MRP. The Discharger is required to modify the network according to the time schedule in the CAO.

The Discharger shall monitor and report the following information:

Groundwater samples shall be collected from the point of compliance wells, background wells, detection monitoring, evaluation monitoring, corrective action, 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 specified in Tables IX and X and the frequencies specified in Table A-1and Tables I-A and I-B.

The Discharger shall measure the groundwater elevations and determine the groundwater flow rate and the direction of flow in the zone of highest hydraulic conductivity[3], in the uppermost aquifer, in any zones of perched water, and in any additional zone of saturation monitored pursuant to this MRP, and shall report the results semiannually, including the times of highest and lowest elevations of the water levels in the wells.

**Once per quarter**, the Discharger shall measure the groundwater elevation in each well, determine groundwater flow direction, and estimate groundwater flow rates in the uppermost aquifer and in any zones of perched water and in any additional portions of the zone of saturation monitored. The results shall be reported semiannually, including the times of expected highest and lowest elevations of the water levels in the wells, pursuant to Title 27, section 20415(e)(15).

Hydrographs for each well shall be prepared quarterly and submitted annually. These hydrographs shall show 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.

The monitoring parameters shall also be evaluated with regards to the cation/anion balance, and the results shall be graphically presented using a Stiff diagram or Piper graph in each semiannual monitoring report.

[3] Title 27 § 20415(b)(1)(B)(5)

Samples for the constituents of concern specified in Tables I-A and I-B shall be collected and analyzed in accordance with the methods listed in Table X every five years. The next 5-year event shall occur in the fourth quarter of 2015.

**Borrow Pit Groundwater Pumping**

The Discharger performs dewatering activities at an area referred to as the "Borrow Pit" in order to harvest earthen material for landfill cover and base liner construction. The Discharger has installed a pump to dewater the borrow pit and to discharge the water. These activities are regulated by the Water Board under the *General Order for Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water* (Limited Threat General Order). The Discharger is required to comply with all the requirements of the Limited Threat General Order, including operation and maintenance requirements. In addition to the requirements of the Limited Threat General Permit, for each semiannual monitoring report required under this MRP, the Discharger shall monitor and report the following:

a. The daily and monthly flows of groundwater extracted from the borrow pit shall be tabulated and reported twice yearly in the semiannual monitoring reports. The Discharger shall monitor and report the daily volumes in gallons per day, and shall calculate and report the monthly flow in gallons per month.
b. Results of sampling from the pump discharge line at the frequencies shown in Table I-C, which shall be tested and analyzed for the field and monitoring parameters listed in Table I-C. Results shall be tabulated, evaluated, and reported twice yearly in the semiannual monitoring reports.
c. Beginning with the fourth quarter of 2014 and every five years thereafter, samples shall be collected for analysis of the constituents of concern listed in Table I-C and Table X.

## 2. Unsaturated Zone Monitoring

The Discharger shall operate and maintain an unsaturated zone detection monitoring and corrective action system that complies with the applicable provisions of §20415 and §20420 of Title 27 and in accordance with an approved Detection and Corrective Action Monitoring Program, as applicable. Unsaturated zone monitoring of the Land Treatment Unit (LTU) shall be conducted in accordance with §20435 of Title 27. The monitoring system shall be certified by a California-licensed professional civil engineer or geologist as meeting the requirements of Title 27.

**Landfill and Waste Pile**

The unsaturated zone monitoring system for the landfill and waste pile includes

the monitoring points listed in Table A-2, and any additional points installed as the landfill expands. Currently, there is one suction lysimeter (VZ-2.1) and 14 pan lysimeters (PL-2.2A, PL-2.2B, PL-3.1, PL-3.2, PL-3.3, PL-4.1, PL-5.1A, PL-5.1B, PL-5.2, PL-6, PL-11.1, PL-11.2, PL-9.1A, and PL-9.1).

The Discharger shall collect, preserve, and transport samples in accordance with the field quality assurance/quality control standards contained in the Board staff-approved Sample Collection and Analysis Plan. Unsaturated zone samples shall be collected from the monitoring devices and background monitoring devices of the approved monitoring system.

As detailed in the WDRs and the CAO, pan lysimeters PL-9.1A, PL-9.1B, PL-11.1, PL-11.2, PL-2.2A, PL-5.1A, PL-5.1B, and PL-4.1 are in corrective action. Pan lysimeters in the corrective action monitoring program shall be monitored weekly for the depth of water. Pan and suction lysimeters in the detection monitoring program shall be monitored monthly for the presence of liquids.

Upon detection of any liquid in a pan lysimeter, regardless if liquid had been previously present, the Discharger shall immediately notify the Water Board staff by phone and email[4], sample the liquid, and remove the liquid. The flow rate and volume of liquids removed shall be obtained using a calibrated flow meter and shall be recorded. Samples of removed liquids shall be analyzed for the constituents listed in accordance with the methods and frequency specified in Table II-A, and shall be analyzed with the methods listed in Tables IX and X. A written notification of the detection of liquids shall be submitted within seven days[5] of the detection**.** Within 30 days of the detection, the Discharger shall submit a written report with tabulated and descriptive information of the monitoring data, volume, field parameters, temporary storage location and disposal method of removed liquid, laboratory reports, a description of the corrective action(s) implemented, and proposed monitoring to demonstrate the success of the corrective action(s).

Liquids removed from any pan lysimeter may not be discharged to a leachate collection sump, onto any landfill unit, dispersed or discharged in the compost area, or used for dust control. However, the liquids may be temporarily stored in an above ground tank prior to off-site disposal at a permitted facility.

Unsaturated zone monitoring reports shall be included with the corresponding semiannual 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. Tabulated data and a corresponding discussion of the (1) volume of liquids removed, (2) cumulative volume removed over the life of the lysimeter, and (3) field and monitoring parameters shall be included in the

[4] *Response to a Release* XIA.1.a).
[5] *Response to a Release* XIA.1.a)

semiannual reports. An evaluation of compliance or lack thereof with the WDRs shall be included.

Annual monitoring reports shall include time-series charts of all monitoring parameters, which shall be graphed to show historical trends at each unsaturated monitoring point.

**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 collecting one soil boring per acre of the (16-acre) LTU area. Background borings shall be collected at the beginning of the drying season (prior to application of sludge). Detection borings shall 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[6] ). Samples shall be analyzed in accordance with Table II-B.

**3. Landfill Gas Monitoring**

The Discharger shall operate and maintain a landfill gas monitoring system that complies with the applicable provisions of §20415, §20420 and §20430 of Title 27 and in accordance with the approved Detection and Corrective Action Monitoring Programs, where appropriate. The landfill gas monitoring system shall be certified by a California-licensed professional civil engineer or geologist as meeting the requirements of Title 27.

All shutdowns of the landfill gas extraction system, regardless of the type of restart, shall be summarized and tabulated in the semiannual reports, which shall include the start/stop dates, and the duration and cause of shutdowns.

The LFG plant run-time per month and percent down-time per month shall be reported and tabulated in each semiannual report.

The Discharger shall collect, preserve, and transport landfill gas samples in accordance with the approved Sample Collection and Analysis Plan. Landfill gas samples shall be collected from all pan lysimeters, leachate sumps, leak detection sumps, LFG extraction wells, and LFG monitoring and extraction points listed in Table A-3, and any new points added as part of the expansion of the LFG system. LFG shall be and monitored for the field and analytical parameters listed in Table III. Field instrument calibrations shall be included in each semiannual report.

