

## Lahontan Regional Water Quality Control Board

March 20, 2012

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### **UNITED STATES FOREST SERVICE, LASSEN NATIONAL FOREST, EAGLE LAKE WASTEWATER TREATMENT FACILITY DECEMBER 2011 SOIL AND GROUNDWATER INVESTIGATION REPORT, CEASE AND DESIST ORDER NO. R6T-2011-0022, LASSEN COUNTY, WDID NO. 6A188505700**

Water Board staff has completed its review of the *Additional Soil and Groundwater Investigation Report* for the Eagle Lake Wastewater Treatment Facility (Facility), dated December 20, 2011. The report was prepared by Lawrence & Associates of Shasta Lake, California on behalf of the United States Forest Service, Lassen National Forest (USFS), and was submitted in response to Cease and Desist Order No. R6T-2011-0022. The Water Board finds the investigation and report are insufficient to achieve the purpose and requirements of the soil and groundwater investigation set forth in the CDO.

Water Board staff has the following comments:

1. The primary objective for the above-referenced soil and groundwater investigation is to determine the extent of impact to groundwater quality caused by wastewater release(s) through deteriorating (leaking) liners at the USFS's Eagle Lake Wastewater Treatment Facility (Facility). This was to be accomplished by determining groundwater elevations and groundwater flow direction, and comparing groundwater quality up-gradient and down-gradient of the Facility. To date, the USFS's investigation has yet to satisfy this primary objective, and currently has only one out of a total of eight groundwater monitoring wells that produces samples and data.

Water Board staff is also becoming concerned that the USFS and/or its contractors may not fully understand the purpose of the soil and groundwater investigation. This developing concern is based upon:

- There is no discussion within the report of the Cease and Desist Order that established the requirements and content of the soil and groundwater investigation report.

- The incorrect statement contained in the CGI Technical Services report in Attachment B that states, "We understand that as part of that [Facility] expansion, the California Regional Water Quality Control Board – Lahontan Region (Board) is requiring that the percolation rate for soils surrounding the proposed ponds be estimated." The percolation tests are required by the Cease and Desist Order for evaluating migration rates of wastewater that has and continues to leak from the existing facility, not from the upgraded/expanded facility.
  - There are no recommendations identifying measures that will meet the investigation's objective other than to simply monitor the existing wells, only one of which has produced any samples.
2. The report does not adequately explain why drilling operations ceased in three of the four new monitoring well borings prior to encountering groundwater or demonstrating that drilling operations had encountered competent bedrock. The USFS's revised work plan for this investigation (September 30, 2011) states that air-rotary drilling equipment would be used if hollow stem auger equipment encountered refusal. It is unclear why this procedure was not followed, even though the USFS has hydrogeologic data from its new water supply well indicating that shallow groundwater is present at the site (21 to 48 feet below ground surface at the well location and time of initial drilling operations), and that different drilling equipment could continue to advance drilling operations when standard hollow stem auger equipment ceased doing so (43 feet below ground surface).

**Required Response** - The USFS must provide an explanation as to why it failed to implement its proposed procedure of using air rotary equipment if and when standard hollow stem auger equipment encountered refusal.

3. Conclusions No. 2 and No. 5 on page 2 appear to be contradictory. Conclusion No. 2 identifies the water in MW-4 as a "perched groundwater table with limited horizontal and vertical extent." There is no mention in Conclusion No. 2 of wastewater being the source or partial source of the water in MW-4. Conclusion No. 5 seems to mix two different ideas. First, it states the source of the water in MW-4 is leakage from the wastewater treatment facility. This statement potentially conflicts with Conclusion No. 2, which identifies what the water is (perched groundwater table), but is silent on its source. Conclusion No. 5 goes on to state that if leakage from the wastewater treatment facility is the source of water in MW-4, then the sample results to date do not indicate the wastewater has had a negative effect on the shallow aquifer. This last statement indicates the water in MW-4 is a combination of wastewater and naturally occurring groundwater from a shallow aquifer, which is different than it being solely leakage from the wastewater facility. Additionally, none of the statements in either of the two conclusions are supported by a discussion of the hydrogeologic data that has been obtained to date. It is also unclear how one can come to any conclusions regarding the impact of the

wastewater facility upon groundwater quality based upon the results from a single monitoring well.

**Required Response** - The USFS must clarify the contradictory/conflicting statements in Conclusions No. 2 and No. 5, and identify and discuss the data that supports the conclusion(s), as clarified.

4. Conclusion No. 4 on page 2 does not appear to be consistent with the log of MW-6. The subsurface materials encountered in the boring are reported to be silts and clays becoming saprolite at depth. While "fractures" may have been observed, they are not indicated on the log. It is also possible that the saturated zone in this well may have been "smeared off" by clayey soils during drilling. If so, water may seep into the well at a later date, and could already be present. If not, developing the well by adding a limited, measured amount of potable water to the well, surging thoroughly, and then bailing to remove the added water may be adequate to clear any fine-grained material that may have been "smeared" during drilling operations, and allow groundwater to enter freely into the well. Please note that this method is not recommended for any of the other wells as they did not encounter saturated conditions, and is only recommended for MW-6 if it is dry upon re-inspection.

