CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

CLEANUP AND ABATEMENT ORDER R5-2015-0713
FOR
LAKE COUNTY PUBLIC SERVICES DEPARTMENT
EASTLAKE SANITARY LANDFILL
LAKE COUNTY

This Order is issued to County of Lake, Lake County Public Services Department (Discharger) based on provisions of 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), and Water Code section 13267, which authorizes the Board to require the submittal of technical reports.

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 County of Lake, Lake County Public Services Department owns and operates the active Eastlake Sanitary Landfill (Facility). The Facility is located at the eastern edge of the City of Clearlake in Section 26, T13N, R7W, MDB&M, and consists of 34.7 acres comprised of Assessor's Parcel Numbers 41-221-14,15; 41-222-34; 41-223-24; 41-224-39; 41-225-25; 41-226-17,22,23,24,25; 41-233-28; 41-234-01,23,24; 41-235-11,13,14; 41-244-18; 10-006-84, and 10-008-03, 39.

2. Waste Discharge Requirements (WDRs) Order R5-2006-0108 was adopted by the Central Valley Water Board on 22 September 2006 to regulate the construction, operations, and corrective action at the Facility. Among other things, the WDRs implement Title 27 of the California Code of Regulations (Title 27).

3. According to the WDRs, the Facility consists of one existing unlined waste management unit covering 22.4 acres (Area I) and a lined waste management unit covering 12.3 acres (Area II). Both of the lined and the unlined units are classified as Class III waste disposal units that accept municipal solid waste in accordance with Title 27.

4. The Facility discharges its leachate into a 600,000 gallon lined Class II Surface Impoundment.

5. Finding 36 of the WDRs states that volatile organic compounds (VOCs) have been detected in groundwater monitoring wells MW-5, MW-8, MW-13, and MW-14.

6. Provisions F.15.C, F.15.D, and F.15.E of the WDRs require that the Discharger submit a VOC site investigation report with an assessment of the VOC transport mechanism, an Engineering Feasibility Study for potential corrective actions, and a Corrective Action Program to address the VOCs in groundwater.

VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

7. The Discharger submitted a VOC investigation report[1] in 2007 and an engineering feasibility study[2] in 2008. However, the reports did not meet the requirements of the WDRs[3].

8. Based on duplicate samples obtained during three semiannual sampling events in 2011 and 2012, Water Board staff informed the Discharger that their laboratory was not able to meet the detection limits required by the WDRs[4], and therefore it was not possible to determine whether groundwater contamination was still present. Subsequently, the Discharger was required to submit a revised sample collection and analysis plan and to select a laboratory that could meet the requirements of the WDRs.

9. Until the sampling and analysis procedures could be resolved, Water Board staff agreed to temporarily defer further site investigation work and a revised engineering feasibility study pending the implementation of a sample collection and laboratory analysis plan that could meet the requirements of the WDRs. In November 2012 the Discharger's newly-selected laboratory was able to meet the reporting requirements specified in the WDRs, and was therefore technically capable of reporting "trace" VOCs to the concentrations required by the WDRs.

10. On 26 April 2013, the Water Board requested an updated Site Investigation Workplan to define the vertical and lateral extent of VOC contamination in groundwater.

11. On 29 July 2013, the Discharger submitted the *VOC Investigation Workplan*, which proposed the installation of two wells to determine if a former burn pit was a source of VOC contamination in groundwater. In addition, two replacement wells[5] were proposed to replace wells MW-2 and -7, which had historically produced insufficient water to obtain samples, even after re-development.

12. Wells MW-17, MW-18, MW-19, and MW-20 were installed and sampled in the spring of 2014.

13. On 1 October 2014, the Discharger submitted their *Volatile Organic Compounds Investigation Report of Findings*, which showed that new well MW-17 also exhibited concentrations of fuel-related hydrocarbons as well as VOCs. The VOCs detected at

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[1] *VOC Investigation Report* (17 Oct 2007)
[2] Feasibility Study Workplan (3 Oct 2008)
[3] 20 October 2007 letter from Water Board staff stating that reports were incomplete.
[4] Detection Monitoring Specifications E.11 and E.12 of the WDRs state "*The methods of analysis and the detection limits used must be appropriate for the expected concentrations. . . . .*" and "*Trace" results - results falling between the MDL and the practical quantitation limit (PQL) - shall be reported as such, and shall be accompanied both by the estimated MDL and PQL values for that analytical run*", respectively
[5] Well MW-19 and MW-20.

MW-17 include 1,1-dichloroethane, cis-1,2-dichloroethene, benzene, methyl-tert-butyl ether, and tert-butyl alcohol.