If organic vapors are detected at 1 part per million (ppm) or greater, and/or if methane is detected at 1.0 percent or greater in a monitoring probe or pan

[6] Per the 14 May 2003 LTU re-sample report

lysimeter, then a gas sample shall be obtained and analyzed for VOCs using EPA Method TO-15. The Discharger shall comply with the verbal and written notification requirements of the Standard Provisions and 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.

Landfill gas monitoring reports shall be included with the semiannual reports and shall include an evaluation of potential impacts of landfill gas on the unsaturated zone beneath and adjacent to the landfill and shall include an evaluation of compliance with the Water Quality Protection Standard.

**4. Leachate Collection and Recovery Sump Monitoring/Seep Monitoring**

The Discharger shall operate and maintain the leachate collection and recovery sump monitoring system (LCRS) and any additional LCRS monitoring locations added as the landfill and modules expand.

LCRS sumps for the landfill disposal modules include S-1, S-2.1, S-2.2A, S-2.2B, S-3.1, S-3.2, S-3.3, S-4.1, S-5.1A, S-5.1B, S-5.2, S-6, S-11.1, and S-11.2, and any others added during the expansion of disposal modules. The waste pile leachate collection sumps are designated S-9.1A and S-9.1B. The leachate monitoring wells for DM-1 are designated as LW-1, LW-2, and LW-3.

**Weekly,** the Discharger shall monitor the leachate sumps whose pan lysimeters are in the corrective action program for the field parameters listed in Table IV. The sumps whose pan lysimeters are in corrective action are S-2.2A, S-4.1, S-5.1A, S-5.1B, S-11.1, S-11.2, S-9.1A, S-9.1B, and any additional added to the corrective action program in the future. The monitoring parameters and constituents of concern shall be monitored according to the schedule in Table IV (i.e. quarterly and semiannually for the monitoring parameters, and every five years for the constituents of concern).

**Monthly**, all leachate collection and removal system sumps shall be inspected for leachate generation.

**Monthly**, the quantity of leachate pumped from each sump shall be measured with a calibrated flow meter and shall be reported monthly as Leachate Flow Rate (in gallons).

**Quarterly**, the Discharger shall determine the separation of groundwater from the lowest point of each unit and/or module, and shall report the results in each semiannual monitoring report. This determination shall be made based on measured groundwater elevations for that quarter and on surveyed elevations for the bottom of each leachate collection and recovery sump system.

Tabulated data shall be accompanied with an evaluation of compliance or lack thereof with the WDRs.

Leachate samples shall be collected for the field and monitoring parameters at the frequency specified in Table IV. Monitoring Parameters shall be analyzed in accordance with the requirements specified in Table IV and the methods in Table IX. The constituents of concern list shall include all constituents listed in Table IV and Table X. Leachate shall be resampled and analyzed if constituents are detected that have not been previously detected.

Upon detection of leachate in a previously dry leachate collection and removal system, leachate shall be sampled **immediately** and analyzed for the field and monitoring parameters listed in Table IV. The date and volume of leachate removed shall be reported. Thereafter, leachate shall be sampled and analyzed according to the schedule in Table IV, with a retest if constituents are detected that have not been previously detected.

**Seeps**
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 upon detection. The quantity of leachate shall be *estimated* and reported as Leachate Flow Rate (in gallons/day). Also, refer to Section E.4, below.

**5. Leak Detection Monitoring**

The Discharger shall operate and maintain the leak detection monitoring system, which consists of the monitoring points LD-3.1, LD-3.2, LD-3.3, LD-4.1, LD-5.2, LD-6, and any monitoring points added as part of the landfill expansion. All leak detection sumps shall be checked **semi-annually** for the presence of liquid.

**Liquid Phase**
Upon the detection of liquids, the Discharger shall **immediately collect samples** for the monitoring parameters in Table V. The Discharger shall provide written notification to the Regional Water Board within **one week** of the detection of liquids. Liquid samples shall be analyzed for the constituents in 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 of detection and sampling.

**Gas Phase**

On a **monthly basis**, the gas phase in the leak detection layer sumps shall be monitored for field and monitoring parameters in Table III. VOCs shall be monitored using a portable photoionization detector (PID) and for methane using an approved field instrument. If the monitoring results show concentrations of 1.0 percent methane or greater and/or 1.0 part 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 (see Table III).

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 §20415 and §20420 of Title 27 and in accordance with an approved Detection and Corrective Action Monitoring Program. The surface water monitoring points include SW-3, SW-4, SW-5, SW-7, and any additional surface water monitoring points added in the future.

For all monitoring points assigned to surface water detection monitoring, samples shall be collected and analyzed for the field and monitoring parameters in accordance with the methods and frequency specified in Table VI. The surface water monitoring points shall consist of the following locations and any locations added in the future:

a. Background monitoring point **SW-3** (south side of the culvert that carries the A-1 Channel under Hay Road)
b. Background monitoring point **SW-4** (approximately 600 feet upstream of the landfill drainage discharge point).
c. Discharge point **SW-5** (monitors the bird sanctuary pond), and
d. Discharge point **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. The last 5-year Constituents of Concern (COC) surface water monitoring event was conducted during 2010; therefore, the next COC event shall occur in the fourth quarter of 2015.

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).

All monitoring parameters shall be graphed so as to show historical trends at each sample location and graphs shall be reported in the annual monitoring report

**7. Storm Water Monitoring**

The Discharger shall operate and maintain a storm water monitoring system. Storm water monitoring shall be conducted in accordance with the NPDES General Permit for Storm Water Discharges Associated with Industrial Activities. 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. Semisolid Waste Monitoring**

Semisolid wastes discharged to the waste pile and to LTU shall be monitored in accordance to the methods and frequencies specified in Table VII.

**9. Composting Area Pond Monitoring**

The Discharger shall operate and maintain a pond monitoring system for the high-flow and the low-flow ponds, which are associated with the composting area. Representative samples shall be obtained at the frequency for the field and monitoring parameters listed in Table VIII.

In addition, the Discharger shall inspect the condition of the pond liners and the drainage ditches, and shall estimate the remaining capacity each month. The results of monthly monitoring, inspections, and remaining capacity shall be reported in the semiannual reports. For each semiannual monitoring report, data shall be tabulated and time-series graphs of monitoring parameters shall be prepared.

**10. Facility Monitoring**

Facility monitoring includes the Annual Facility Inspection and the inspections after major storm events, as described below.

a. **Annual Facility Inspection**

Annually, prior to the anticipated rainy season, but no later than **15 August of each year**, the Discharger shall conduct an inspection of the facility. This Facility Inspection shall

- Assess damage to the drainage control system, groundwater monitoring equipment (including wells, etc.), and

- Include the results of the following Standard Observations,

  1) <u>For the Unit</u>:
     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) <u>Along the perimeter of the Unit</u>:
     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) <u>For receiving waters</u>:
     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.

By **15 September of each year**, the Discharger shall submit to the Regional Water Board a **Winterization Plan** describing the results of the annual facility inspection, including the damage assessment, Standard Observations, and measures which are planned to prepare the site and conduct operations during the wet season. A map and photographs shall accompany the Winterization Plan.

By **15 November** of each year, the Discharger shall submit an **Annual Winterization Report** describing the repair measures

implemented, including a map and photographs of the problem and the repairs.

b. **Storm Events**

The Discharger shall inspect all precipitation, diversion, and drainage facilities for damage **within 7 days** following *major storm events*. Necessary repairs shall be completed **within 30 days of the inspection**. 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.

