

Preliminary Questions/Comments
Project: North Antelope Hills Oil Field-Tulare Oil Sands

General Project and Aquifer Information

1. Areal Extent of the Aquifer Proposed for Exemption
 - a. Please provide separate shape files that depict the existing exempted area and the area of the Tulare Oil Sands that is proposed to be exempted.
 - b. Please indicate the acreage of the originally exempt area at the time of primacy, the area proposed for exemption, and the total exempted area.
 - c. The third bullet in Section 2.4 should refer to Sections 5 and 6, Township 27 South, Range 20 East. Please correct the error.
 - d. Please provide the information to complete the following table (which EPA will need for the final decision document).

AE Boundary Vertex Point Number	Township	Range	Section	Latitude	Longitude	Top Tulare Oil Sands, Subsea Depth (feet)

2. General Project Information
 - a. Are any injection wells located within the area proposed for exemption? If so, please indicate how many are of each type, e.g., recovery or disposal well.
 - b. Please include a site map in the application that shows the area proposed for exemption with an inset that provides context for the field location in relation to nearby communities, showing township, range, and section.
3. Information about the Aquifer Proposed for Exemption
 - a. Please provide the average and range of depths to the top of the Tulare Oil Sands in bgs and MSL.
 - b. In what direction does groundwater within the Tulare Formation flow, i.e., due to a pressure gradient formed due to injection and production activities?
 - c. Please provide information on how ground water direction and speed within the Tulare Formation were determined.
4. Information on the TDS Content of the Aquifer
 - a. Given the limited data indicating that the Tulare Formation has a salinity less than 10,000 mg/L, on what basis does the applicant consider the Tulare to be a USDW and have a TDS of 3,000 to 10,000 mg/L (per 146.4(c)) throughout the area proposed for exemption?

- b. Is there any additional data to support the assertion that the TDS throughout the area proposed for exemption is between 3,000 and 10,000 mg/L?
- c. Is a lab report for Well 2-30 available? If so, please include this in Appendix B for completeness.
- d. Where is the Pickrell Williams 10 well?

40 CFR 146.4(a) Criteria Support

5. Permeability and Porosity

- a. Can additional, formation-specific information be provided on the cover table to Appendix C to indicate which of the porosity and permeability values come from the Tulare Clay versus the Tulare Oil Sands to allow a clearer comparison to the information in Table C of the application?
- b. Is any Tulare Oil Sands porosity or permeability data available from the eastern portion of the aquifer proposed for exemption? If not, on what basis can it be inferred that porosity and permeability on the eastern portion are similar to the western portion?
- c. Please highlight which values in Table C are from the proposed expansion area and provide porosity and permeability values that are specific to the expansion area.

6. Vertical Confinement

- a. From which wells are the electric logs that show the Tulare Clay interval, as referenced on page 19? Where are these wells in relation to the proposed exemption area?
- b. From which wells are the core samples on which porosity and permeability data presented on Table C based? Where are they located?
- c. The application refers to the Monterrey Formation and Canoas shale as providing lower bound confinement. Please clarify the relationship between these two formations.

7. Lateral Confinement

- a. What evidence is there that the displacement along the faults is greater than the thickness of the Tulare Oil Sands, which would be needed to provide full sealing capacity.
- b. Please discuss in the application well data that support confinement. For example:
 - Across the fault defining the western boundary, is any data available to show a change in formation chemistry or the absence of hydrocarbons to indicate that a trap is functioning?
 - Likewise, are there any wells to the north, south, or east of the proposed exemption area that indicate an absence of the Tulare Oil Sands outside of the pitchouts?

8. Water Well Table

- a. What evidence is there that domestic well NO_1012608 is not usable? Is this the domestic well mentioned on page 17? Where is the well?
- b. Was any physical survey performed to locate water wells in the area proposed for exemption?
- c. On page 13, please revise the reference to Tables 1-5 in Appendix H to refer to Appendix F.
- d. Please highlight on Figure 62 which wells are the GAMA wells. It is assumed that they are the “water supply other” wells.
- e. On what basis is the assertion on page 13 that the four GAMA wells are of similar use and design as the well with a known depth of 460 feet?
- f. How deep are the three monitoring wells identified in the GAMA database?
- g. Is any information available on the cathodic protection wells in the Kern River County Environmental Health Records that would indicate they are completed above the Tulare Clay?
- h. For clarity/transparency to reviewers, please compile all the tables in Appendix F into a single table that shows each well’s owner, purpose, depth, name of aquifer, well completion, age, and data source.
- i. Please explain how the 1 mile search area for water wells was selected.

9. Capture Zone Analysis (CZA)

- a. Are any of the wells in the conduit analysis water supply wells? If so, are they in Appendix F?

40 CFR 146.4 (c) Criteria Support

10. Water quality and availability

- a. To support assertions that the Tulare Oil Sands meets the criteria at 40 CFR 146.4(c), please discuss the water quality of the Tulare Formation (i.e., which water quality parameters exceed MCLs) and the cost to treat that water for domestic use based on any contaminants present.
- b. Please annotate the lab reports in Appendix B to indicate if any Tulare Formation samples exceed MCLs.

11. Potential PWS use of the aquifer

- a. To support assertions that the Tulare meets the criteria at 40 CFR 146.4(c), please provide a detailed economic analysis comparing the current water rates paid by customers to the cost of providing potable Tulare water to these communities.
- b. Are notes of the three meetings with the Water District (mentioned on page 16) available?
- c. Please provide information to demonstrate that the Tulare Formation is unlikely to be used/needed in the future for public water supply, i.e., based on population trends and the availability of existing water sources to meet future supply.