



California  
**Department of Conservation**  
 Geologic Energy Management Division



## Statement of Basis for the Proposed Expansion of the Aquifer Exemption for the Holser – Nuevo Zone of the Modelo Formation, Holser Oil Field

<b>Field:</b>	Holser Oil Field
<b>County:</b>	Ventura, California
<b>Class and Well Type:</b>	Class II, Water Disposal
<b>Geologic Formations:</b>	Modelo Formation (Holser - Nuevo Zone)
<b>Federal Exemption Criteria:</b>	40 CFR §§ 146.4(a) and 146.4(b)(1)

The California Department of Conservation, Geologic Energy Management Division (CalGEM), in consultation with the staff of the State Water Resources Control Board (State Water Board), and Los Angeles Regional Water Quality Control Board (collectively, the Water Boards) is considering recommending that the United States Environmental Protection Agency (US EPA) expand the existing aquifer exemption area for the Modelo Formation in the Holser Oil Field by designating an additional portion of the Modelo Formation in the Holser Oil Field (the Proposal Area) an exempted aquifer under the Safe Drinking Water Act, for purposes of receiving fluids from Class II injection wells. This document summarizes the basis for the State's recommendation.

### SYNOPSIS

In 1983, subject to ongoing US EPA supervision, the US EPA granted CalGEM primary authority to regulate Class II injection in California for purposes of achieving the objectives of the Safe Drinking Water Act. These objectives include regulating Class II injection to ensure that current or anticipated sources of drinking water are not endangered. Federal regulations broadly define underground sources of drinking water as any geologic formation that contains water with a total dissolved solids composition of less than 10,000 milligrams per liter in a sufficient quantity to supply a public water system. Class II injection encompasses injection for enhanced oil recovery (e.g., injection of water or steam to increase oil production) and for disposal of produced fluids associated with oil and gas production.

As part of its ongoing supervision of Safe Drinking Water Act implementation, the US EPA retains authority to designate specific water-containing geologic formations (i.e., aquifers) "exempt" from presumptive classification as a source of drinking water. This aquifer exemption process involves a careful case-by-case evaluation of characteristics affecting the aquifer's potential for use as a source of drinking water based on specific criteria set by federal law. CalGEM, with concurrence from the State Water Board, may submit a proposal to the US EPA recommending that an aquifer be designated "exempt" for the purpose of receiving fluids from Class II injection wells. Although the decision to designate an aquifer exempt ultimately rests exclusively with the US EPA, California state law adds additional criteria that CalGEM and Water Boards must evaluate before proposing an aquifer exemption to the US EPA. These state law criteria are intended to help ensure that injection activity will not negatively affect waters of potential beneficial use. The federal and state components of the aquifer exemption process are important mechanisms for regulating the safe operation of Class II injection in California.

Concurrent with its grant of primary authority to CalGEM in 1983, the US EPA designated an aquifer exemption for portions of the Modelo Formation within the Holser Oil Field. The boundaries of this aquifer exemption were based on data available at that time. In 2016, the operator of wells located in the Holser Oil Field requested that CalGEM propose to the US EPA an expansion of the existing aquifer exemption for the Modelo Formation, utilizing newer and more detailed data. Based on a rigorous review of the supporting data, and with preliminary concurrence from the State Water Board, CalGEM has determined that the portion of the Modelo Formation identified as the Proposal Area appears to meet the criteria for proposal of an aquifer exemption recommendation to the US EPA.

In accordance with section 146.4 of title 40 of the Code of Federal Regulations (40 CFR), the information presented in the proposal materials supports a conclusion that the Proposal Area does not currently serve as a source of drinking water, and that the Proposal Area cannot now and will not in the future serve as a source of drinking water because it is hydrocarbon producing or contains hydrocarbons that are expected to be commercially producible. In accordance with California Public Resources Code (PRC) section 3131, information presented in the proposal materials also supports a conclusion that injection of fluids into the Proposal Area will not affect the quality of water that is, or may reasonably be, used for any beneficial use, and that injected fluids will remain confined in the Proposal Area.