## 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, with the required signed certification statement, 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. All reporting information, tabulated data, and evaluations required in this MRP.

   b. 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.
      3) The elevation of the pump intake relative to the elevation of the screened interval.
      4) 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;
      5) The type of pump - or other device - used for sampling, if different than the pump or device used for purging; and
      6) A statement whether the sampling procedure was conducted in accordance with the Board-approved Sampling and Analysis Plan.

   c. A map or aerial photograph showing the locations of observation stations, monitoring points, and background monitoring points. All existing and abandoned monitoring points shall be indicated on the map. For clarity and readability, a separate map shall be submitted for groundwater monitoring locations, which shall indicate all existing and abandoned wells and piezometers.

   d. For each groundwater body, a description and graphical presentation of the groundwater gradient, direction of groundwater flow under/around the Unit, and the groundwater flow rate in the zone of highest hydraulic conductivity, in the uppermost aquifer, perched zones, and any additional zone of saturation monitored pursuant to this MRP. This information shall be based upon water level elevations taken prior to the collection of the water quality data submitted in the report.

   e. Field instrument calibration logs.

   f. Tabulated data of all field and analytical monitoring results required for the reporting period, which shall be arranged so that the date, constituents, units, flow rates, volumes, and other parameters are readily discernible. Tabulated data shall clearly indicate compliance or lack thereof with the WDRs and CAO.

   g. Tabulated data showing the separation of groundwater from the lowest point at the bottom of the sump of leachate collection and recovery sump and the groundwater monitoring well designated in the CAO for this calculation.

h. Laboratory reports of analytical results.

i. Stiff diagrams showing the cation/anion balance at groundwater monitoring wells.

j. Stiff diagrams showing the cation/anion balance at unsaturated zone monitoring points which are in the corrective action monitoring program.

k. An evaluation of potential impacts of landfill gas on the unsaturated zone beneath and adjacent to the landfill with an evaluation of compliance with the Water Quality Protection Standard.

l. An evaluation of the results of all field and monitoring parameters and constituents of concern, and whether the monitoring results are in compliance with the WDRs and CAO requirements.

m. An evaluation of the effectiveness of the leachate monitoring and control facilities.

n. An evaluation of the effectiveness of the run-off/run-on control facilities.

o. 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). Standard 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.

p. 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 Monitoring Parameters and Constituents of Concern listed in Table III of this MRP, 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 downgradient data. Graphical analysis of monitoring data may be used to provide significant evidence of a release.

b. All monitoring and analytical data obtained during the previous two six-month reporting periods shall be submitted in tabular form and shall clearly indicate compliance or lack thereof with the WDRs *All* historical monitoring data, including data for the previous year, shall be submitted 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 [Title 27 CCR Section 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. Semi-annually, 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. This report may be included in the Semi-Annual Monitoring 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: _____
ANDREW ALTEVOGT, Assistant Executive Officer

_____
(Date)

hh/ww/mlb: 5 May 2014

## TABLE I-A
## GROUNDWATER DETECTION MONITORING PROGRAM

| Parameter | Units | Frequency[1] |
|---|---|---|
| **Field Parameters** | | |
| Groundwater Elevation | Ft. & hundredths, MSL | Quarterly[2, 3] |
| Temperature | $^{o}C$ | See Table A-1 for the Detection Monitoring Program wells and sampling frequency |
| Electrical Conductivity | µmhos/cm | |
| pH | pH units | |
| Turbidity | Turbidity units | |
| **Monitoring Parameters** | | |
| Total Dissolved Solids (TDS) | mg/L | See Table A-1 for Detection Monitoring Program wells and sampling frequency for monitoring parameters |
| Nitrate-Nitrogen | mg/L | |
| Nitrite-Nitrogen | mg/L | |
| Ammonia-Nitrogen | mg/L | |
| Total Kjeldahl Nitrogen | mg/L | |
| Carbonate | mg/L | |
| Bicarbonate | mg/L | |
| Chloride | mg/L | |
| Sulfate | mg/L | |
| Calcium | mg/L | |
| Magnesium | mg/L | |
| Potassium | mg/L | |
| Sodium | mg/L | |
| Arsenic | ug/L | |
| Chromium | ug/L | |
| Lead | ug/L | |
| Volatile Organic Compounds (USEPA Method 8260, see Table IX) | µg/L | |
| **5-Year Constituents of Concern (see Table X)** | | |
| Phosphate | mg/L | Sample every five years for the wells in the Detection Monitoring Program in Table A-1 |
| Fecal Coliform | MPN/100 ml | |
| Total Alkalinity | mg/L | |
| Inorganics (dissolved) | mg/L | |
| Total Organic Carbon | mg/L | |
| Inorganics (dissolved) | mg/L | |
| Volatile Organic Compounds (USEPA Method 8260B, extended list) | µg/L | |
| Semi-Volatile Organic Compounds (USEPA Method 8270C) | µg/L | |
| Chlorophenoxy Herbicides (USEPA Method 8151A) | µg/L | |
| Organophosphorus Compounds (USEPA Method 8141A) | µg/L | |

Note
1 See Table A-1 for the current list of wells to be sampled and their monitoring frequency.
2 All wells and piezometers to be monitored quarterly for groundwater elevations.
3. For the separation between groundwater and the lowest point in the unit, use the surveyed elevation of the bottom of the LCRS sump and the designated groundwater monitoring well.

## TABLE I-B
## NITRATE-NITROGEN GROUNDWATER EVALUATION AND CORRECTIVE ACTION MONITORING PROGRAM

| Parameters | Units | Frequency[1] |
|---|---|---|
| **Field Parameters**[2] | | |
| Groundwater Elevation | Ft. & hundredths, MSL. | Quarterly |
| Temperature | $^{o}C$ | Quarterly |
| Electrical Conductivity | µmhos/cm | Quarterly |
| pH | pH units | Quarterly |
| Oxidation/Reduction Potential (ORP) | millivolts | Quarterly |
| Volume extracted | gallons | Quarterly |
| **Monitoring Parameters**[2] | | |
| Total Dissolved Solids (TDS) | mg/L | Quarterly |
| Nitrate-Nitrogen | mg/L | Quarterly |
| Nitrite-Nitrogen | mg/L | Quarterly |
| Ammonia-Nitrogen | mg/L | Quarterly |
| Total Kjeldahl Nitrogen | mg/L | Quarterly |

Notes

1. See Table A-1 for the Corrective Action Monitoring Wells. Sample the corrective action monitoring wells quarterly for the field and monitoring parameters listed above in Table I-B.
2. Under a Board-approved corrective action program, additional Field and Monitoring parameters may be required.