14. In April 2015, all site monitoring wells were sampled, and the table below provides a summary of wells with VOC detections during that sampling event. The Discharger reported VOC detections at wells MW-5, MW-10, MW-13, MW-14, and MW-17, with wells MW-5 and MW-17 exhibiting the most detections. The concentrations of benzene at wells MW-5 and MW-17 exceed the health-based California Primary Maximum Contamination Level of 1 mg/L. At well MW-10, methyl-tert-butyl ether was first detected in November 2012, and as of April 2015 it continues to be detected. At well MW-8, there have been no reported detections of VOCs since November 2012.

VOC Detections in Groundwater During April 2015 Sampling Event

	Trichloroethene and Daughter Products (ug/L)				Fuel-Related Hydrocarbons (ug/L)			
Well ID	TCE	1,1-DCA	cis-1,2-DCE	Chloroethane	Benzene	DIPE	MTBE	TBA
MW-5	*0.26J*	*0.14J*	*2.6*	*0.35*	*1.9*	*0.42*	*2.2*	*15*
MW-17	ND	*0.11J*	*0.98*	ND	*1.3*	ND	3.7	*46*
MW-14	ND	*0.17J*	ND	ND	ND	*0.47*	*1.2*	*29*
MW-13	ND	*0.24J*	ND	ND	ND	ND	*1.7*	*13*
MW-10	ND	ND	ND	ND	ND	NE	*0.31*	ND
MW-8	ND	ND	ND	ND	ND	ND	ND	ND

Legend: *J*: "trace" concentrations, as reported by the laboratory. 1,1-DCA: 1,1-Dichloroethane. cis-1,2 DCE: cis-1,2 Dichloroethene. DIPE: Di-isopropyl ether. MTBE: Methyl-tert-butyl ether. TBA: tert-Butyl alcohol. TCE: Trichloroethene.

15. Three landfill gas monitoring wells (LGMW-1, LGMW-2, and LGMW-3) were installed in November 2005 as part of an evaluation monitoring program[7]. LGMW-1 and LGMW-2 were installed within the limits of the landfill, and LGMW-3 was installed outside the limits of the landfill and adjacent to groundwater monitoring well MW-14. The Discharger's 2007 *VOC Investigation Report of Findings* indicates that all three wells were sampled for VOCs in 2005, and that wells LGMW-1 and LGMW-2 were sampled in 2006. The number of VOC constituents in each sample ranged from 25 to 39 VOCs, with fuel-related products, tetrachloroethene and reductive degradation products, and refrigerants (e.g., Freon-12) reported in all samples.

16. Based on Water Board staff's review of the data and the site investigation reports, the landfill is the source of the VOC releases to groundwater, and has impacted the beneficial uses of groundwater.

17. The VOC plume has not been fully defined because the vertical extent has not been investigated, and the lateral extent has not been defined at MW-17, MW-10, and MW-13.

18. Wells without detectable concentrations of VOCs have not been installed upgradient and downgradient of MW-17 and downgradient of MW-10 and MW-13.

19. On 12 May 2015, Board staff met with the Discharger to discuss the extent of VOC contamination. Based on those discussions and as outlined in the above Findings, it was determined that the lateral and vertical extent of the VOC plume has not been fully defined, and that further investigation to delineate the release is required.

20. The facility is regulated under waste discharge requirements which implements Title 27. Sections 20420 and 20425 of Title 27 specific actions when a release has been confirmed, including (1) establishment of an Evaluation Monitoring Program to assess the nature and extent of the release, (2) submittal of results and assessment of the Evaluation Monitoring Program, (3) an updated Engineering Feasibility Study for Corrective Action, and (4) implementation of the Corrective Action. This Order requires the Discharger to complete these items.

REGULATORY CONSIDERATIONS

21. Prohibition A.3 of the WDRs prohibits the discharge of wastes outside of a Unit or portion of a Unit specifically designed for their containment. Groundwater and landfill gas monitoring data confirm that a release has taken place.

22. 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. Pursuant to Water Code section 13263(a), waste discharge requirements must implement the Basin Plan.

23. Surface water from the Facility drains to Molesworth Creek, which is tributary to Clear Lake.

24. The designated beneficial uses of Clear Lake, as specified in the Basin Plan, are municipal and domestic supply; industrial service supply; agricultural supply; water contact and non-contact water recreation; spawning, reproduction, and/or early development; warm fresh water habitat; cold fresh water habitat; and wildlife habitat.

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

26. 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.*

27. The State Water Resources Control Board (hereafter State Board) has adopted Resolution No. 92-49, the *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*. This Policy sets forth the policies and procedures to be used during an investigation or cleanup of a polluted site and requires that cleanup levels be consistent with State Board Resolution No. 68-16, the *Statement of Policy With Respect to Maintaining High Quality of Waters in California*. Resolution No. 92-49 and the Basin Plan establish the cleanup levels to be achieved. Resolution No. 92-49 requires the waste to be cleaned up to background, or if that is not reasonable, to an alternative level that is the most stringent level that is economically and technologically feasible in accordance with Title 23, California Code of Regulations (CCR) Section 2550.4. Any alternative cleanup level to background must (1) be consistent with the maximum benefit to the people of the state; (2) not unreasonably affect present and anticipated beneficial use of such water; and (3) not result in water quality less than that prescribed in the Basin Plan and applicable Water Quality Control Plans and Policies of the State Board.