If approved by the US EPA, this aquifer exemption proposal would clarify that the Proposal Area may be a suitable location for Class II injection to occur. However, approval of the proposed aquifer exemption would not, by itself, authorize any new injection activity. Approval to operate a Class II injection project involves a regulatory process separate from aquifer exemption. The approval process for operation of a Class II injection project includes evaluation of well construction, pressure limits, and many other project-specific details not considered in the context of an aquifer exemption proposal.

Additional information about this aquifer exemption proposal may be found in the supporting proposal materials.

## LOCATION

The Holser Oil Field is located in Eastern Ventura County, California, approximately 3.3 miles east-northeast of the unincorporated town of Piru, California. It is bordered to the east by the Ramona Oil Field and to the west by the Piru Oil Field (abandoned). The proposed aquifer exemption expansion would add an area of approximately 111 acres to the already-exempt 64 acres. A map depicting the boundaries of the Proposal Area appears at the end of this document.

A 1-mile study area was used to identify the number and the location of any and all nearby water wells potentially drilled into the formation proposed for exemption. A ¼-mile study area was used to delineate the confinement of the zone proposed for expansion of the exemption.

## AQUIFER EXEMPTION CRITERIA

### Federal Exemption Criteria:

*Section 146.4 of Title 40 of the Code of Federal Regulations. (40 CFR § 146.4)*

An aquifer or a portion thereof which meets the criteria for an “underground source of drinking water” in 40 CFR section 146.3 may be determined under 40 CFR section 144.7 to be an “exempted aquifer” if it meets the following criteria:

- (a) It does not currently serve as a source of drinking water; and
- (b) It cannot now and will not in the future serve as a source of drinking water because:
  - (1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.
  - (2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical.
  - (3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or
  - (4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse; or
- (c) The total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

**California State Criteria for Aquifer Exemption Proposals:**

*California Public Resources Code section 3131, subdivision (a). (PRC § 3131(a))*

To ensure the appropriateness of a proposal by the state for an exempted aquifer determination subject to any conditions on the subsequent injection of fluids, and prior to proposing to the US EPA that it exempt an aquifer or portion of an aquifer pursuant to Section 144.7 of Title 40 of the Code of Federal Regulations, CalGEM shall consult with the appropriate regional water quality control board and the state board concerning the conformity of the proposal with all of the following:

- (1) Criteria set forth in Section 146.4 of Title 40 of the Code of Federal Regulations.
- (2) The injection of fluids will not affect the quality of water that is, or may reasonably be, used for any beneficial use.
- (3) The injected fluid will remain in the aquifer or portion of the aquifer that would be exempted.

**BASIS FOR EXEMPTION**

The Proposal Area meets the federal criteria for aquifer exemption, as described in 40 CFR sections 146.4(a) and 146.4(b)(1).

The Proposal Area also meets the California criteria for proposal of an aquifer exemption to the US EPA, as described in PRC section 3131(a).

**Proposal Area Meets Federal Exemption Criteria**

*It does not currently serve as a source of drinking water. (40 CFR § 146.4(a))*

A search of the water wells and data in the general area surrounding and including the study area shows that there are no municipal services or company-owned water wells completed within the Modelo Formation that are serving the town of Piru. No drinking water wells were found that were completed within the Proposal Area. Most communities that surround the study area are served by the local water purveyors with oversight by the United Water Conservation District. All known water supply wells within the study area are completed in the shallower alluvium and are hydraulically isolated from the portion of the Modelo Formation considered for exemption. There are no identified water supply wells within the surface boundaries of the proposal. The nearest public water supply well used for municipal purposes is located approximately 2.9 miles west-southwest from the western edge of the Proposal Area. Field verification and letters sent and received by landowners in the study area support that no wells in the Proposal Area are completed in the Modelo Formation.

*It cannot now and will not in the future serve as a source of drinking water because it is hydrocarbon producing or contains hydrocarbons that are expected to be commercially producible. (40 CFR § 146.4(b)(1))*

Analysis of oil production records, mud logs, geophysical logs, and core samples indicates that the Proposal Area contains or is expected to contain commercially producible hydrocarbons. Between 1977 and May 2018, 1.13 million barrels of oil have been produced from the Holser – Nuevo Zone of the Modelo Formation within the Holser Oil Field; 37% of which (418,497 barrels) was produced from outside the existing aquifer exemption boundary.

