January 28, 2016

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Lahontan Water Board Comments for "Additional Site Investigation Workplan-Olancha Spring Water Bottling Facility, Geosyntec Consultants, December 29, 2015"

Lahontan Regional Water Quality Control Board (Water Board) staff has reviewed the above-referenced report and is providing its comments, below. In general, the plan addresses the horizontal delineation of the plume but does not adequately address the vertical extent. It may be best to conduct the investigation in steps where the questions regarding perched water bearing zones, confined water bearing zones, and vertical gradient are answered before identifying appropriate target monitoring zones and completing monitoring well installations.

Comments

Section 4. Hydrogeological Site Conceptual Model (p. 8)

1. The vertical groundwater gradient at the site needs to be investigated, especially in the area of the East Pond, Fire Pond discharges and in the area of the Arsenic Pond. Please modify the Workplan to include tasks designed to identify the vertical gradient at the site. This information needs to be added to the Site Conceptual Model (SCM) findings to refine target monitoring zones for the proposed monitoring network.

2. The text indicates that local semi-confined conditions may occur where fine-grained layers are present as well as localized perched water bearing zones. Please add tasks to the workplan to identify how semi-confined and perched water bearing zones will be identified and sampled. Prepare a monitoring well design that takes into account the need to sample semi-confined water bearing zones independently from perched water bearing zones. Be prepared to discuss how these different water bearing zones affect groundwater monitoring well construction and contaminant transport in the SCM. Ensure that drilling avoids vertical contaminant transport.

3. The SCM needs refinement. Please ensure that the Phase 3 Report includes a SCM that produces detailed cross sections (both parallel and perpendicular to the estimated flow path) illustrating the site's lithology, especially near the East Pond, Fire Pond discharges and the Arsenic pond. The SCM should also be able to clearly identify the vertical and horizontal gradients, perched groundwater bearing zones, and semi-confined groundwater bearing zone near the East Pond, Fire Pond discharges points and the Arsenic Pond.

4. The Final Cabin Bar Ranch Hydrogeology Report indicates that "there is some hydraulic connectivity between the Shallow Zone and the deeper portions of the alluvial aquifer beneath the Shallow Zone." This connectivity to the deeper zone potentially provides a pathway for contaminant transport to the deeper zone, (i.e. >80 feet). Please include deeper monitoring points around the Arsenic Pond to determine if contamination has migrated to depth. Investigation activities conducted in the deeper zone shall incorporate drilling and sampling techniques that minimize the potential for cross contamination (e.g. temporary conductor casings, CPT sounding retraction grouting techniques, retraction grouting after hydropunch sample collection, etc.).

5. In order to determine the potential for contaminant transport from the Arsenic Pond offsite, please run the MODFLOW Groundwater Model developed for the Cabin Bar Ranch project using current arsenic groundwater concentrations surrounding the Arsenic Pond. Provide the results as isocontours of arsenic concentration on a map. Run the model using all existing and future production wells or in a normal operational scenario for the Olancha and Cabin Bar Ranch facilities. Include an evaluation of whether ongoing discharges impact modeling results.

6. Water Board staff recommends that CG Roxane, LLC compile all available well (i.e. public/municipal water supply wells, private/domestic water supply wells, monitoring wells, and piezometers) information for the area, clearly identify and sort the wells by stratigraphic units (i.e. the Shallow Zone, Deep Zone, etc.), and provide recommendations for existing wells that can be incorporated into the monitoring well network and used as "sentry" monitoring wells. Wells that are screened across multiple stratigraphic units (i.e. the Shallow and Deep Zones) should be clearly identified. Water Board staff also recommends that all of the wells listed above be presented on a single figure/map.

Section 5.0 Investigation Objectives and Design (p. 10)

7. The proposed work at Well OW-8US/OW-8U and MW-11/MW-12 may be too far from the Arsenic Pond, Fire Pond and East Pond to yield representative results Please add tasks to the Workplan to identify the vertical gradient near the East Pond, Fire Pond ischarges and the Arsenic Pond. The location of Well OW-8U is not shown on Figure 6, please add.

Section 6.2 Direct Push Drilling and Field Sampling (p. 11)

8. Geosyntec indicates that "Soil samples will be collected approximately every 5 feet for laboratory analysis. The soil cores will be inspected for any signs of obvious contamination (staining, odors, PID), and if signs are of contamination are present." For clarification purposes, Geosyntec should revise these statements to indicate that soil samples will be collected every 5 feet and/or from portions of the soil core with signs of obvious contamination.

9. Geosyntec indicates that direct push "borings will be backfilled using medium bentonite chips poured into the borehole in 1-foot lifts and hydrated with water after each lift to seal the borehole." Since hydrated bentonite chip seals have a strong tendency to shrink and crack (i.e. the seal fails) within the unsaturated zone, Water Board staff recommends that Geosyntec use a more appropriate sealing material (e.g. neat cement grout, cement bentonite grout) for borehole destruction. Additional relevant information regarding appropriate seal materials that can be used in the unsaturated zone can be found in the following Statewide Advisory: Sealing Materials for Water Wells, Monitoring Wells, Cathodic Protection Wells, and Geothermal Heat Exchange Wells http://www.water.ca.gov/groundwater/docs/FINALGroutAdvisory_30Sep15.pdf"

   Additionally, it is very difficult to place and hydrate medium bentonite chips in a small diameter direct push borehole as proposed in the Work Plan without encountering significant problems with the bentonite chips "bridging" during placement and creating void spaces in the borehole.