## TABLE I-C
## BORROW PIT GROUNDWATER DETECTION MONITORING PROGRAM

| Parameter | Units | Frequency[1] |
|---|---|---|
| **Field Parameters** | | |
| Daily Flow Rate | Gallons/day | Daily |
| Dissolved Oxygen | mg/L | Monthly |
| Monthly flow rate | Gallons/month | Monthly |
| Temperature | $^{o}C$ | Monthly |
| Electrical Conductivity | µmhos/cm | Monthly |
| pH | pH units | Monthly |
| Turbidity | Turbidity units | Monthly |
| **Monitoring Parameters** | | |
| Total Dissolved Solids (TDS) | mg/L | Monthly |
| Nitrate-Nitrogen | mg/L | Monthly |
| Nitrite-Nitrogen | mg/L | Monthly |
| Ammonia-Nitrogen | mg/L | Monthly |
| Total Kjeldahl Nitrogen | mg/L | Monthly |
| Carbonate | mg/L | Semiannual |
| Bicarbonate | mg/L | Semiannual |
| Chloride | mg/L | Semiannual |
| Sulfate | mg/L | Semiannual |
| Calcium | mg/L | Semiannual |
| Magnesium | mg/L | Semiannual |
| Potassium | mg/L | Semiannual |
| Sodium | mg/L | Semiannual |
| Arsenic | ug/L | Semiannual |
| Chromium | ug/L | Semiannual |
| Lead | ug/L | Semiannual |
| Volatile Organic Compounds (USEPA Method 8260, see Table IX) | µg/L | Semiannual |
| **5-Year Constituents of Concern (see Table X)** | | |
| Phosphate | mg/L | 5 years |
| Fecal Coliform | MPN/100 ml | 5 years |
| Total Alkalinity | mg/L | 5 years |
| Inorganics (dissolved) | mg/L | 5 years |
| Total Organic Carbon | 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 |

Note
1. If no discharge occurred for the entire duration of the month, then monthly sampling is not required. Semiannual and five year sampling must always be performed.

## TABLE II-A

## UNSATURATED ZONE DETECTION AND CORRECTIVE ACTION MONITORING PROGRAM–LANDFILL AND WASTE PILE PAN AND SUCTION LYSIMETERS

| Parameter | Units | Frequency |
|---|---|---|
| **Field Parameters** | | |
| Depth to water | ± 0.01feet | See Table A-2[1] for the sampling frequency for the depth to water and the field parameters at each lysimeter |
| Flow rate/volume | gpm/gallons | |
| Electrical Conductivity | µmhos/cm | |
| pH | pH units | |
| **Monitoring Parameters** | | |
| Total Dissolved Solids (TDS) | mg/L | See Table A-2 for the sampling frequency of the Monitoring Parameters for lysimeters in the Detection Monitoring Program and for lysimeters in the Corrective Action Monitoring Program |
| Nitrate-Nitrogen | mg/L | |
| Nitrite-Nitrogen | mg/L | |
| Ammonia-Nitrogen | mg/L | |
| Total Kjeldahl Nitrogen | mg/L | |
| Carbonate | mg/L | |
| Bicarbonate | mg/L | |
| Chloride | mg/L | |
| Sulfate | mg/L | |
| Calcium | mg/L | |
| Magnesium | mg/L | |
| Potassium | mg/L | |
| Sodium | mg/L | |
| Arsenic | ug/L | |
| Chromium | ug/L | |
| Lead | ug/L | |
| Volatile Organic Compounds (USEPA Method 8260B, see Table IX) | µg/L | |
| **5-Year Constituents of Concern (see Table X)** | | |
| Fecal coliform | mg/L | All lysimeters are to be sampled every 5 Years for the Constituents of Concern. See Table A-2 for the list of all lysimeters. |
| Phosphate | mg/L | |
| Total alkalinity | mg/L | |
| Total Organic Carbon | mg/L | |
| Inorganics (dissolved) | mg/L | |
| Volatile Organic Compounds (USEPA Method 8260B, extended list) | µg/L | |
| Semi-Volatile Organic Compounds (USEPA Method 8270C) | µg/L | |
| Chlorophenoxy Herbicides (USEPA Method 8151A) | µg/L | |
| Organophosphorus Compounds (USEPA Method 8141A) | µg/L | |

Note:

1. Pan lysimeters are designed to be dry. Therefore, whenever liquids are detected in a lysimeter, including detected in a previously dry lysimeter, immediately notify Water Board staff, and sample and remove the liquids. Monitor the flow rate and volume of liquids removed using a calibrated flow meter. Submit written notification within seven days.

## TABLE II-B

## UNSATURATED ZONE DETECTION MONITORING PROGRAM– LAND TREATMENT UNIT-(SOIL PORE WATER/SOIL[1.])

| Parameter | Units | Frequency |
|---|---|---|
| **Field Parameters** | | |
| Moisture | % | Twice per year[2.] |
| pH | pH units | Twice per year[2.] |
| **Monitoring Parameters** | | |
| Total Dissolved Solids (TDS) | mg/L | Twice per year[2.] |
| Nitrate-Nitrogen | mg/L | Twice per year[2.] |
| Nitrite-Nitrogen | mg/L | Twice per year[2.] |
| Ammonia-Nitrogen | mg/L | Twice per year[2.] |
| Total Kjeldahl Nitrogen | mg/L | Twice per year[2.] |
| Chloride | mg/L | Twice per year[2.] |
| Sulfate | mg/L | Twice per year[2.] |
| Arsenic | ug/L | Annually[2.] |
| Chromium | ug/L | Annually[2.] |
| Dissolved lead | ug/L | Annually[2.] |
| Phosphate | mg/L | Annually[2.] |
| Volatile Organic Compounds (USEPA Method 8260B, extended list) | µg/L | Annually[2.] |
| **5-Year Constituents of Concern (see Table X)** | | |
| Carbonate | mg/L | Every 5 Years |
| Bicarbonate | mg/L | |
| Calcium | mg/L | |
| Magnesium | mg/L | |
| Potassium | mg/L | |
| Sodium | mg/L | |
| Phosphate | mg/L | |
| Fecal coliform | MPN/100 ml | |
| Phosphate | mg/L | |
| Total alkalinity | mg/L | |
| Total Organic Carbon | mg/L | |
| Phosphorous | mg/L | |
| Inorganics (dissolved) | mg/L | |
| Volatile Organic Compounds (USEPA Method 8260B, extended list) | µg/L | |
| Semi-Volatile Organic Compounds (USEPA Method 8270C) | µg/L | |
| Chlorophenoxy Herbicides (USEPA Method 8151A) | µg/L | |
| Organophosphorus Compounds (USEPA Method 8141A) | µg/L | |

Notes:

1. If pore water cannot be extracted from the samples, proceed with soil analysis using the WET test.

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 III
## LANDFILL GAS (LFG) DETECTION MONITORING PROGRAM

| Parameter | Units | Frequency |
|---|---|---|
| **Field Parameters for LFG Plant** | | |
| Plant Run-time | Hours | Monthly |
| Plant Down-time | % | Monthly |
| Atmospheric Temperature | $^0$F | Monthly |
| Atmospheric Pressure | PSIG | Monthly |
| Temperature into Plant | $^0$F | Monthly |
| Pressure into Plant | mm Hg vacuum | Monthly |
| Totalized flow into Plant | Cubic Feet | Monthly |
| Totalized flow rate into Plant | CFM | Monthly |
| Total halogenated VOCs into the Plant | ug/cm$^3$ | Monthly[2] |
| **Monitoring Parameters for LFG Plant Influent** | | |
| Volatile Organic Compounds (USEPA Method TO-15) | ug/cm$^3$ | Semiannually |
| Methane | % | Semiannually |

| Parameter | Units | Frequency |
|---|---|---|
| **Field Parameters for LFG Monitoring & Extraction Points**[1] | | |
| Weather Conditions | | Monthly |
| Atmospheric Temperature | $^0$C | Monthly |
| Atmospheric Pressure | mm Hg | Monthly |
| Gas concentrations at each well/point | | |
| Methane | % by volume | Monthly |
| Carbon Dioxide | % by volume | Monthly |
| Oxygen | % by volume | Monthly |
| Remainder gas | % by volume | Monthly |
| Total halogenated VOCs | ug/cm$^3$ | Monthly[2, 3] |
| **Field Parameters for LFG Extraction Points**[1] | | |
| Gas temperature at each well | | |
| Before adjustment | $^0$F | Monthly |
| After adjustment | $^0$F | Monthly |
| Gas Pressure at each well | | |
| Initial static pressure in wellhead | inches H2O | Monthly |
| Adjusted static pressure in wellhead | inches H2O | Monthly |
| **Monitoring Parameters for LFG Monitoring & Extraction Points** | | |
| Volatile Organic Compounds (USEPA Method TO-15) | ug/cm$^3$ | See Note 3 |

Notes

1. See Table A-3 for the list of LFG monitoring locations and their associated designation and description.
2. The Discharger shall measure total halogenated VOCs using field instruments with the appropriate lamp.
3. The instrument shall be calibrated to methane. If the PID indicates organic vapors at 1 part per million or greater and/or methane at 1.0 percent or greater, then a gas sample shall be obtained and analyzed for speciated VOCs using EPA Method TO-15.

