

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

CLEANUP AND ABATEMENT ORDER R5-2014-0703  
FOR

CITY OF LINCOLN  
LINCOLN LANDFILL, PLACER COUNTY

This Order is issued to City of Lincoln (hereafter 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), 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 Discharger owns and operates the Lincoln Landfill, an unlined Class III landfill located east of the City of Lincoln. The site covers approximately 6-acres. Waste was placed in unlined trenches and the refuse was burned to reduce volume. Waste was last placed in the landfill in 1976 and the landfill was closed in 1993 with a low hydraulic conductivity clay cover.
2. Waste Discharge Requirements (WDRs) Order R5-2003-0142 was adopted on 5 September 2003. The WDRs regulate post-closure maintenance and require the Discharger to conduct investigation to define the extent of groundwater contamination and to implement corrective action at the site. The WDRs also require the Discharger to maintain five feet of separation between the bottom of waste and groundwater.
3. The Discharger must comply with the requirements of the WDRs and with Title 27 of the California Code of Regulations (Title 27).
4. Finding 22 in the WDRs state that groundwater beneath the landfill ranges between 13 and 22 feet below ground surface (bgs) and can fluctuate seasonally up to four feet bgs. At the time the WDRs were adopted, data indicated that there may be less than the required minimum of five feet of separation between groundwater and landfill wastes, and therefore the WDRs required the Discharger to monitor groundwater and to implement corrective action measures as necessary to maintain the required separation.
5. Volatile organic compounds (VOCs) were first detected in the groundwater in 1989. In addition, elevated levels of inorganic compounds have been found in the groundwater and the concentrations did not decline with the installation of the landfill cover in 1993. The WDRs state that the full extent of the inorganic constituent plume has not been defined.
6. In February 2000, Board staff requested the submittal of a Corrective Action Plan (CAP) and Engineering Feasibility Study (EFS) to address groundwater impacts at the site. The Discharger had difficulties in obtaining access rights to land downgradient of the landfill,

and at the time that the WDRs were adopted in 2003, had not yet submitted the documents. The WDRs required that offsite wells be installed by May 2004, that the CAP and EFS be submitted by July 2004, and that corrective actions be implemented by July 2005.

### **Impacts to Groundwater Quality**

7. Although the WDRs required that the Discharger install additional groundwater monitoring wells by 2004, the wells were not installed until much later. In 2010, the Discharger installed three wells and in 2011, the Discharger installed three more wells. With these installations, the site appears to have an appropriate number of wells to evaluate offsite contamination and to define the extent of the plume.
8. The Lincoln Landfill groundwater monitoring program currently consists of 17 groundwater monitoring wells. Eight wells are located within the six-acre site boundary, and nine wells are located off-site.
9. The WDR Monitoring and Reporting Program (MRP) requires the Discharger to conduct groundwater monitoring, and to determine "concentration limits" for each constituent of concern using statistical methods. Monitoring Specification E.3 states, in part: "*The concentrations of constituents of concern in waters passing the Point of Compliance shall not exceed the concentration limits...*" The Point of Compliance is defined (C.4 of the MRP) as a vertical surface at the downgradient edge of the unit, as measured at wells MWs-1, 3, 4, and 5. Any exceedence of the concentration limit downgradient of these four wells is considered a violation of the WDRs and of Title 27.
10. Analytical results from groundwater samples collected from monitoring wells during the monitoring event in the first half 2013 indicates that two wells exceeded the concentration limit (CL) for specific conductance; seven wells exceed the CL for bicarbonate; two wells exceeded the CL for chloride; four wells exceeded the CL for nitrogen; and eight wells exceeded the CL for sulfate, as summarized below. Exceedences of bicarbonate could be an indication of landfill gas generation and the exceedence of chloride could be an indication of the formation of leachate. Exceedences of nitrogen and sulfate concentration limits could be due to biodegradation of organic material within the waste mass.

