UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Kenneth A. Harris Jr.
State Oil and Gas Supervisor
Division of Oil, Gas, and Geothermal Resources
California Department of Conservation
801 K Street, MS 18-05
Sacramento, CA 95814-3530

Re: Approval of Aquifer Exemption for the San Ardo and McCool Ranch Oil Fields, Monterey County, California

Dear Mr. Harris:

Based on a thorough review of the supporting documents submitted by the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources and the State Water Resources Control Board, the U.S. Environmental Protection Agency (EPA) hereby approves the aquifer exemption request for portions of the Lombardi and Aurignac Formations in the San Ardo and McCool Ranch Oil Fields in Monterey County, California.

The approved aquifer exemption boundaries and depths, along with EPA's analyses and rationale in support of the approval, are detailed in the enclosed Record of Decision. In accordance with applicable regulations at 40 C.F.R. Parts 144, 145, and 146, we find that this aquifer exemption request is a non-substantial program revision, and the requested formation meets the following federal exemption criteria:

- The portion of the formations proposed for exemption in the fields do not currently serve as sources of drinking water; and
- The portion of the formations proposed for exemption in the fields have more than 3,000 milligrams per liter (mg/L) and less than 10,000 mg/L total dissolved solids content and are not reasonably expected to supply a public water system.

If you have any questions, please contact David Albright, Manager of our Drinking Water Protection Section, at (415) 972-3971.

Sincerely,

for

Tomás Torres
Director, Water Division

11/21/2018

Enclosure: Aquifer Exemption Record of Decision for San Ardo and McCool Ranch Oil Fields

cc: Jonathan Bishop, Chief Deputy Director, State Water Resources Control Board

US Environmental Protection Agency (EPA) Region 9

Underground Injection Control (UIC) Program

AQUIFER EXEMPTION RECORD OF DECISION

This Record of Decision (ROD) provides the EPA's decision to approve an aquifer exemption (AE) for portions of the Lombardi Sands and portions of the Aurignac Sands within the San Ardo and McCool Ranch Oil Fields, background information concerning the AE request, and the basis for the AE decision.

Primacy Agency: California Division of Oil, Gas, & Geothermal Resources (DOGGR)

Date of Aquifer Exemption Request: October 3, 2017

Exemption Criteria: DOGGR requests this exemption because it has determined that it meets the criteria at 40 CFR § 146.4(a) and § 146.4(c).

Substantial or Non-Substantial Program Revision: Non-Substantial

Although the EPA must approve all revisions to EPA-approved state UIC programs, the process differs depending on whether the EPA finds the revision to be a substantial or non-substantial program revision. The EPA determined this is a non-substantial program revision because it is associated with an active oil field and is not a state-wide programmatic change or a program revision with unique or significant implications for the State's UIC program. The decision to treat this AE request as a non-substantial program revision is also consistent with the EPA's "Guidance for Review and Approval of State Underground Injection Control (UIC) Programs and Revisions to Approved State Programs" ("Guidance 34"), which explains that the determination of whether a program revision is substantial or non-substantial is made on a case-by-case basis.

Operators: Chevron U.S.A. Inc., Aera Energy LLC, California Resources Corporation, New York Oil Company, and Trio Petroleum LLC.

Well/Project Name: Lombardi Sands and Aurignac Sands, San Ardo and McCool Ranch Oil Fields.

Well/Project Permit Number: There are currently 32 Class II injection and enhanced oil recovery (EOR) wells in the San Ardo and McCool Ranch Oil Fields within the area of the aquifers proposed for exemption.

Well/Project Location: The AE is located in all or portions of: Township 22S Range 10E, Sections 4-5, 7-11, 13-29, 32-36; Township 22S Range 11E, Sections 19, 29-32; Township 23S Range 10E, Sections 1-5, 9-11, 13-15, 16, 22-26, 36; Township 23S Range 11E, Sections 3-10, 14-36; Township 24S Range 11E, Sections 2-6 and 9; and Township 24S Range 10E, Section 1, Mount Diablo Base and Meridian (MDB&M). [Refer to Figure 1.]