## TABLE IV

## LEACHATE COLLECTION SUMP MONITORING PROGRAM FOR LANDFILL AND WASTE PILE

| Parameter | Units | Frequency |
|---|---|---|
| **Field Parameters** | | |
| Depth to Water | ± 0.01Feet | Monthly[1.] |
| Total Volume Pumped | Gallons | Monthly[1.] |
| Leachate Flow Rate | Gallons/Day | Monthly[1.] |
| Electrical Conductivity | µmhos/cm | Monthly[1.] |
| pH | pH units | Monthly[1.] |
| **Monitoring Parameters** | | |
| Total Dissolved Solids (TDS) | mg/L | Quarterly |
| Nitrate-Nitrogen | mg/L | Quarterly |
| Nitrite–Nitrogen | mg/L | Quarterly |
| Ammonia-Nitrogen | mg/L | Quarterly |
| Total Kjeldahl Nitrogen | mg/L | Quarterly |
| Carbonate | mg/L | Semiannual |
| Bicarbonate | mg/L | Semiannual |
| Chloride | mg/L | Semiannual |
| Sulfate | mg/L | Semiannual |
| Calcium | mg/L | Semiannual |
| Magnesium | mg/L | Semiannual |
| Potassium | mg/L | Semiannual |
| Sodium | mg/L | Semiannual |
| Phosphate | mg/L | Semiannual |
| Phosphorous | mg/L | Semiannual |
| Fecal Coliform | MPN/ 100 ml | Semiannual |
| Total Alkalinity | mg/L | Semiannual |
| Total Organic Carbon | mg/L | Semiannual |
| Arsenic | mg/L | Semiannual |
| Chromium | mg/L | Semiannual |
| Lead | mg/L | Semiannual |
| Volatile Organic Compounds (USEPA Method 8260B, see Table IX) | µg/L | Semiannual |
| **5-Year 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 |

Note:

1. Sumps whose pan lysimeters are in the corrective action monitoring program shall be monitored weekly for Field Parameters and shall be monitored according to Table IV for Monitoring Parameters and Constituents of Concern.

**TABLE V**
**LEAK DETECTION MONITORING**
**(Semiannual)**

| Location | Semiannual Monitoring Parameters for Liquids (if present) |
|---|---|
| All leak detection layer sumps | Total Dissolved Solids |
| | Chloride |
| | Bicarbonate |

## TABLE VI

## SURFACE WATER DETECTION MONITORING PROGRAM

| Parameter | Units | Frequency |
|---|---|---|
| **Field Parameters** | | |
| Temperature | $^{o}C$ | Semiannual |
| Electrical Conductivity | µmhos/cm | Semiannual |
| pH | pH units | Semiannual |
| Turbidity | Turbidity units | Semiannual |
| **Monitoring Parameters** | | |
| Total Dissolved Solids (TDS) | mg/L | Semiannual |
| Total Suspended Solids | mg/L | Semiannual |
| Carbonate | mg/L | Semiannual |
| Bicarbonate | mg/L | Semiannual |
| Chloride | mg/L | Semiannual |
| Nitrate-Nitrogen | mg/L | Semiannual |
| Nitrite-Nitrogen | mg/L | Semiannual |
| Ammonia-Nitrogen | mg/L | Semiannual |
| Total Kjeldahl Nitrogen | mg/L | Semiannual |
| Arsenic | mg/L | Semiannual |
| Chromium | mg/L | Semiannual |
| Lead | mg/L | Semiannual |
| Sulfate | mg/L | Semiannual |
| Calcium | mg/L | Semiannual |
| Magnesium | mg/L | Semiannual |
| Potassium | mg/L | Semiannual |
| Sodium | mg/L | Semiannual |
| Volatile Organic Compounds (USEPA Method 8260B, see Table IX) | µg/L | Semiannual |
| **5-Year Constituents of Concern (see Table X)** | | |
| Fecal Coliform | MPN/ 100 ml | 5 years |
| Phosphorus | 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 |

## TABLE VII

## SEMISOLID WASTE MONITORING PROGRAM
## Waste Pile WP-9.1 and the Land Treatment Unit

### Waste Pile

| Parameter | Units | Frequency |
|---|---|---|
| Type of material discharged | -- | Monthly |
| Quantity discharged/month | cubic yards, wet tones | Monthly |
| Moisture content[1.] | percent | Weekly |
| Capacity of unit/module remaining | percent | Monthly |

[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 & number 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 | cubic yards, wet tons | Monthly |
| Final Sludge Depth | inches & number 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
## Low-Flow and High-Flow Pond Monitoring

| Parameter | Units | Frequency |
|---|---|---|
| **Field Parameters** | | |
| Freeboard | Feet | Monthly |
| Dissolved oxygen | mg/L | Monthly |
| Turbidity | Turbidity units | Monthly |
| Electrical Conductivity | umhos/cm | Monthly |
| pH | pH Units | Monthly |
| Condition of pond liners | observations | Monthly |
| Available capacity | acre-feet | Monthly |
| Condition of drainage ditches | observations | Monthly |
| **Monitoring Parameters**[1] | | |
| Total Dissolved Solids (TDS) | mg/L | Monthly |
| Total Fixed Dissolved Solids (TFDS) | mg/L | Monthly |
| Biological Oxygen Demand | mg/L | Monthly |
| Bicarbonate | mg/L | Monthly |
| Carbonate | mg/L | Monthly |
| Chloride | mg/L | Monthly |
| Sulfate | mg/L | Monthly |
| Calcium | mg/L | Monthly |
| Sodium | mg/L | Monthly |
| Magnesium | mg/L | Monthly |
| Potassium | mg/L | Monthly |
| Nitrate-Nitrogen | mg/L | Monthly |
| Nitrite-Nitrogen | mg/L | Monthly |
| Ammonia-Nitrogen | mg/L | Monthly |
| Total Kjeldahl Nitrogen | mg/L | Monthly |
| Total Phosphorous | mg/L | Monthly |
| Total Lead | mg/L | Monthly |
| Fecal coliform | MPN/100 mL | Monthly |

1. See Section D.9 of this MRP for additional reporting requirements.

## TABLE IX

## MONITORING PARAMETERS & APPROVED USEPA ANALYTICAL METHODS

| **Field Parameters** | **Method** |
|---|---|
| Temperature | 2550 |
| Turbidity | 2130B |
| pH | 150.1 |
| Electrical Conductivity | 2510 |
| Dissolved Oxygen | 360.1 |

| **Biosolids Parameters** | **Method** |
|---|---|
| Ammonia-Nitrogen | 4500-NH3 |
| Nitrate-Nitrogen | 300 (anion scan) |
| Nitrite-Nitrogen | 300 (anion scan) |
| Total Kjeldahl Nitrogen | 4500-N-org |
| Fecal Coliform | 9221B |

| **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) |
| Ortho-Phosphate | 300 (anion scan) |

| **Inorganics[1]** | **Method** |
|---|---|
| Arsenic | 7062 |
| Lead | 7421 |
| Chromium | 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 & APPROVED USEPA ANALYTICAL METHODS – continued from previous page**