**Summary of Inorganic Analytical Results vs. Concentration Limits (CL)**

	<b>Specific Conductance</b>	<b>Bicarbonate</b>	<b>Chloride</b>	<b>Nitrogen</b>	<b>Sulfate</b>
<b>CL</b>	2,745	360	200	5.3	40
<b>Well ID</b>					
MW-2 (upgradient)	513	210	16	2.5	29
MW-1	<b>2,776</b>	<b>530</b>	<b>200</b>	<b>18</b>	<b>800</b>
MW-3	2,211	<b>560</b>	67	1.6	<b>700</b>
MW-4	<b>3,387</b>	<b>460</b>	<b>210</b>	<b>13</b>	<b>1,200</b>
MW-5	2,677	<b>600</b>	110	<b>13</b>	<b>740</b>
MW-7	1,282	310	110	4.2	<b>460</b>
MW-11	1,770	<b>380</b>	140	1.2	<b>440</b>
MW-12	2,270	<b>450</b>	120	<b>8.9</b>	<b>700</b>
MW-16	610	220	24	1.0	<b>58</b>
MW-18	1,186	<b>580</b>	14	<0.50	15

11. In general, the wells with exceedences are located within the landfill or at the compliance boundary of the unit. Two downgradient offsite wells, MW-7 and MW-16, exceeded the CL for sulfate. Downgradient offsite well MW-18 reported an exceedence of the CL for bicarbonate. The exceedence of the concentration limit in these downgradient wells is a violation of the WDRs.
12. Volatile organic compounds (VOCs) were not detected during the monitoring event in the first half 2013 although VOCs have been reported in various site wells in the past, including downgradient offsite well MW-18. According to the Annual 2013 monitoring report, VOCs were not detected in the site wells during the second half of 2013 except for well MW-11, which contained a trace concentration of cis-1,2-dichloroethene at 0.33 micrograms per liter (µg/L). A detection of a VOC is a violation of the WDRs (see C.2.b of the MRP).
13. Based on the isoconcentration maps presented in the Annual 2013 monitoring report, it is evident that a release from the landfill has affected groundwater quality both beneath the landfill and south of the landfill.

**Separation of Waste from Groundwater**

14. Discharge Specification B.1 states “A minimum separation of five feet shall be maintained between wastes or leachate and the highest anticipated elevation of underlying groundwater per Section 20240(c) of Title 27.”

15. Provision G.11 of the WDRs requires the Discharger to develop and implement a Corrective Action Plan and Engineering Feasibility Study that was to include, among other items corrective action measures to maintain “*adequate separation from groundwater.*” The deadline for submission of this document was 15 July 2004 and the deadline for implementation of corrective action was 15 July 2005. The Discharger has not complied with either requirement.
16. Provision E.1.4 of the MRP requires that the Discharger monitoring groundwater, and among other items, determine “*separation of groundwater from the lowest point of the unit*”. The Discharger’s 2013 Annual Monitoring Report states “*Based on current data, the separation between the bottom of the waste trenches and the highest expected groundwater level is unknown.*” The Discharger is in violation of the WDRs for failing to measure and report the separation between the waste and high groundwater.
17. Finding 23 of the WDRs states that historical information and groundwater elevation data indicates that there is less than five feet of separation between groundwater and landfill wastes. In addition, during a 27 August 2013 meeting, the Discharger presented information indicating that groundwater separation was not being achieved as required, even in dry years.
18. Board Staff reviewed current groundwater data submitted in the *Conceptual Site Model and Data Gaps Work Plan* dated 31 January 2014. Figure 4 presents historical groundwater elevations measured in the monitoring wells across the site. Staff compared these elevations to the deepest elevation of waste recorded during a soils investigation conducted in 2004. The deepest elevation of waste recorded was 189.6 feet msl (mean sea level). Since five feet of separation between waste and groundwater is required by the WDRs, staff determined that an elevation of 184.6 msl is the compliance point that must be maintained for purposes of separation. If groundwater exceeds this elevation, then the Discharger is in violation of its WDRs because it is not maintaining a five foot separation.

According to Figure 4, multiple wells over time have recorded groundwater elevations that exceed the 184.6 msl elevation. In addition, staff plotted the compliance elevation of 184.6 msl on Figure 7 of the work plan and compared that elevation to the December 2013 groundwater elevations recorded. It is apparent that groundwater beneath approximately one-third of the landfill was measured at an elevation that exceeded the 184.6 msl elevation. In summary, staff’s review of the data submitted by the Discharger shows that the Discharger is consistently in violation of the five foot separation required by Discharge Specification B.1 of the WDRs.