### **Proposal Area Meets California State Exemption Criteria**

*The Proposal Area meets US EPA exemption criteria. (PRC § 3131(a)(1))*

As discussed above, the Proposal Area meets the federal criteria for aquifer exemption—specifically, 40 CFR sections 146.4(a) and 146.4(b)(1).

*The injection of fluids into the Proposal Area will not affect the quality of water that is, or may reasonably be, used for any beneficial use. (PRC § 3131(a)(2))*

Groundwater contained in the Proposal Area is comingled with naturally occurring hydrocarbons and contains constituents such as boron, arsenic, and total dissolved solids (TDS) at concentrations that limit its suitability for agricultural, domestic, and other beneficial uses. Groundwater from the Modelo Formation within the Proposal Area in the Holser Oil Field contains water with TDS ranging between 8,530 and 8,970 mg/L. Higher quality groundwater is available shallower geologic zones. For these reasons, and because injected fluids are expected to remain within the area that would be exempted, injection of fluids into the Proposal Area is not expected to affect the quality of water that is, or may reasonably be, used for any beneficial use.

*The injected fluid will remain in the aquifer or portion of the aquifer that would be exempted. (PRC § 3131(a)(3))*

Injected fluids are expected to remain in the Proposal Area due to a combination of geologic conditions and operational controls. Vertical containment for the Holser – Nuevo Zone of the Modelo Formation is provided by the underlying and overlying Modelo Shale. Lateral containment of the proposal area is provided by the Modelo Anticline Structure at the north, east and south along with a permeability barrier to the west. In addition, gross injection volume of ~50% the gross production volume (~50% water cut with oil production) will maintain a production-induced inward hydraulic gradient that will act as a means of containment at the crest of the Modelo Anticline (i.e., a “pressure sink”).

## Conduit Analysis

Before any well will be approved for injection activity, CalGEM regulations require analysis of nearby idle and abandoned wells to identify, evaluate, and redress as necessary the potential that any of those nearby wells might serve as a pathway for injected fluid to escape from the intended area of subsurface confinement (i.e., "conduit analysis"). When considering whether to recommend an aquifer exemption proposal to the US EPA, if the area proposed for exemption is overlain by one or more other aquifers that contain water of potential beneficial use--based on considerations such as quality, quantity, accessibility, and availability of alternative sources—then, as a precautionary measure, it may be appropriate to conduct a conduit analysis within the proposed exemption area additionally and prior to the conduit analysis routinely conducted in the context of evaluating plans for injection into specific wells.

In the case of this aquifer exemption proposal, a well search indicated that there are no idle or abandoned wells located in any portion of the Proposal Area overlain by an aquifer containing water of potential beneficial use. For that reason, CalGEM and the Water Boards determined that no further conduit analysis is necessary to complete their consideration of whether to recommend this aquifer exemption proposal to the US EPA. Conduit analysis as part of the process for obtaining approval to commence injection still will be required, consistent with CalGEM regulations.

## Project-Level Conditions

Approval of Class II injection projects involves a joint review by CalGEM and Water Boards staff. CalGEM and Water Boards staff will consider incorporating conditions into approvals of Class II injection projects within the Proposal Area. Potential conditions include, but are not limited to, requiring monitoring, such as pressure or fluid level monitoring, to confirm that injected fluids remain in the exempted area. If a groundwater monitoring requirement is incorporated in a Class II injection project approval, the operator of the injection project must submit a work plan to the Los Angeles Regional Water Quality Control Board for review.