**Required Response** - The USFS must clarify the inconsistency between Conclusion No. 4 and the log of MW-6. Additionally, the USFS must inspect MW-6 as soon as practicable to see if water has subsequently seeped into the well. If so, groundwater elevation data and water quality data must be collected from the well, in addition to any other monitoring wells that have water in them at the time. If water is not found in MW-6, then the USFS must perform the well development technique referenced above, and report the results. Additionally, it is important to remember that only MW-4 has had water in it. If water is found in any of the other monitoring wells, they will need to be properly developed and purged prior to collecting samples for analysis.

5. The CGI report provides estimated, extrapolated hydraulic conductivity values derived from their percolation test results using correlations of Bedinger (1997). However, the Additional Soil and Groundwater Report refers to these values as "permeability" rather than (estimated) hydraulic conductivity. Although these terms are related, they are not one and the same.

**Required Response** - The USFS must provide the methodology and calculations for conversion of the percolation test results to estimated hydraulic conductivities. Additionally, Finding No. 2 and Table No. 4, as well as any related text, must be clarified accordingly using correct terminology.

6. Recommendation No.1 is a conclusion rather than a recommendation. Additionally, if "fractures" are present that are capable of causing the monitoring wells to drain

any water that may enter the casing, as discussed in Conclusion No. 4, then the monitoring well network may not be adequate for leak detection monitoring.

**Required Response** - Reevaluate how effective the existing monitoring well network may be for leak detection purposes if fractures are present and able to drain water entering the monitoring wells.

### **Additional Analysis Required**

7. For the revised report, the USFS must include a Site Conceptual Model (SCM), with more comprehensive analysis of the available hydrogeologic data. The SCM is critical to developing a thorough understanding of the site and identify data gaps that must be filled to define the extent of the impact to groundwater at the site. The results of the SCM will facilitate a more productive and focused next phase of investigation. The revised soil and groundwater investigation report must present a SCM with a thorough hydrogeologic analysis using all appropriate data collected from the site to date. Detailed, appropriately-scaled cross sections must be prepared clearly depicting surface and subsurface conditions at the site, including topography and locations/depths of all of the original primary ponds and evaporation ponds (as existed at the time the leaking liners in the ponds were discovered), percolation and permeability test data and other analytical results, and pond water levels and groundwater levels where known.

The SCM must, at a minimum, include cross sections constructed at the following locations:

- a) From the location of MW-7 to the original water supply well. This cross section must include, and clearly present, all subsurface data available from Test Pit 3 (TP-3), the new water supply well, MW-8 and percolation test 3 (P3). Original topography must be shown through the location of proposed Primary Pond No. 2. This cross section must clearly depict the location and depth of original Primary Pond No. 1. Pond water levels and saturated intervals identified in the subsurface must be shown.
- b) From the original water supply well to MW-2, including MW-4 and Boring 5/P4. If preferred, this section may be combined with the one above to make one large cross section provided it is of adequate scale to clearly show the necessary level of detail, displaying all available hydrogeologic data.
- c) From well MW-7 to MW-5, through MW-1 and MW-6, with the original Primary Pond No. 2 and original Evaporation Ponds clearly depicted (locations and depths).

- d) From MW-7 to MW-3/P5 (through TP-5, Boring 6 and P2), with the original location and depth of Evaporation Pond No. 3 clearly depicted. Original topography should be shown through the location of new Evaporation Pond No. 4.
- e) From TP-7 to MW-4 (through TP-9, Boring 6 and MW-6), with the location and depth of Evaporation Pond No. 1 clearly depicted. Original topography must be shown through the location of new Evaporation Pond No. 4.

The SCM must also include time-series hydrographs depicting all available groundwater elevations measured and recorded in monitoring well MW-4 over time, plotted with rainfall/precipitation data and pond water level data for Evaporation Pond No. 1, where available. The SCM must include a narrative analysis discussing the information obtained from thorough review and analysis of the cross sections, hydrographs and other data presented. A complete SCM is also necessary to evaluate the threat the release(s) at the site pose to human health, the environment, and water quality. The SCM should also:

- f) Identify all nearby surface water bodies, streams (intermittent and permanent), and wetland areas.
  - g) Identify the depth to water and production intervals in the original and new water supply wells at the site as well as the distance to the nearest public water supply well.
  - h) Evaluate the risk for all complete exposure pathways or identify significant data gaps that must be filled to evaluate the pathway.
  - i) Identify and clarify all data gaps that must be filled to meet the minimum requirements set forth in the Cease and Desist Order.
8. Additionally, all of the monitoring wells at the site must be monitored on a monthly basis, through at least the end of the second quarter 2012 (June 2012), to determine whether groundwater is present. If groundwater is found in any of the wells groundwater elevation data must be collected. For any well found to have water in it for the first time, such wells must be developed, subsequently purged, and sampled with all other wells that have water in them at the time, including MW-4. At a minimum, MW-4 must be sampled on a quarterly basis if the other seven monitoring wells continue to be dry.

The revised soil and groundwater investigation report, with Required Responses addressing comments 2 through 6 above, the Site Conceptual Model discussed in comment 7, above, and the additional groundwater monitoring data discussed in comment 8, above, for data collected through April 2012, must be submitted no later

than **June 1, 2012**. A report documenting the results of groundwater monitoring subsequent to submittal of the revised report must continue to be submitted according to the quarterly status report schedule established by the Cease and Desist Order.

Water Board staff recommends a meeting be scheduled as soon as possible to discuss these matters. Please contact Lisa Scorallo at (530) 542-5452 or me at (530) 542-5432, if you have any questions.



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