19. Data indicates that the Discharger has been in violation of Discharge Specification B.1 for many years and that the Discharger should have implemented corrective actions to achieve the separation. This Order requires that the Discharger immediately comply with the WDR reporting requirements, including the requirement to report the separation to groundwater. This Order also reiterates the WDR requirement to submit a Corrective Action Plan to ensure that five feet of separation is maintained at all times.

### Recent Events

20. In a letter dated 11 March 2013, staff issued a Notice of Violation (NOV) for non-compliance with the WDRs. The NOV was based on a review of the 2012 Annual Monitoring Report for the Lincoln Landfill, which found: two groundwater monitoring wells (MW-1 and MW-18) contained VOCs, deficient analytical reporting limits, and the non-submittal of a corrective action plan (CAP) and engineering feasibility study (EFS) which was required to be submitted by July 2004. The Discharger submitted a CAP and EFS on 9 May 2013. The Discharger proposed to repair the clay cover as the corrective measure to address groundwater
21. On 27 August 2013, staff met with the Discharger to discuss the CAP and EFS. The Discharger stated that the landfill cover had not been maintained in the past and, as a corrective action, proposed to fix the cover and monitor the groundwater. During the meeting, the Discharger also provided depth-to-groundwater information in relation to the bottom of waste, which further indicated that groundwater separation was not being achieved even in dry years. The data showed that in wet years, groundwater rises and saturates portions of the waste.
22. On 11 September 2013, staff conducted an inspection of the Lincoln Landfill to determine the condition of the final cover and whether or not the cover could allow storm water to infiltrate the waste mass. Staff walked the site with the Discharger and determined that only minor post-closure maintenance was needed to the surface of the final cover.
23. In a letter dated 16 September 2013, Board staff rejected the Discharger's proposed corrective action measure of maintaining the cover. Staff's letter states: "*The closure cover is the final containment structure for the landfill and the Board requires the Discharger to maintain the cover in accordance with the Final Closure Plan and Closure Specifications C.1 through C.11 of the WDRs. The closure cover was not constructed as a corrective measure, and post-closure maintenance of the closure cover is a requirement of the WDRs, Standard Provisions and Reporting Requirements, and Title 27. The Discharger's recommendation to only repair the closure cover as a corrective action measure is not appropriate at this time. However, the Discharger must repair and maintain the cover as part of its required post closure maintenance activities.*"

In addition, the letter required that the Discharger submit a work plan by 30 October 2013 to comply with the WDR requirement for (a) maintaining five feet of separation from groundwater and (b) implementing corrective action with regard to the groundwater plume. Based on the discussion during the August meeting, staff expected the Discharger to submit a proposal to extract groundwater to obtain the five foot separation and to contain the plume.

24. The Discharger requested an extension to submit the work plan, citing the need to change consultants and discuss the matter with the City Council. Board staff granted the City's

request to submit the work plan on 1 February 2014, but also requested that monthly updates be provided.

