

**ATTACHMENT C**  
**ORDER NO. R5-2010-\_\_\_\_\_**  
**THUNDERBOLT WOOD TREATING COMPANY**  
**ITEMS TO BE INCLUDED IN**  
**MONITORING WELL INSTALLATION WORK PLANS**  
**AND**  
**MONITORING WELL INSTALLATION REPORTS**

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**SECTION 1 - Monitoring Well Installation Workplan**

- A. General Information:
  - 1. Purpose of well installation and sampling/analysis project
  - 2. Site location map
  - 3. Copies of County Well Construction Permits (to be submitted after workplan review)
  - 4. New monitoring well locations and rationale
  - 5. Equipment decontamination procedures
  - 6. Health and safety plan
  - 7. Topographic map showing any existing wells, proposed wells, waste handling facilities, utilities, and other major physical and man-made features.
- B. Drilling Details:
  - 1. Drill rig and contractor
  - 2. Sampling intervals and logging methods.
- C. Monitoring Well Design—Graphic and Descriptive:
  - 1. Casing diameter and centralizer spacing (if needed)
  - 2. Borehole diameter
  - 3. Depth of surface seal
  - 4. Well construction materials
  - 5. Diagram of proposed well construction details
  - 6. Type of well cap, bottom cap either screw on or secured with stainless steel screws
  - 7. Size of perforations and rationale
  - 8. Grain size of sand pack and rationale
  - 9. Thickness and position of bentonite seal and sand pack
  - 10. Depth of well, length and position of perforated interval.
- D. Well Development:
  - 1. Method development
  - 2. Method of determining when development is complete
  - 3. Parameters to be monitored during development
  - 4. Development water storage and disposal.
- E. Well Survey Coordinates, horizontal and vertical:
  - 1. Name of the Licensed Land Surveyor or Registered Civil Engineer
  - 2. Well features to be surveyed (i.e. top of casing, horizontal and vertical coordinates)
  - 3. Horizontal (within 0.1 foot) and vertical accuracy (vertical must be at least 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. Proposed time-schedule with dates for proposed work.

H. Plan signed and stamped by California Licensed engineer or geologist.

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## **SECTION 2 - Monitoring Well Installation and Groundwater Analytical Report**

A. Well Construction Details—Graphical, Tabular, and Descriptive:

1. Quantity and depth of wells drilled
2. Date(s) wells drilled and completed
3. Description of drilling and construction
4. Updated comprehensive site map with facility site features including monitoring wells, sample locations and identification numbers, storage ponds, landfills, investigation areas, groundwater gradient and iso-contour lines, buildings, tanks, and etc.
5. A well construction diagram for each well with the following 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. Stabilized depth to groundwater
  - t. Date of water level measurement
  - u. Monitoring well number
  - v. Date drilled
  - w. Location

B. Well Development:

1. Date(s) of development of each well
2. Method of development
3. Volume of water purged from well

4. How well development completion was determined
5. Method of effluent disposal
6. Field notes from well development should be included in report.

C. 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 1/100<sup>th</sup> 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.

D. Groundwater Field Sampling

1. Tabulated groundwater elevations and wells
2. Graphical presentation of groundwater gradient and iso-contour lines.
3. 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

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