28. Water Code section 13267 subdivision (b)(1) 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.*

29. The technical reports required by this Order are necessary for staff to evaluate compliance with this Order and WDRs Order R5-2006-0108, and are required to ensure the protection of water quality. Lake County owns and operates the Facility that discharges waste subject to this Order and WDRs Order R5-2006- 0108.

30. 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 15321 subdivision (a)(2).

IT IS HEREBY ORDERED that, pursuant to Water Code sections 13304 and 13267, Lake County shall cleanup and abate the Eastlake Landfill release to groundwater in accordance with the scope and schedule set forth below in order to return to compliance with WDRs Order R5-2006- 0108.

1. The Discharger shall comply with all aspects of WDRs Order R5-2006-0108 including complying with Detection Monitoring Specifications E.11 and E.12 of the WDRs[6].

2. **By 31 August 2015**, the Discharger shall submit an *Updated Evaluation Monitoring Work Plan* to define the horizontal and lateral extent of volatile organic compound impacts in groundwater in all aquifer zones affected by the release. This shall be completed through collection of grab groundwater samples followed by installation of permanent monitoring wells, or a series of installations of permanent monitoring wells. The *Updated Evaluation Monitoring Work Plan* shall include the information outlined below.

   Contents of the Updated Evaluation Monitoring Work Plan

   Definition of the extent of the plume may be accomplished in either of the following ways: (1) collect grab groundwater samples, analyze them on a 24-hour turnaround, continue moving sample points outward or downward and collecting grab samples until no VOCs are detected, and then install permanent groundwater monitoring wells at the edge of the release. Or (2), install permanent monitoring wells, develop within 72 hours, then collect groundwater samples within 24 hours, and analyze on a 24-hour turn around. If VOCs are detected, then install additional permanent monitoring wells outward or downward and the process continued until no VOCs are detected. The installation of permanent monitoring wells shall not delay the step-out/step-down program.

   The plan shall include the following elements:

   - Timeline showing that work, including well development, sampling, and analysis will be completed during the first quarter of 2016.
   - Procedures to develop wells within 72-hours of installation.
   - In order to propose the location of the grab groundwater samples or permanent monitoring wells:
     i. A discussion of the elevation of the fractured bedrock and the orientation of the fractures.
     ii. Plan-view maps showing current groundwater VOC iso-concentration lines for each individual constituent of concern.
     iii. A plan-view map showing the locations of planned grab groundwater samples or permanent monitoring wells, existing wells, abandoned wells, and the direction of groundwater flow.

[6] In this regard, the Discharger's laboratory must report "trace" concentrations falling between the method detection limits (MDLs) and practical quantitation limits (PQLs). These concentrations must closely agree with published values, and the MDLs and PQLs must be approved by Water Board staff.

iv. Cross-section maps showing the depth of existing wells and depth of planned grab groundwater samples.

- For the grab/groundwater samples:
  i. A description of how the grab groundwater samples or permanent monitoring wells will be collected.
  ii. A step-out plan and decision tree, which includes a time-line to efficiently delineate the vertical and horizontal extent of contamination.
  iii. Procedures to obtain grab/groundwater samples and to perform field and analytical tests. The proposed constituents to be analyzed, detection limits, and laboratory turn-around times shall be included.
  iv. Procedures to address drilling refusal.
  v. Procedures to have 24-hour hour turn-around time for VOC analytical results.

- For the installation of permanent monitoring wells:
  i. Procedures to develop wells and sample within 72-hours of installation and to obtain VOC analytical results within 24 hours of sampling.
  ii. Procedures to immediately drill new wells if any VOCs are detected.
  iii. A description of how the location of the monitoring wells will be determined.
  iv. A monitoring well installation work plan, which shall follow the requirements in Attachment A to this Order.

- All new monitoring wells, and existing wells MWs-8, -10, 13, -14, -15, and -17, shall be sampled for three quarters, beginning with the First Quarter 2016. Groundwater shall be sampled as follows: (1) the first sampling event shall include the Field and Monitoring Parameters in Table I of the MRP and the five year constituents of concern in Table VI of the MRP, and (2) the second and third sampling events shall include the Field Parameters and Monitoring Parameters in Table I of the MRP. After that point, quarterly sampling may cease, and all wells (including the new ones) shall be incorporated into the Monitoring and Reporting Program and sampled per the WDRs.

