STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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May 14, 2021

Sent via email and hard copy

Greg Vogelpohl
Resource Environmental, LLC
925 Salida Del Sol Drive
Paso Robles, CA 93446

RE: Ecology comments on groundwater portion of the Supplemental Remedial Investigation for all applicable phases

- **Site Name:** Chelan Chevron
- **Site Address:** 232 E. Woodin Avenue, Chelan
- **Facility Site ID No.:** 77751227
- **Cleanup Site ID No.:** 6660
- **Agreed Order No.:** DE 10629
- **Chevron No.:** 9-6590

Dear Greg Vogelpohl:

I have a number of comments regarding the aggregate findings from the investigations, including SRI Phase 5, and the implications for refining the conceptual site model with a special emphasis on the hydrogeology of the site in context of the geologic setting.

1. Tetrachloroethene (PCE) was detected in the soil sample collected near the central UST at 221 E. Woodin Avenue. The soil concentration detected is one order of magnitude (OoM) greater than the Method A soil cleanup level, which is based on applicable state and federal law. To my knowledge, this is the first discovery of a chlorinated solvent at the site. The other soil samples collected during this phase of investigation did not show PCE above compliance levels in this vicinity. However, this detection gives cause to screen the monitoring well groundwater for chlorinated solvents including trichloroethene (TCE) using EPA Method 8260. Unusual odors were previously noted in the field notes, which suggested the presence of contaminants other than petroleum hydrocarbons.

   Requirement: Screen for halogenated compounds in groundwater.

2. The groundwater results show that the concentrations of ethylene dibromide (EDB) are currently or historically greater than one order of magnitude (OoM) over the Method A groundwater cleanup level of 0.01 ug/L at the wells near 221 E. Woodin Avenue (MW-46, RW-1 and MW-17). EDB was also detected in soil near this location.

   At another location, near 141 E. Woodin Avenue, the laboratory reporting limit was not sufficient to evaluate for detections of EDB in soil for comparison to Method A soil cleanup levels. EDB has historically been detected in soil during the installation of MW-21. Note that EDB has never been assessed in groundwater near 141 E. Woodin Avenue.

   Detections of EDB in shallow soil warrant soil vapor assessment of this volatile organic compound. In certain situations, EDB can be a vapor intrusion risk driver over that of benzene.

   Requirement: Continue to evaluate EDB in groundwater within the well network, including the wells screened fully in the lower aquifer. Use EPA Method 8011.

   Assess for EDB in soil vapor as a potential risk driver or mitigate by performing an interim action to remove source mass at the appropriate locations.

3. The GRO concentrations near the UST nest at 221 E. Woodin Avenue are approximately 21,000 mg/kg, which is a concentration for soil of that grain size to potentially yield mobile NAPL, depending on what is saturating the soil pore space (e.g., air/NAPL vs NAPL/water) and other factors that affect pore entry pressure. This may warrant an interim action.

   Recommendation: Remediate source mass that exists at relatively shallow depth and that is readily accessible.

4. DRO concentrations near 136 E. Johnson Avenue are approximately 36,000 mg/kg, which is a concentration that suggests potential for NAPL migration based on what is occupying the soil pore space and other factors that affect pore entry pressure. The nearest well, MW-27 has shown in-well NAPL thicknesses ranging from about 5 to 12 feet. What is important is whether the in-well NAPL represents a 'top-filling' situation or a mobile NAPL interval at shallow depth versus a 'bottom-filling' situation with confined NAPL or a combination of both. A data gap exists regarding whether another historical release source is present east of MW-27.

   Requirement: Investigate this data gap with the objective of determining if an additional release source exists east of MW-27 and north of MW-21 or if the elevated concentrations represent a hotspot due to other causes.

5. The screen lengths of the monitoring wells initially ranged from 10 to 20 feet long but as the investigation extended to the west, north and the south of the subject property, the screen lengths increased to 25 to 30 feet long. The lengthening of the screen lengths appear to be related to the issue of the wells going dry. However, lengthening the screen lengths also may cause difficulties with obtaining representative groundwater samples since dilution of aqueous phase concentrations may occur. The effects of a vertical gradient are also problematic with long screens.

   Recommendation: Discuss the implications of submerged screen length since we have never properly addressed this issue. This issue is especially important for the deep wells installed to assess the glacial outwash aquifer that overlies the fractured bedrock aquifer, which is a source of drinking water. Information to date does not show impact to the lower aquifer but might this conclusion be an artifact of well construction and sampling?

6. A number of lines of evidence were assessed to evaluate the vertical hydraulic gradient.

   - Water levels were compared at well pairs, MW-9/RW-2 and MW-10/RW-1, using water level data collected during the Phase 5 field onsite. Vertical head profiles were not created, however, calculations show that a downward vertical gradient exists at those two locations.
   - The well logs for many of the earlier monitoring wells were assessed to compare the initial water level versus the stabilized water level. The majority of wells installed into the silt that comprises the perching layer or aquitard exhibits what appears to be a vertical downwards gradient.
   - A downwards vertical gradient is also consistent with a general understanding of groundwater flow across some aquitards, e.g., as described Cherry, J.A., B.L. Parker, K.R. Bradley, T.T. Eaton, M.G. Gotkowitz, D.J. Hart, and M.A. Borchardt, 2004.
   - The diagrams that show a groundwater flow direction based on interpretation of a horizontal hydraulic gradient using the water levels for wells installed in the aquitard are likely erroneous.

   Requirement: More fully consider the hydrogeological conceptual site model as representing an aquifer-aquitard-aquifer system that includes a leaky confined aquifer. Evaluate the impact of vertical gradient, together with long screen intervals, on the collection of representative groundwater samples. This will require determining the direction of vertical gradient over a period of time to assess its variation under different conditions and at different spatial locations.

7. The proportion of the screens that are submerged was evaluated. Twenty-two wells show submerged portions of screen exceeding 10 feet. Notably, the wells installed to assess the lower glacial aquifer had submerged screen portion lengths ranging from 25.4 feet to 29.7 feet long. With this length, it is important to consider the position of the bladder pump's intake within the submerged portion of the screen interval.

   Requirement: Determine the vertical position of the intake tube within the submerged portion of the screen interval in the deep wells. Have field personnel indicate where the tubing intake is placed in relation to the screen interval.

In closing, I appreciate the cooperation that Chevron and its agents have shown in managing the development of the conceptual site model and working towards a remedial solution sufficient to meet the requirements under the Model Toxics Control Act.

Sincerely,

John Mefford

John Mefford
Cleanup Project Manager
Toxics Cleanup Program
Central Region Office

Enclosure (1): Table 1. Wells and Well Specifications Sorted by Portion of Screen Submerged

cc: Russ Shropshire, Leidos Engineering, LLC (electronic copy only)
Tim Bishop, CEMREC