25. The Discharger's first monthly update on 15 December 2013 states that there is not enough data to design a groundwater extraction system and therefore the Discharger proposed field work that would continue through the summer of 2014. However, the Discharger stated it would submit a 50% design of the extraction system on 1 February 2014.
26. The Discharger's second monthly update on 15 January 2014 reiterates the need to obtain more data and requested a meeting with Board staff.
27. Staff met with the Discharger on 29 January 2014 to discuss the Discharger's recommendations regarding further investigation into the subsurface conditions under the landfill. The Discharger determined it was appropriate to better define groundwater conditions prior to identifying the appropriate corrective action, and proposed installing four nested piezometers to define the underlying groundwater system as confined, unconfined, or perched. According to the Discharger, the City Council approved the budget to install the piezometers and to write a report. However, no other funding beyond piezometer installation has been approved by the City Council. The Discharger proposed deadlines of 1 February 2014 and 30 April 2014 to submit a work plan and piezometer installation report, respectively. The Discharger submitted the work plan on 7 February 2014 and Central Valley Water Board staff approved it in an email on 20 February 2014.
28. The Discharger submitted a third monthly update dated 13 February 2014. This update recapped the 29 January 2014 meeting and provided a tentative schedule to install the four nested piezometers. Staff approved the work plan in an email dated 20 February 2014. The Discharger has provided verbal notification that the piezometers were installed but has not submitted an installation report to staff. The Discharger has not submitted the 50% design of the extraction system.
29. The Discharger submitted a *Field Summary Report and Updated Conceptual Site Model* dated 15 May 2014. This report was prepared following the installation of four piezometers (PZ-1 through PZ-4) and a hydrogeologic investigation to determine the physical characteristics of the underlying aquifer. The report states that the 4 March 2014 groundwater measurements show that, in a few locations, (a) groundwater is within five feet of the waste and (b) groundwater intersects the bottom of the waste trenches and may come into contact with waste materials. The Discharger utilized the findings to define a course of corrective action to achieve compliance with the WDRs. The Discharger's proposal to install a cutoff trench dewatering system has been incorporated into this Order.
30. The Discharger provided comments on a draft of this Order. The comments have been incorporated and the deadline to install the cutoff trench dewatering system has been modified based on the Discharger's request for additional time. In its comments, the Discharger states that it "does not have a particular funding source earmarked for remediation project. Consequently the City will likely need to use money from its General Fund, as available, for completing corrective actions." To ensure that the Discharger

secures the appropriate funding to implement remediation, whether from the General Fund or an alternate source, a requirement to submit quarterly progress reports describing the steps taken to obtain funding for the tasks has been added herein. Asserting inadequate funding to implement the tasks of this Order as justification for noncompliance with task deadlines will not preclude the Discharger from further enforcement actions for failure to comply with the deadlines of this Order.

### **BASIS FOR CLEANUP AND ABATEMENT ORDER**

31. The Discharger is required by WDRs R5-2003-0142 to develop and implement a Corrective Action Plan and Engineering Feasibility Study for (a) groundwater corrective action and monitoring and (b) maintenance of the five feet of separation between waste and groundwater. For a period of almost ten years, the Discharger was unable to conduct the appropriate offsite investigation due to private property access issues, resulting in non-compliance with the WDRs. Access to define offsite contamination was recently attained and additional groundwater wells were installed. Based on groundwater sampling data collected from these wells and wells onsite, the Discharger prepared the required CAP and EFS but was submitted on 9 May 2013, nine years after the date in the WDRs. However, the CAP and EFS was inadequate and does not address the two main violations of the WDRs (i.e., lack of five foot separation and groundwater impacts).
32. The WDRs required the Discharger to install corrective actions by July 2005. That work has not been completed, and as of this date, it is unclear whether the Discharger has a plan or financing approval to complete the work.
33. This Order provides a timeframe for the Discharger to perform additional site investigations and to propose and install appropriate corrective actions, as previously required in the WDRs, to (a) maintain a minimum of five feet separation between the waste and groundwater, and (b) remediate the groundwater impacts. This Order also requires the Discharger to maintain its landfill cover consistent with the WDRs, conduct quarterly inspections of the cover, and to certify the groundwater monitoring system meets the standards of Title 27 for a Detection Monitoring System.

### **REGULATORY CONSIDERATIONS**

34. 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.
35. Surface water drainage is to the south into Auburn Ravine, which is a tributary to the Sacramento River, which flows into the Sacramento-San Joaquin Delta. The beneficial uses of the Sacramento River, as specified in the Basin Plan, are municipal and domestic

supply, agricultural irrigation supply; stock watering, hydroelectric power generation, recreation; freshwater habitat, fish migration and spawning; wildlife habitats; groundwater recharge; fresh water replenishment; preservation of rare and endangered species; and aesthetic enjoyment.