**Constituents included in VOC Analysis, USEPA Method 8260B**

Acetone
Acrylonitrile
Benzene
Bromochloromethane
Bromodichloromethane
Bromoform (Tribromomethane)
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)
Ethanol
Ethyltertiary butyl ether
Ethylbenzene
2-Hexanone (Methyl butyl ketone)
Hexachlorobutadiene
Hexachloroethane
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
4-Methyl-2-pentanone (Methyl isobutylketone)

**TABLE IX**
**MONITORING PARAMETERS & APPROVED USEPA ANALYTICAL METHODS – continued from previous page**

**Constituents included in VOC Analysis, USEPA Method 8260B, continued**

Naphthalene
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
Vinyl acetate
Vinyl chloride
Xylenes

## TABLE X
## CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

| **Field Parameters** | **USEPA Method** |
|---|---|
| Temperature | 2550 |
| Turbidity | 2130B |
| pH | 150.1 |
| Electrical Conductivity | 2510 |
| Dissolved Oxygen | 360.1 |
| **Biosolids Parameters** | **USEPA Method** |
| Ammonia-Nitrogen | 4500-NH3 |
| Nitrate-Nitrogen | 300 (anion scan) |
| Nitrite-Nitrogen | 300 (anion scan) |
| Total Kjeldahl Nitrogen | 4500-N-org |
| Fecal Coliform | 9221B |
| Total Alkalinity | 2310B |
| Total Organic Carbon | 415.1 |
| **General Minerals** | **USEPA 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)** | **USEPA Method** |
| Aluminum | 6010 |
| Antimony | 7041 |
| Barium | 6010 |
| Beryllium | 6010 |
| Cadmium | 7131A |
| Chromium | 6010 |
| Cobalt | 6010 |
| Copper | 6010 |
| Silver | 6010 |
| Tin | 6010 |
| Vanadium | 6010 |
| Zinc | 6010 |
| Iron | 6010 |
| Manganese | 6010 |
| Arsenic | 7062 |
| Lead | 7421 |
| Mercury | 7470A |
| Nickel | 7521 |
| Selenium | 7742 |

## TABLE X
## CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS
## Continued

**Volatile Organic Compounds, Method 8260**

Acetone
Acetonitrile (Methyl cyanide)
Acrolein
Acrylonitrile
Allyl chloride (3-Chloropropene)
Benzene
Bromochloromethane (Chlorobromomethane)
Bromodichloromethane (Dibromochloromethane)
Bromoform (Tribromomethane)
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)
2,2-Dichloropropane (Isopropylidene chloride)
1,1 -Dichloropropene
cis- 1,3-Dichloropropene
trans- l ,3-Dichloropropene
Di-isopropylether (DIPE)
Ethanol
Ethyltertiary butyl ether
Ethylbenzene
Ethyl methacrylate
Hexachlorobutadiene
Hexachloroethane

**CONSTITUENTS OF CONCERN & APPROVED ANALYTICAL METHODS**
**Continued**

**Volatile Organic Compounds, continued**

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
Methyl methacrylate
4-Methyl-2-pentanone (Methyl isobutyl ketone)
Methylene bromide (Dibromomethane)
Methylene chloride (Dichloromethane)
Naphthalene
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
Vinyl acetate
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

**TABLE X**
**CONSTITUENTS OF CONCERN & APPROVED ANALYTICAL METHODS**

**Continued**

**Semi-Volatile Organic Compounds, continued**

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
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

**Semi-Volatile Organic Compounds, continued**

Di-n-octyl phthalate

**TABLE X**
**CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS**
**Continued**

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
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)

**Semi-Volatile Organic Compounds, continued**

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

**Chlorophenoxy Herbicides USEPA 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 CompoundsUSEPA Method 8141A**

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

| Table A-1 – Groundwater Monitoring Programs and Sampling Frequencies | | | | |
|---|---|---|---|---|
| | | Monitoring Program and Sampling Frequency | | |
| | | Detection Program | Evaluation Program | Corrective Action Program |
| Well ID | All Wells to be Monitored Quarterly for GW Elevations | Sample Semiannually & Annually for Field and Monitoring Parameters. Sample every 5-Yrs for COCs in Table I-A of the Revised MRP | Sample Quarterly for Field and Monitoring Parameters in Table I-B of the Revised MRP | Sample Quarterly for Field and Monitoring Parameters in Table I-B of the Revised MRP |
| G-1 | X | X | | |
| G-2 | X | X | | |
| G-4R | X | X | | |
| G-6* | X | X | | |
| G-8 | X | X | | |
| G-9 | X | X | | |
| G-10 | X | X | | |
| G-10M | X | X | | |
| G-10R | X | X | | |
| G-11 | X | X | | |
| G-11M | X | X | | |
| G-11R | X | X | | |
| G-12 | X | X | | |
| G-13 | X | X | | |
| G-16 | X | X | | |
| G-20 | X | X | | |
| G-25 | X | X | | |
| G-28 | X | X | | |
| G-29 | X | X | | |
| G-30 | X | X | | |
| MW-4 | X | X | | |
| MW-92-1 | X | X | | |
| P-1 | X | X | | |
| G-19R | X | X | X | |
| G-26 | X | X | X | |
| G-27 | X | X | X | |
| G-21 | X | X | | X |
| G-22 | X | X | | X |
| G-23 | X | X | | X |
| 4BR | X | X | | X |
| G-17* | X | X | | X |
| G-18* | X | X | | X |
| A-1 | X | | | |
| D-1 | X | | | |
| D-2 | X | | | |
| D-4 | X | | | |
| D-5 | X | | | |
| D-6 | X | | | |
| D-7 | X | | | |
| G-5R | X | | | |
| G-7 | X | | | |
| I-7 | X | | | |
| MW-5 | X | | | |
| MW-6 | X | | | |
| MW-7 | X | | | |
| MW-8 | X | | | |

Note: * Wells G-6, G-17, and G-18 are designated background wells in the WDRs. G-4, abandoned on 4 Dec 2008, was also a WDRs-designated background well prior to abandonment. G-16 and G-18 exhibit an increasing trend of nitrate over time. The time schedule in the CAO requires (1) new background monitoring wells and new point of compliance wells, and (2) establishment of an evaluation monitoring network, and corrective action monitoring network.
COCs = Constituents of Concerns which are sampled for analysis every five years.

**Table A-2 – Unsaturated Zone Monitoring Programs and Sampling Frequencies**
**Landfill, Waste Pile, Pan Lysimeters, and Suction Lysimeters**

| | Monitoring Program | |
|---|---|---|
| | Detection | Corrective Action |
| **Lysimeter ID** | Monthly Check for Liquids; Sample Semiannually for Field and Monitoring Parameters; Sample every 5-Years for Constituents of Concern | Weekly Measurement for Depth to Water; Sample Quarterly for Field and Monitoring Parameters; Sample every 5-Years for Constituents of Concern |
| VZ-2.1* | X | |
| PL-2.2B | X | |
| PL-3.1 | X | |
| PL-3.2 | X | |
| PL-3.3 | X | |
| PL-5.2 | X | |
| PL-6 | X | |
| PL-2.2A | | X |
| PL-4.1 | | X |
| PL-5.1A | | X |
| PL-5.1B | | X |
| PL-11.1 | | X |
| PL-11.2 | | X |
| PL-9.1A | | X |
| PL-9.1B | | X |

Notes: * VZ-2.1 is a suction lysimeter. The remaining are pan lysimeters.