Section 6.3 Groundwater Monitoring Well Installation (p. 12 and p. 13)

Geosyntec indicates that "During drilling, soils samples will be collected every five feet using a California Modified split-spoon sampler." Utilization of this limited sample/core collection methodology can make it very difficult to assess the presence, or absence, of thin, fine-grained units (or coarse-grained units with greater than at 30 percent fines content) that may act as "perching" layers for infiltrated water. As a result, potential perched water zones that may have potentially different concentrations of chemicals of concern would not be identified and sampled (if appropriate) during site characterization. The proposed limited sample/core collection methodology also makes direct observation of the depth to water (i.e. wet soil as defined in the Unified Soil Classification System), identification of all water bearing units, and the depths/thicknesses of these water bearing units within the borehole, problematic (i.e. the depths and thicknesses of water bearing units are often estimates rather than measured). In order to minimize potential estimates and errors in the lithologic log, Water Board staff recommends that Geosyntec collect continuous core during advancement of all borings. Continuous core can be collected using the hollow stem auger (HSA) drilling method with a CME Bearing Head sample tube system (5-foot sample interval capacity) or continuous use of the proposed California-Modified split-spoon sampler (1.5-foot sample interval capacity). Please propose a drilling method to

address heaving sands are an issue at the site, a continuous record of soil properties/lithology can also be obtained with a cone penetration test (CPT) rig.

10. Geosyntec proposes to utilize hydrated bentonite chips as a sanitary seal (i.e. the uppermost sealed portion of the well annulus above the filter pack and/or transition seal) in the construction of the new monitoring wells. This methodology is not approved. As previously noted, hydrated bentonite chip seals have a strong tendency to shrink and crack (i.e. the seal fails) within the unsaturated zone and are generally not considered an acceptable material to be used for the upper portion of a well's sanitary seal. Due to the expected poor performance of the hydrated bentonite chip seals, Water Board staff recommends that Geosyntec utilize a more appropriate sealing material (e.g. neat cement grout, cement bentonite grout) for borehole destruction."

11. Geosyntec proposes to utilize relatively long (15-foot length) well screens in the construction of the new monitoring wells. In previously constructed monitoring wells MW-02, MW-03, MW-04, MW-05, and MW-09, similar, 15-foot-long well screens were installed across multiple water bearing units with potentially different concentrations of chemicals of concern. In addition, since limited soil sample/core was collected from previous borings, it is unknown if the screens were installed across potential perched water zones (i.e. infiltrated water perched on thin fine-grained units and/or coarse-grained units with greater than at 30 percent fines content) that may also have potentially different concentrations of chemicals of concern. Water Board staff recommends that the selection of the well screen length and depth interval for each monitoring well be made after a lithologic log has been generated and a target monitoring zone has been selected for each monitoring well location. Water Board staff also recommends that Geosyntec select target monitoring zones, and select appropriate well screen lengths, that minimize the potential for the well screens to be installed across perched water zones and/or multiple water bearing units.

12. Water Board staff notes that the Well Construction Logs for previously constructed monitoring wells MW-01, MW-02, MW-03, MW-04, MW-05, MW-06, MW-7, MW-08, and MW-09, as presented in the Phase 2 Site Groundwater Investigation Report, indicate that the end cap/sump length was NA (not applicable). Water Board staff also note that the grout mixture (quantities of Portland cement, bentonite, and water) recorded in the Well Construction Log for MW-01 appears to be incorrect (approximately 5 to 6 gallons of mix water is required per cubic foot of neat Portland cement; an additional 1 to 2 gallons of mix water is required for a cement bentonite grout. Geosyntec indicates that they used approximately 3 gallons of mix water per cubic foot of their Portland IV/Wyoben Grout mixture). Water Staff recommends that Geosyntec field staff accurately records all well construction material volumes and lengths and ensure that the monitoring wells are properly constructed and the well casings, screens, and end caps are properly installed.

13. Water Board staff notes that there are number of minor errors and description conflicts in the use of the Unified Soil Classification System (USCS) descriptions in the Phase 2 Site Groundwater Investigation Report Borehole Logs. For example, in the Borehole Log prepared for MW-04, the Lean Clay (CL) unit at 11 feet is described as having high plasticity. Based on this visual manual description, the unit should have been described as a Fat Clay (CH). The Borehole Logs also include unit descriptions such as very fine sand, very coarse sand, and medium gravel which are not USCS descriptions. In order to minimize soil description errors in Borehole Logs to be prepared during additional phases of site investigation, Water Board staff recommends that Geosyntec field staff reviews the USCS as described in ASTM D2487 prior to implementing the next phase of site investigation.

Section 6.4 Groundwater Sampling (p. 13)

14. In order to provide a baseline for the community concerns regarding water quality in the area, please conduct a snapshot sampling event of the following wells: CGR-1, CGR-2, CGR-3, CGR-4, CGR-5, CGR-6, OW-7U, OW-7M, OW-7D, OW-10U, OW-10M, CBR-1, CBR-2, CBR-5 and the following piezometers P-2, P-3, P-4, P-13, RP-1. Additionally, if any of the private wells to the north are available for sampling it would be good to add them to this sampling event. Analyze the snapshot samples for metals total and dissolved, pH, TDS, specific conductance, general minerals and field parameters.

Section 6.5 Laboratory Analyses (p. 13-14)

15. The request to reduce the metals analyses to dissolved metals only is not approved. MW-04 has a significant difference between total and dissolved and for this round of investigation it is important to include total metals. The Water Board will consider the request for future sampling events.

Please feel free to call me with any questions you may have and we are available to meet and discuss our comments. Please provide a revised workplan within 60 days of the date of this letter.

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Cc: Mailing list

CP/dk/T: Phase 3 Workplan comments
E-file: CW-792389