36. The beneficial uses of the underlying groundwater are municipal and domestic supply, agricultural supply, and industrial service supply.
37. Title 27, section 20365 subdivision (a) states in part: *Units and their respective containment structures shall be designed and constructed to limit, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping under the precipitation conditions specified in Table 4.1...* Section 20365 subdivision (c) contains specific performance standards for the design, construction, and maintenance of diversion and drainage facilities. Section 20365 subdivision (f) requires that landfill covers be graded to divert precipitation, prevent ponding, and resist erosion.
38. Title 27, section 20240 subdivision (c) states in part: *"...Existing landfills, waste piles, and surface impoundments shall be operated to ensure that wastes will be a minimum of five feet (5 ft.) above the highest anticipated elevation of underlying ground water."*
39. Water Code section 13304 subdivision (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.*
40. 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.*
41. The technical reports required by Water Code section 13267 and this CAO are necessary to evaluate compliance with this CAO and WDRs Order R5-2003-0142, and to ensure the protection of water quality. The Discharger owns and operates the facility that discharges waste subject to this CAO and WDRs Order R5-2003-0142.



42. 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 (CEQA) (Public Resources Code section 21000 et seq.) in accordance with California Code of Regulations, title 14, sections 15061 subdivision (b)(3), 15306, 15307, 15308, and 15321. This Order generally requires the Dischargers to submit plans for approval prior to implementation of cleanup activities at the landfill. 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, however, 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 Discharger will conduct the necessary and appropriate environmental review prior to the Assistant Executive Officer's approval of the applicable plan. The Discharger will bear the 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.

**IT IS HEREBY ORDERED** that, pursuant to Water Code sections 13304 and 13267, the City of Lincoln shall cleanup and abate the Lincoln Landfill in accordance with the scope and schedule set forth below, in order to comply with WDRs Order R5-2003-0142 and the State Water Board General Storm Water Permit.

1. The Discharger shall **immediately** comply with all aspects of Monitoring and Reporting Program (MRP) R5-2003-0412, including item E.1.4 which requires that the Discharger report the "*separation of groundwater from the lowest point of the unit*". Based on the data presented in the Discharger's 31 January 2014 piezometer work plan, the lowest elevation of the landfill is located in Trench F at an elevation of 189.6 feet msl, and therefore groundwater is not to exceed 184.6 feet msl, under the entire footprint of the landfill.
2. **Beginning with the second quarter of 2014**, the Discharger shall conduct routine post-closure inspections and maintenance of the landfill cover and monitoring devices associated with the Detection Monitoring Program (DMP). The Discharger is required to comply with the Closure Specifications of the WDRs including "Closure and Post-Closure Specifications" in Section IX of the Standard Provisions and Reporting Requirements, as well as section 20365 of Title 27. The Discharger shall conduct post-closure inspections **semi-annually** and report the findings in the semi-annual groundwater monitoring reports submitted in accordance with MRP R5-2003-0142.
3. **Beginning with the second quarter of 2014**, the Discharger shall submit *Quarterly Progress Reports* describing (a) the source of funding that has been obtained to implement the requirements described in this Order and (b) the progress toward complying with the requirements of this Order. The reports are due on the first day after the end of each quarter (i.e., by **1 April, 1 July, 1 October, and 1 January**). The first report is due by **1 July 2014**.

4. By **30 September 2014** the Discharger shall submit a *Corrective Action Workplan* describing actions that will be taken to (a) maintain five feet of separation beneath the lowest elevation of the waste, and (b) provide source control and groundwater remediation. Actions already required by the WDRs such as maintenance of the landfill cover are not considered "corrective actions." Due to the number of years of groundwater contamination at this site, natural attenuation within the compliance boundary of the landfill is not an acceptable corrective action. At a minimum, the Discharger shall consider a cutoff trench dewatering system to lower the groundwater beneath the site, control the source of pollutants, and capture a portion of the downgradient plume.

The *Workplan* shall include an updated Site Conceptual Model based on the field work conducted in 2014. If the Discharger believes that the current groundwater monitoring network is not adequate to determine whether there is five feet of separation between waste and groundwater, then the *Workplan* shall include a proposal to install monitoring wells in the areas of the deepest waste mass. These wells shall be screened for five feet below the bottom of the waste. If the Discharger wishes to install these wells, then the *Workplan* shall include the information found in Attachment A to this Order.