**Table A-3 – Landfill Gas Monitoring Program**

| Landfill Gas (LFG) Monitoring Point ID No. | LFG Monitoring Designation | Description |
|---|---|---|
| GP-1 | Monitoring Point | Gas probe |
| GP-2 | Monitoring Point | Gas probe |
| GP-3A | Monitoring Point | Gas probe |
| GP-3B | Monitoring Point | Gas probe |
| GP-4A | Monitoring Point | Gas probe |
| GP-4B | Monitoring Point | Gas probe |
| GP-5A | Monitoring Point | Gas probe |
| GP-5B | Monitoring Point | Gas probe |
| GP-6 | Monitoring Point | Gas probe |
| GP-7 | Monitoring Point | Gas probe |
| GP-9 | Monitoring Point | Gas probe |
| GP-10 | Monitoring Point | Gas probe |
| GP-11 | Monitoring Point | Gas probe |
| GP-12 | Monitoring Point | Gas probe |
| GP-13 | Monitoring Point | Gas probe |
| GP-14 | Monitoring Point | Gas probe |

| Table A-3 – Landfill Gas Monitoring Program | | |
|---|---|---|
| **Landfill Gas (LFG) Monitoring Point ID No.** | **LFG Monitoring Designation** | **Description** |
| GP-15 | Monitoring Point | Gas probe |
| GP-16 | Monitoring Point | Gas probe |
| GP-17 | Monitoring Point | Gas probe |
| GP-18 | Monitoring Point | Gas probe |
| GP-19 | Monitoring Point | Gas probe |
| GP-20D | Monitoring Point | Gas probe |
| GP-21S | Monitoring Point | Gas probe |
| GP-21D | Monitoring Point | Gas probe |
| LD-3.1 | Monitoring Point | Leak detection sump |
| LD-3.2 | Monitoring Point | Leak detection sump |
| LD-3.3 | Monitoring Point | Leak detection sump |
| LD-4.1 | Monitoring Point | Leak detection sump |
| LD-5.2 | Monitoring Point | Leak detection sump |
| LD-6 | Monitoring Point | Leak detection sump |
| LD-3.1 | Extraction Point | Leak detection sump |
| LD-3.2 | Extraction Point | Leak detection sump |
| LD-3.3 | Extraction Point | Leak detection sump |
| LD-4.1 | Extraction Point | Leak detection sump |
| LD-5.2 | Extraction Point | Leak detection sump |
| LD-6.1 | Extraction Point | Leak detection sump |
| PL-2.2A | Extraction Point | Pan lysimeter |
| PL-2.2B | Extraction Point | Pan lysimeter |
| PL-3.1 | Extraction Point | Pan lysimeter |
| PL-3.2 | Extraction Point | Pan lysimeter |
| PL-3.3 | Extraction Point | Pan lysimeter |
| PL-4.1 | Extraction Point | Pan lysimeter |
| PL-5.1A | Extraction Point | Pan lysimeter |
| PL-5.1B | Extraction Point | Pan lysimeter |
| PL-6.1 | Extraction Point | Pan lysimeter |
| PL-9.1A | Extraction Point | Pan lysimeter |
| PL-9.1B | Extraction Point | Pan lysimeter |
| PL-11.1 | Extraction Point | Pan lysimeter |
| PL-11.2 | Extraction Point | Pan lysimeter |
| GEW-1 | Extraction Point | LFG Extraction well |
| GEW-2 | Extraction Point | LFG extraction well |
| GEW-3 | Extraction Point | LFG extraction well |
| GEW-4 | Extraction Point | LFG extraction well |
| GEW-5 | Extraction Point | LFG extraction well |
| GEW-6 | Extraction Point | LFG extraction well |
| GEW-7 | Extraction Point | LFG extraction well |
| GEW-8 | Extraction Point | LFG extraction well |
| GEW-8R | Extraction Point | LFG extraction well |
| GEW-9 | Extraction Point | LFG extraction well |
| GEW-9R | Extraction Point | LFG extraction well |
| GEW-10 | Extraction Point | LFG extraction well |
| GEW-10R | Extraction Point | LFG extraction well |
| GEW-11 | Extraction Point | LFG extraction well |
| GEW-12 | Extraction Point | LFG extraction well |
| GEW-13 | Extraction Point | LFG extraction well |
| GEW-14 | Extraction Point | LFG extraction well |
| GEW-15 | Extraction Point | LFG extraction well |
| GEW-16 | Extraction Point | LFG extraction well |
| GEW-17 | Extraction Point | LFG extraction well |

| Table A-3 – Landfill Gas Monitoring Program | | |
|---|---|---|
| **Landfill Gas (LFG) Monitoring Point ID No.** | **LFG Monitoring Designation** | **Description** |
| GEW-18 | Extraction Point | LFG extraction well |
| GEW-19 | Extraction Point | LFG extraction well |
| GEW-20 | Extraction Point | LFG extraction well |
| GEW-21 | Extraction Point | LFG extraction well |
| GEW-22 | Extraction Point | LFG extraction well |
| GEW-23 | Extraction Point | LFG extraction well |
| GEW-24 | Extraction Point | LFG extraction well |
| GEW-25 | Extraction Point | LFG extraction well |
| GEW-26 | Extraction Point | LFG extraction well |
| GEW-27 | Extraction Point | LFG extraction well |
| GEW-28 | Extraction Point | LFG extraction well |
| GEW-29 | Extraction Point | LFG extraction well |
| GEW-30 | Extraction Point | LFG extraction well |
| GEW-31 | Extraction Point | LFG extraction well |
| GEW-32 | Extraction Point | LFG extraction well |
| GEW-33 | Extraction Point | LFG extraction well |
| GEW-34 | Extraction Point | LFG extraction well |
| GEW-35 | Extraction Point | LFG extraction well |
| GEW-36 | Extraction Point | LFG extraction well |
| GEW-37 | Extraction Point | LFG extraction well |
| GEW-38 | Extraction Point | LFG extraction well |
| GEW-39 | Extraction Point | LFG extraction well |
| GEW-40 | Extraction Point | LFG extraction well |
| GEW-41 | Extraction Point | LFG extraction well |

## ATTACHMENT C

## REQUIREMENTS FOR MONITORING WELL INSTALLATION WORKPLANS AND MONITORING WELL INSTALLATION REPORTS

Prior to installation of any groundwater monitoring wells, the Discharger shall submit a workplan containing, at a minimum, the information listed in Section 1 below. Wells may be installed after staff approves the workplan. Upon installation of the monitoring wells, the Discharger shall submit a well installation report that includes the information contained in Section 2 below. All workplans and reports must be prepared under the direction of, and signed by, a registered geologist or civil engineer licensed by the State of California.

### SECTION 1 - Monitoring Well Installation Workplan and Groundwater Sampling and Analysis Plan

The monitoring well installation workplan shall contain the following minimum information:

**A. General Information**

- Purpose of the well installation project,
- Brief description of local geologic and hydrogeologic conditions,
- Proposed monitoring well locations and rationale for well locations,
- Topographic map showing facility location, roads, and surface water bodies,
- Large scaled site map showing all existing on-site wells, proposed wells, surface drainage courses, surface water bodies, buildings, waste handling facilities, utilities, and major physical and man-made features.