## CONCLUSION

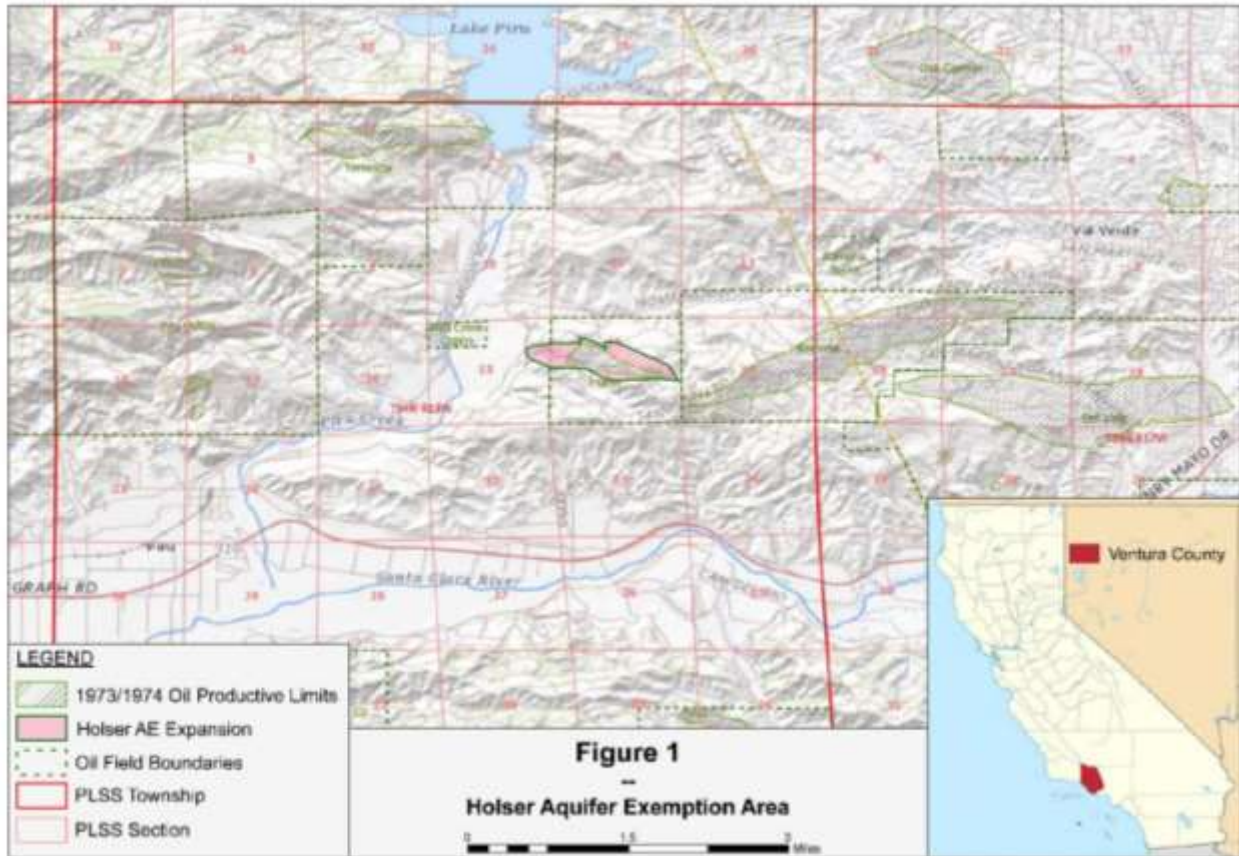
Information presented in the proposal materials supports the following conclusions regarding the Proposal Area:

- 1) The Proposal Area does not currently serve as a source of drinking water;
- 2) The Proposal Area cannot now and will not in the future serve as a source of drinking water because it is hydrocarbon producing or contains hydrocarbons that are expected to be commercially producible;
- 3) The injection of fluids into the Proposal Area will not affect the quality of water that is, or may reasonably be, used for any beneficial use; and
- 4) The injected fluids will remain in the aquifer or portion of the aquifer that would be exempted.

Based on these factors, as further discussed in the supporting proposal materials, and pending review of all timely and relevant comments from the public, with the concurrence of the State Water Board, CalGEM intends to recommend that the US EPA designate the Proposal Area an exempted aquifer for purposes of receiving fluids from Class II injection wells.