5. By **1 October 2015** the Discharger shall submit a *Corrective Action Installation Report* that documents that the *Corrective Action Workplan* was implemented as approved by Board staff.
6. In addition to the above, the Discharger shall comply with WDRs Order R5-2003-0142 and all applicable provisions of Title 27 and the Water Code that are not specifically referred to in this Order.

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.

Any person signing a document submitted under 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](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:

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Andrew Altevogt, Assistant Executive Officer

3 June 2013

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(Date)

TAD/HFH/WSW: 27May14

Attachments:

- A: Monitoring Well Installation Workplan Guidelines
- B: Monitoring Wells Installation Report Guidelines

**ATTACHMENT A**  
**Monitoring Well Workplans and Groundwater Sampling and Analysis Plan**

The monitoring well installation work plan 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. Drilling Details:

- On-site supervision of drilling and well installation activities
- Description of drilling equipment and techniques
- Equipment decontamination procedures
- Soil sampling intervals (if appropriate) and logging methods

C. Monitoring Well Design (in narrative and/or graphic form):

- Diagram of 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

D. Well Development (not to be performed until at least 48 hours after sanitary seal placement):

- 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

E. Well Survey (precision of vertical survey data shall be at least 0.01 foot):

- Identify the Licensed Land Surveyor or Civil Engineer that will perform the survey
- Datum for survey measurements
- List well features to be surveyed (i.e. top of casing, horizontal and vertical coordinates, etc.)

F. Schedule for Completion of Work

**G. Appendix: Groundwater Sampling and Analysis Plan (SAP)**

The Groundwater SAP shall be included as an appendix to the work plan, and shall be utilized as a guidance document that is referred to by individuals responsible for conducting groundwater monitoring and sampling activities.

Provide a detailed written description of standard operating procedures for the following:

- Equipment to be used during sampling
- Equipment decontamination procedures
- Water level measurement procedures
- Well purging (include a discussion of procedures to follow if three casing volumes cannot be purged)
- Monitoring and record keeping during water level measurement and well purging (include copies of record keeping logs to be used)
- Purge water disposal
- Analytical methods and required reporting limits
- Sample containers and preservatives
- Sampling
  - General sampling techniques
  - Record keeping during sampling (include copies of record keeping logs to be used)
  - QA/QC samples
- Chain of Custody
- Sample handling and transport

## **Attachment B - Monitoring Well Installation Report**

The monitoring well installation report must provide the information listed below. In addition, the report must also clearly identify, describe, and justify any deviations from the approved work plan.

### **A. General Information:**

Purpose of the well installation project

Brief description of local geologic and hydrogeologic conditions encountered during installation of the wells

Number of monitoring wells installed and copies of County Well Construction Permits

Topographic map showing facility location, roads, surface water bodies

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 (in narrative and/or graphic form):**

On-site supervision of drilling and well installation activities

Drilling contractor and driller's name

Description of drilling equipment and techniques

Equipment decontamination procedures

Soil sampling intervals and logging methods

Well boring log

- Well boring number and date drilled
- Borehole diameter and total depth
- Total depth of open hole (same as total depth drilled if no caving or back-grouting occurs)
- Depth to first encountered groundwater and stabilized groundwater depth
- Detailed description of soils encountered, using the Unified Soil Classification System

### **C. Well Construction Details (in narrative and/or graphic form):**

Well construction diagram, including:

- Monitoring well number and date constructed
- Casing and screen material, diameter, and centralizer spacing (if needed)
- Length of well casing, and length and position of perforated interval
- Thickness, position and composition of surface seal, sanitary seal, and sand pack
- Type of well caps (bottom cap either screw on or secured with stainless steel screws)

### **E. Well Development:**

Date(s) and method of development

How well development completion was determined

Volume of water purged from well and method of development water disposal

Field notes from well development should be included in report

- F. Well Survey (survey the top rim of the well casing with the cap removed):
- Identify the coordinate system and datum for survey measurements
  - Describe the measuring points (i.e. ground surface, top of casing, etc.)
  - Present the well survey report data in a table
  - Include the Registered Engineer or Licensed Surveyor's report and field notes in appendix