3. By **1 March 2016**, the Discharger shall submit a Well Installation Report which includes the information outlined in the second section of Attachment A for the monitoring wells installed for compliance with this Order. In addition, the Report shall include a demonstration, which is supported by water quality data, that the extent of contamination, both laterally and vertically, as defined in Item #2 of this Order, is complete.

4. By **30 November 2016**, the Discharger shall submit an *Updated Evaluation Monitoring Report of Results*, which shall include the results of the quarterly groundwater monitoring, and a determination of the spatial distribution and concentration of each constituent of concern throughout the zone(s) affected by the release. The report must provide discussions and correlated illustrations, both plan view and cross-section, that depict the vertical and lateral extent of the contamination for zones affected by the release.

5. By **28 February 2017**, the Discharger shall submit an *Updated Engineering Feasibility Study* that evaluates different corrective action measures to remediate the groundwater VOC plume. Corrective action measures for the fuel related hydrocarbons shall be evaluated separately from the corrective action measures for the other VOC compounds. For each corrective action measure that is evaluated, there shall be an estimation of the length of time to clean up the release. This study shall be based on the data collected to delineate the release as well as the data collected from the ongoing monitoring program required under the WDRs. The *Updated Engineering Feasibility Study* shall propose additional corrective action measure(s) to be implemented.

6. By **30 June 2017**, the Discharger shall submit an *Additional Corrective Action Implementation Report* documenting that the proposed corrective action(s) have been implemented.

7. The Discharger shall submit quarterly *Corrective Action Progress Reports* containing (a) an evaluation of the effectiveness of the site-wide corrective action measures, (b) an estimation of the length of time to clean up the release, and (c) a discussion of whether additional corrective actions, or fine-tuning of existing corrective actions, are necessary. The first *Progress Report* is due by **15 October 2015.** Thereafter, the quarterly progress reports shall be submitted by **15 January, 15 April, 15 July, 15 October** of each year. The *Progress Reports* shall be submitted separately from the monitoring reports required by the WDRs and shall continue to be submitted quarterly until this Order is rescinded.

Additional Requirements

8. All data, technical reports and plans, and monitoring reports prepared by the Discharger after the date of this Order 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 Order and under any Order or permit issued by the State Water Quality Control Board.

9. 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. Each technical report submitted by the Discharger shall contain the professional's signature and/or stamp of the seal.

10. As required by Provisions F.6.c and F.6.d of WDRs Order R5-2006- 0108, all reports and transmittal letters shall be signed by either a principal executive officer, ranking elected or appointed official, or a duly authorized representative, and any person signing a document which is submitted to comply with this 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.

Original signed by

ANDREW ALTEVOGT, Assistant Executive Officer

July 30, 2015

(Date)

Attachment A: Monitoring Well Installation Workplan Requirements

ATTACHMENT A
REQUIREMENTS FOR
MONITORING WELL INSTALLATION WORKPLANS AND 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 concurs with the workplan. Upon installation of the monitoring wells, the Discharger shall submit a well installation report which 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

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,
- 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 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 a 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 and no more than 72 hours after the sanitary seal has been placed, and must include

- Method of development to ensure maximum removal of fines from the vicinity of the screen and to ensure free-flow of fluids (i.e., over-pumping, air-lift, surge block and bailer, jetting, etc.),
- Parameters to be monitored during development and the record keeping procedures,
- 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, including the top of casing, ground surface, and horizontal and vertical coordinates,
- Accuracy: Horizontal must be within $\pm$0.1 foot and Vertical within $\pm$0.01-foot.

G. 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

H. Sampling and Laboratory Analysis

Groundwater samples must be obtained immediately upon development, with VOC analysis to have a 24-hour turn-around time. Groundwater sampling must be performed after the well is developed, and analytical results must be included with the monitoring well installation report. Groundwater sampling, field tests, and laboratory analysis must comply with the requirements in the Cleanup and Abatement Order, Monitoring and Reporting Program, and Standard Provisions. All Method Detection Limits, Practical Quantitation limits, and “trace” concentrations must be reported on the laboratory reports.

I. Proposed Schedule for Completion of Work

SECTION 2 - Monitoring Well Installation Report

Forty-five days after completion of the well installation, a monitoring well installation report must be submitted which provides the information listed below.

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. The Discharger must verify that boring logs and well construction data have been uploaded to the State's GeoTracker system.
2. 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

D. 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.

E. Well Survey

1. Coordinate system, epochs, bench marks, horizontal controls, accuracy, and precision,
2. Survey results of casing elevation with the cap removed (vertical to 1/100th foot) and the ground surface,
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.
6. Verification that survey data has been uploaded to the State's GeoTracker system.

F. Laboratory Analytical Results

Laboratory analytical results must be included with the well installation report. 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. 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.