## **ATTACHMENTS**





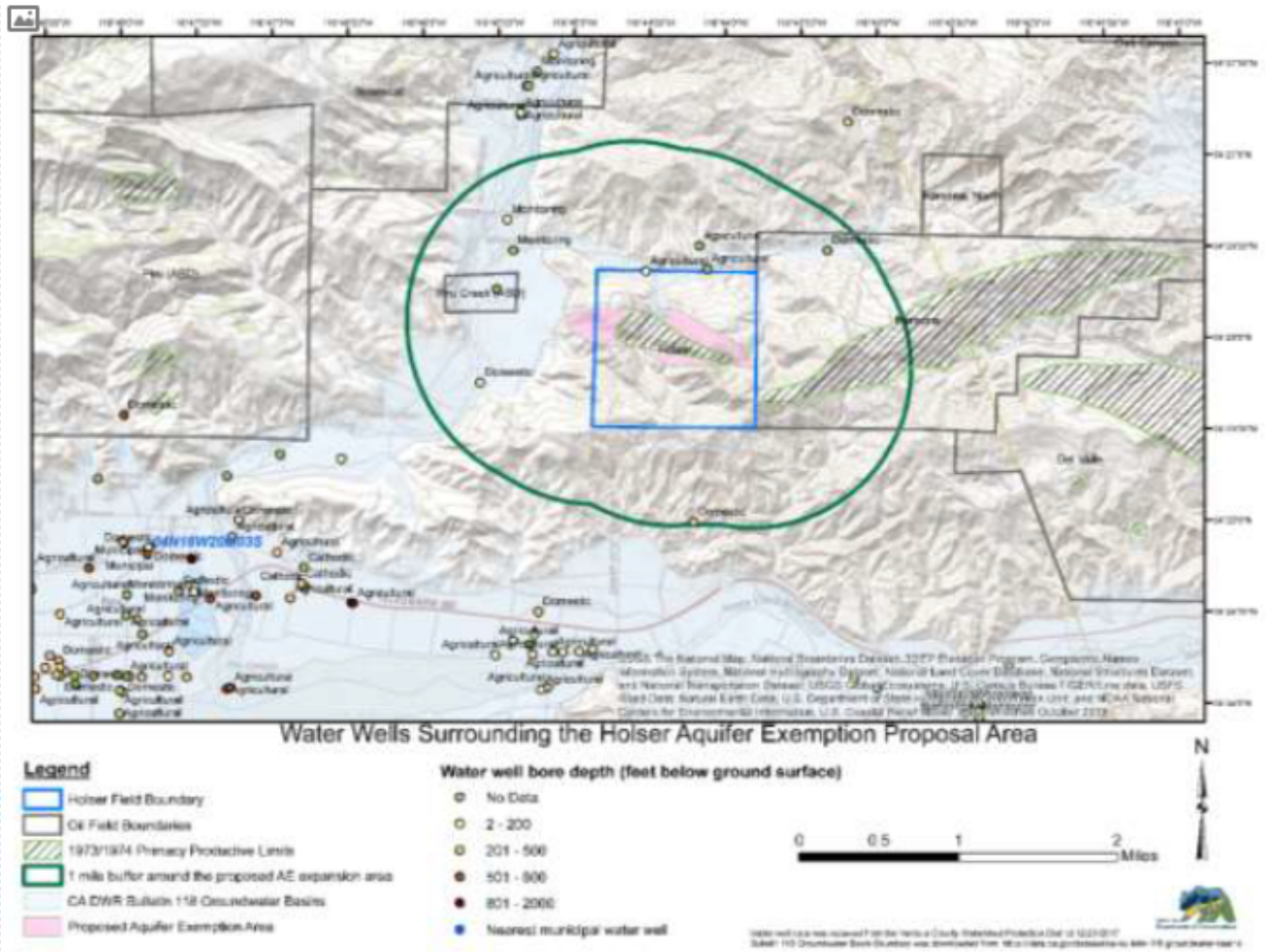


Figure 1-A: Water Wells Surrounding the Holser Aquifer Exemption Proposal Area

Map of the proposed Holser aquifer exemption boundary with respect to water wells. The nearest municipal water supply well (O4N18W20P015) is 2.9 miles from the proposed aquifer exemption boundary. All water wells in the Piru sub-basin are considered Pleistocene - Holocene age alluvium and Pleistocene San Pedro formation (California Groundwater Bulletin 118).