County: Monterey **State:** California

Well Class/Type: Class II EOR and produced water disposal wells.

DESCRIPTION OF PROPOSED AQUIFER EXEMPTION

Aquifers to be Exempted: Portions of the Lombardi Sands and the Aurignac Sands within the San Ardo and McCool Ranch Oil Fields.

Areal Extent of Aquifer Exemption: The total areal extent of the AE is approximately 38,053 acres in the Lombardi Sands and 33,703 acres in the Aurignac Sands (see the table below). This decision expands the existing exempted aquifers, which include the 1974 productive limits of the Aurignac oil pools (exempted at the time the EPA approved DOGGR's Class II program in 1982) and the July 1999 EPA-approved aquifer exemption expansion for the Lombardi and Aurignac Sands to the south of the San Ardo Oil Field. DOGGR has provided GIS shape files that delineate the AE boundary, which are included in the administrative record for this ROD. Refer to Figures 2.1 and 2.2 for depictions of the proposed exempt formations.

A breakdown of the proposed and existing exempted areas, in acres, for each of the aquifers follows:

Aquifer	Proposed (approx.)	Existing Exempted Area*
Lombardi Sands	33,348	4,705
Aurignac Sands	20,732	12,971

* The existing exempted area includes those areas that were approved in 1982 and 1999.

Lithology, Total Dissolved Solids (TDS), Depth, Thickness, Porosity, and Permeability of the Aquifers: The following table presents the lithology, TDS levels, depth, thickness, and average porosity and permeability information about the aquifers proposed for exemption.

Aquifer	Lombardi Sands	Aurignac Sands
Lithology	Medium to fine grained, clean to fairly clean, soft, friable quartzose sand, with a few to common firm and tight interbedded silty calcareous streaks.	Medium to fine, well sorted, generally friable quartzose sand, with some coarse grains. Includes a basal conglomerate of non-marine, coarse grained conglomeratic sand and granitic cobbles sourced from the underlying granite.
TDS (mg/L)	Averages 6,811 mg/L (based on 18 samples ranging from 4,500 mg/L to 11,200 mg/L).	Averages 7,877 mg/L (based on 32 samples ranging from 4,842 mg/L to 12,000 mg/L).
Depth to Top (feet bgs)	1,842 to 3,650 feet (average of 2,661 feet).	2,218 to 3,632 feet (average of 2,916 feet).
Thickness (feet)	100 – 200 feet.	80 - 120 feet (central area); 400 feet (southwestern area), including the basal conglomerate.
Average Porosity and Permeability	Porosity averages 32%. Permeability averages 2,000 – 7,000 millidarcies (mD).	Porosity averages 33%. Permeability averages 1,000 – 4,000 mD.

Confining Zone(s): The Lombardi and Aurignac Sands within the San Ardo and McCool Ranch Oil Fields are separated from shallow drinking water sources above by more than 800 feet of mudstones, shales, and silts; confinement below is provided by the impermeable granitic basement rock. Lateral confinement is provided by a change from sand to silt and shale toward the southwest, south, and southeast, and by a pinchout to the north and east. Additional hydraulic confinement is provided by low pressure created by ongoing production in the San Ardo Oil Field. [Refer to Figures 3.1 through 3.7.]

BACKGROUND

On October 3, 2017, DOGGR submitted a request for EPA Region 9 approval to exempt the Lombardi Sands and the Aurignac Sands within the San Ardo and McCool Ranch Oil Fields, in Monterey County, California. On October 16, 2017, the EPA submitted a list of questions about the request to DOGGR. On November 8, 2017, DOGGR requested additional time to prepare a supplement to the request. The EPA received the supplement on August 27, 2018, with additional information provided to the EPA on September 20, October 15, and November 5, 2018. DOGGR requested this AE based on the criteria at 40 CFR § 146.4(a): that it does not currently serve as a source of drinking water; and at 40 CFR § 146.4(c): that the TDS content of the ground water is more than 3,000 milligrams per liter (mg/L) and less than 10,000 mg/L and it is not reasonably expected to supply a public water system. After the EPA's approval of the AE, the exempt formations would not be protected as "underground sources of drinking water" (USDWs) under the Safe Drinking Water Act (SDWA) and DOGGR would be authorized, subject to state regulatory requirements, to approve Class II injection into the identified formations.

