

State Water Resources Control Board

February 8, 2016

Kenneth A. Harris Jr., State Oil & Gas Supervisor
Department of Conservation
Division of Oil, Gas & Geothermal Resources
801 K Street, MS 18-05
Sacramento, CA 95814-3530
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FINAL CONCURRENCE ON THE AQUIFER EXEMPTION PROPOSAL, MOUNT POSO OIL FIELD, KERN COUNTY

Dear Mr. Harris:

State Water Resources Control Board (State Water Board) staff, in consultation with Central Valley Regional Water Quality Control Board staff (collectively Water Boards staff), have reviewed the proposal provided by the Division of Oil, Gas and Geothermal Resources (DOGGR) on June 29, 2016 for the expansion of the aquifer exemption of the Pyramid Hill Sand and Vedder Formation in the Mount Poso Oil Field. Water Boards staff assessed whether the exemption proposal meets the criteria set forth in California Public Resources Code (PRC) section (§) 3131 and § 146.4 of Title 40 of the Code of Federal Regulations (CFR). Based on this review, State Water Board staff concur with the exemption proposal. In conjunction with the evaluation of current and future underground injection control (UIC) projects in the proposed exempted area, DOGGR and Water Boards staff will consider incorporating conditions, described below, into project approvals.

On October 4, 2016, State Water Board staff preliminarily concurred with the exemption proposal pending the State's public comment process. On October 17, 2016, DOGGR published notice of the exemption proposal and opened a public comment period. DOGGR and the State Water Board held a joint public hearing to receive public comments on the exemption proposal on November 18, 2016. The public comment period also closed on November 18, 2016. DOGGR and the State Water Board have reviewed and responded in writing to the comments received during the comment period and public hearing.

As required by PRC § 3131(a)(1) and 40 CFR § 146.4, the aquifers at issue do not currently serve as sources of drinking water. Consistent with 40 CFR § 146.4(b)(1), the aquifers at issue will not in the future serve as sources of drinking water because they are currently hydrocarbon energy producing and are expected to produce commercial quantities of hydrocarbons in the future. Oil is currently produced from both the Pyramid Hill Sand and Vedder Formation within the proposed exempted areas. The produced water is re-injected in the same zones via Class II UIC water flood, steam flood, and/or disposal wells. Injection into the Walker Formation (not

proposed for exemption) has been discontinued. In addition, as per PRC § 3131(a)(2), the injected fluids are not expected to affect the quality of water that is, or may reasonably be, used for any beneficial use because, (1) the groundwater in the proposed exempted areas is not expected to be put to beneficial use because it contains petroleum hydrocarbons, and (2) the injected fluids are expected to remain in the proposed exempted areas.

The requirement of PRC § 3131(a)(3) is also satisfied because a detailed technical demonstration has been made that the injected fluids are expected to remain in the proposed exempted areas due to a combination of geologic conditions and hydraulic controls. Predominant geologic features include normal faults, which are present throughout the Mount Poso Oil Field and extend from the deeper granitic basement rock through the shallower proposed exempted aquifers. The faults are demonstrated to be barriers to fluid migration as evidenced by one or more of the following conditions: (1) oil-saturated formations are separated from non-saturated formations by the fault, (2) elevated temperatures/pressures are observed on the injection side of the fault, but are not detected on the other side, and (3) oil-water contact levels are different on both sides of the fault. Injected fluids in the proposed exempted areas are also expected to be contained hydraulically, both vertically and laterally, due to the inward hydraulic gradient created by oilfield operations in the proposed exempted areas.

Fault barriers are present to the north (western splay of the Main Mount Poso fault), south (Pond Poso fault), east (Main Mount Poso fault), and west (northwest to southeast trend of the Pond Poso fault) of the proposed exempted areas. Permeabilities of the Pyramid Hill Sand range from approximately 20 to 90 millidarcies (md) and the overlying Freeman Silt has a permeability of 0.9 md. Based on the lithology, permeability of the Vedder Formation is estimated to be 7 md. Containment to the west for the Vedder Formation is due to an inward hydraulic gradient created by oilfield operations. Containment will be verified through the implementation of the conditions described below in Class II UIC projects in the proposed exempted areas.

No water supply wells have been identified in the Pyramid Hill Sand within one mile of the administrative boundary of the Mount Poso Field. Two water supply wells have been completed in the Vedder Formation. However, both wells are supplemental water source wells for the biomass cogeneration facility and are not intended to be a water source for domestic, municipal, or agricultural use. Water supply wells in proximity to the proposed exempted areas are completed in the shallower alluvium, Kern River Formation, and Santa Margarita Formation. Water quality data supports the conclusion that these shallow aquifers are hydraulically separated from the aquifers proposed for exemption by the regionally extensive 300 to 700 feet thick, less permeable Freeman Silt (vertical confining layer). Based on a review of the water supply well information, the completed depths of the deepest water supply wells are approximately 1,000 to 2,000 vertical feet from the top of the shallowest aquifer proposed for exemption (Pyramid Hill Sands).

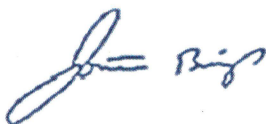
Approval of Class II UIC projects involves a joint review by DOGGR and Water Boards staff. DOGGR and Water Boards staff will consider incorporating conditions into approvals of Class II injection projects in the proposed exempted areas. Potential conditions include, but are not limited to, the following:

- 1) Requiring that regeneration brine derived from steam generation operations using produced water from the Vedder Formation is disposed in the Vedder Formation; and

- 2) Requiring monitoring to validate that the injected fluids remain in the proposed exempted areas.

If you have any questions regarding this matter, please contact Mr. John Borkovich at (916) 341-5779 or john.borkovich@waterboards.ca.gov.

Sincerely,

A handwritten signature in blue ink that reads "Jonathan Bishop". The signature is written in a cursive style with a large initial "J" and "B".

Jonathan Bishop
Chief Deputy Director

cc: Pamela Creedon
Executive Officer
Central Valley Regional Water Quality Control Board
pamela.creedon@waterboards.ca.gov

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