**B. Proposed Well Numbers**

The proposed well numbers for each well must be provided in the text and on the site map.

**C. Drilling Details**

- On-site supervision of drilling and well installation activities,
- Description of drilling equipment and techniques,
- Equipment decontamination procedures,
- Continuous soil sampling and logging,
- Logging methods, which shall comply with ASTM D2488-93 *Method for Visual Classification, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) for field work.*

**D. Monitoring Well Design – Diagram and Narrative**

The well design must be provided in both a narrative description and in diagram, which must include the proposed well construction details:

- Borehole diameter,
- Casing and screen material, diameter, and centralizer spacing (if needed),
- Type of well caps (bottom cap either screw on or secured with stainless steel screws),
- Anticipated depth of well, length of well casing, and length and position of perforated interval,
- Thickness, position and composition of surface seal, sanitary seal, and sand pack,
- Anticipated screen slot size and filter pack.

**E. Well Development**

Well development must be performed at least 48 hours after the sanitary seal has been placed, and must include

- Method of development to be used (i.e., surge, bail, pump, etc.),
- Parameters to be monitored during development and record keeping technique,
- Method of determining when development is complete,
- Disposal of development water.

**F. Well Survey - Horizontal and Vertical Coordinates**

- Name of the Licensed Land Surveyor or Civil Engineer,
- Datum for survey measurements,
- List of well features to be surveyed: top of casing, horizontal and vertical coordinates, etc.,
- Accuracy: Horizontal must be within $\pm$0.1 foot and Vertical within $\pm$0.01-foot.

**F. Water Level Measurement**

- The elevation reference point at each monitoring well must be within 0.01-foot,
- Ground surface elevation at each monitoring well must be within 0.01-foot,
- Method and time of water level measurement must be specified

**G. Sampling and Laboratory Analysis**

Groundwater sampling, field tests, and laboratory analysis must comply with the requirements in the Waste Discharge Requirements, Monitoring and Reporting Program, and Standard Provisions. All Method Detection Limits, Practical Quantitation limits, and “trace” concentrations must be reported on the laboratory reports, as required in the WDRs.

**H. Proposed Schedule for Completion of Work**

## SECTION 2 - Monitoring Well Installation Report

The monitoring well installation report must be submitted within 60 days of well installation, and must include the laboratory analytical results and the information listed below. In addition, the report must also clearly identify, describe, and justify any deviations from the approved workplan.

**A. General Information:**

1. Purpose of the well installation project,
2. Brief description of local geologic and hydrogeologic conditions encountered during installation of the wells,
3. Number of monitoring wells installed and copies of County Well Construction Permits,
4. Topographic map showing facility location, roads, surface water bodies,
5. Scaled site map showing all previously existing wells, newly installed wells, surface water bodies, buildings, waste handling facilities, utilities, and other major physical and man-made features.

**B. Drilling Details – Narrative and Graphic**

1. On-site supervision of drilling and well installation activities,
2. Drilling contractor and driller's name,
3. Description of drilling equipment and techniques,
4. Equipment decontamination procedures,
5. Soil sampling intervals and logging methods,
6. Well boring log:
    a. Well boring number and date drilled
    b. Borehole diameter and total depth
    c. Total depth of open hole (same as total depth drilled if no caving or back-grouting occurs)
    d. Depth to first encountered groundwater and stabilized groundwater depth
    e. Detailed description of soils encountered, using ASTM D2488-93 *Method for Visual Classification, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) for Field Work*.

**C. Well Construction Details – Diagram and Narrative**

1. Well construction details
    a. Well number, date started, date completed, geologist's name
    b. Total depth drilled
    c. Drilling Contractor and driller name and address
    d. Depth of open hole (same as total depth drilled if no caving occurs)
    e. Method and materials of grouting excess borehole
    f. Footage of hole collapsed
    g. Length of slotted casing installed
    h. Depth of bottom of casing
    i. Depth to top of sand pack
    j. Thickness of sand pack
    k. Depth to top of bentonite seal
    l. Thickness of bentonite seal

m. Thickness of concrete grout
n. Boring diameter
o. Casing diameter
p. Casing material
q. Size of perforations
r. Well elevation at top of casing
s. Initial and stabilized depth to groundwater
t. Date of water level measurement
u. Monitoring well number
v. Date drilled

**E. Well Development**

1. Date(s) and method of development of each well,
2. Method of development,
3. How well development completion was determined,
4. Volume of water purged from well and method of development water disposal,
5. Field notes from well development.

**F. Well Survey (survey the top rim of the well casing with the cap removed):**

1. Coordinate system, epochs, bench marks, horizontal controls, accuracy, and precision,
2. Survey results of casing elevation with the cap removed (vertical to 1/100$^{th}$ foot),
3. California Registered Civil Engineer or Licensed Surveyor's report, field notes, and stamp/signature in an appendix,
4. Description of the measuring points (i.e. ground surface, top of casing, etc.),
5. Tabulated survey data with well numbers and horizontal and vertical coordinates.

**G. Laboratory Analytical Results**

All analytical reports prepared for the Discharger's facility must contain, at a minimum, the information within this section.

1. Tabulated field and analytical data with sample location identification numbers, water quality goals, field/analytical results, and highlighted data that is outside water quality goals,
2. Appendix with laboratory reports, COCs, and laboratory signatures on reports,
3. Laboratory reports showing results, reporting units, MDLs, PQLs, "trace" results, flagged results, matrix effects, and QA/QC results,
4. Site map(s) showing iso-concentration lines for Constituents of Concern,
5. Piper Diagrams and Stiff Plots comparing upgradient and downgradient water quality parameters,
6. Discussion of results including, but not limited to, discussion of violations, exceedances, if all field and monitoring parameters were sampled and analyzed, description of groundwater flow direction, comparison of analysis and field sampling results to background and water quality goals, list of potential constituents of concern at each sampling location, and other relevant discussions,

**Attachment D**
**Requirements for a Water Balance**

The *Water Balance Report* shall be prepared by or under the supervision of a California Registered Engineer and shall be signed/stamped by the registered engineer. The water balance report shall include:

- One water balance for the low-flow pond and a separate balance for the high-flow pond.
- Hard copies and an electronic Excel file with all the formulas, assumptions, and calculations used to determine the water balances.
- The drainage area.
- Rainfall based on the average annual rainfall plus the 24-hour 100-year return period for Vacaville, CA or other approved location. The average monthly precipitation data are available from the Western Regional Climate Center (www.wrcc.dri.edu). The 24-hour 100-year data are available from the California Department of Water Resources in its Depth-Duration-Frequency Tables (ftp://ftp.water.ca.gov/users/dfmhydro/Rainfall%20Dept-Duration-Frequency/Rain%20D%20DDF%20Daily/).

- Water balance inflows and outflows distributed over the months of the year.
    - The monthly contributions from major sources such as run-off from the composting area and direct precipitation onto the surface area of the pond.
    - The monthly evaporation rates from open water surfaces (i.e., evaporation pans), which are available from local/state authorities (e.g., www.ipm.ucdavis.edu).
    - Monthly outflows from the pond for reuse in the composting process.
    - Other monthly inflow and outflow sources.
- Current influent flow versus permitted influent flow. A discussion with an evaluation of the ability of the storage ponds and disposal area to store water during the 24-hour 100-year return period while maintaining compliance with the WDRs.