ATTACHMENT D

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 Water Board 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

1. Purpose of the well installation project,
2. Brief description of local geologic and hydrogeologic conditions,
3. Proposed monitoring well locations and rationale for well locations,
4. Topographic map showing facility location, roads, and surface water bodies,
5. 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

1. On-site supervision of drilling and well installation activities,
2. Description of drilling equipment and techniques,
3. Equipment decontamination procedures,
4. Soil sampling intervals (if appropriate),
5. 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.*

C. Monitoring Well Design – Diagram and Narrative

1. Proposed well construction details:
   a. Borehole diameter,
   b. Casing and screen material, diameter, and centralizer spacing (if needed),
   c. Type of well caps (bottom cap either screw on or secured with stainless steel screws),
   d. Anticipated depth of well, length of well casing, depth and thickness of saturated zones, and length and position of perforated interval,
   e. Thickness, position and composition of surface seal, sanitary seal, and sand pack,
   f. Anticipated screen slot size and filter pack.

D. Well Development (at least 48 hours after sanitary seal placement)

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

E. Well Survey - Horizontal and Vertical Coordinates

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

F. Water Level Measurement

1. The elevation reference point at each monitoring well must be within 0.01-foot,
2. Ground surface elevation at each monitoring well must be within 0.01-foot,
3. 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 provide 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 and thickness of saturated zones,

e. Depth to first encountered groundwater and stabilized groundwater depth,
f. 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 Results

1. Description of the measuring points (i.e. ground surface, top of casing, etc.),
2. Coordinate system, epochs, bench marks, horizontal controls, accuracy, and precision,
3. Vertical survey results with casing elevation with the cap removed within $\pm$ 0.01 foot accuracy,
4. Horizontal survey results with coordinates within $\pm$0.1 foot accuracy,
5. California Registered Civil Engineer or Licensed Surveyor's report, field notes, and stamp/signature in an appendix,
6. Tabulated installation data with well number(s), date well installed, datum, horizontal coordinates, vertical coordinates, ground surface elevation, total depth drilled, elevation of top of screen, elevation of bottom of screen, completed well depth, and depth of pump inlet.

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,
7. Certification statement signed by an authorized representative,
8. Report signed and stamped by California Licensed engineer or geologist.