The San Ardo Oil Field was discovered in 1947. Initially, the discovery of oil was in the Lombardi Sands, with the deeper reservoir in the Aurignac Sands discovered the following year. Peak oil production was achieved in 1966 at 49,000 barrels per day. The San Ardo Oil Field is the 13th largest oil field in California; over 550 million barrels (MMBBLs) of oil have been produced from the Lombardi and Aurignac Sands since the discovery of the field, which currently produces 22,000 barrels of oil per day. EOR methods (e.g., steam flood, water flood, and cyclic steam injection) are needed to produce the heavy crude in the field. Additionally, over 90,000 million cubic feet of gas have been produced from the Lombardi and Aurignac Sands in the San Ardo Oil Field.

The McCool Ranch Oil Field was discovered in 1964. Oil in this field is produced from the Lombardi Sands and is generally light enough to be produced using traditional rod and pump recovery methods. Since 1964, the Lombardi Sands have produced 267 MMBBLs of oil in the McCool Ranch Oil Field (there is no hydrocarbon production from the Aurignac Sands within the McCool Ranch Oil Field).

BASIS FOR DECISION

Regulatory Criteria under which the AE is Requested and Approved

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

In their concurrence on this AE package, the State Water Resources Control Board (State Board) determined that the portions of the Lombardi and Aurignac Sands that were proposed for exemption do not currently serve as sources of drinking water and are not hydraulically connected to domestic or public water supply wells. This is based on the evaluation of information about water supply wells in the area, ground water flow patterns, and confinement of the formations to ground water flow. The State's review demonstrates that the aquifers identified for exemption do not currently serve as sources of drinking water because there are no existing drinking water supply wells, public or private, that currently or in the future would draw water from the portion of the Lombardi and Aurignac Sands proposed for exemption. The formations are vertically and laterally confined (i.e., separated) from other USDWs, and no aquifers that serve as sources of drinking water are hydraulically connected to the aquifers. Further, within the State's water well search area (described more fully below), the Lombardi and Aurignac Sands are not currently sources of drinking water. The Paso Robles aquifer (the shallow drinking water source in the area) is more than 800 and 1,000 feet above the tops of the Lombardi and Aurignac Sands, respectively.

Water Supply Wells: DOGGR's AE request included information about water wells in the area proposed for exemption to establish that no drinking water wells or other water supply wells draw from the aquifers proposed for exemption. The State Board reviewed well data from the Monterey County Environmental Health Department, the GeoTracker (GAMA) Groundwater Information System, California Department of Water Resources well completion reports, California Statewide Groundwater Elevation Monitoring (CASGEM), and well data provided from oil field operators. DOGGR also interviewed nearby landowners and property tenants and researched well completion reports to gather additional information on well depths and usage that was not available from the data searches.

The water supply well search area ("study area") extended one mile beyond the proposed boundaries of the Lombardi and Aurignac Sands aquifer exemption areas and encompassed a total area of 95 square miles. This study area was selected because it encompassed the entire extent of the two formations proposed for exemption. The water well survey identified 169 wells: 57 domestic or public drinking water wells (i.e., listed as domestic wells, municipal wells, water supply wells, water wells, or public wells); 78 wells with agricultural uses (i.e., listed as irrigation wells, domestic/stock, domestic irrigation, stock wells, or agricultural wells); 15 monitoring wells; 9 test wells; 8 industrial or domestic/industrial wells; one corrosion protection well; and one well whose type is listed as "other." All the domestic or public drinking water wells are between 80 and 670 feet deep and are completed in the Alluvium and/or Paso Robles aquifer. See Table 1. No public drinking water supplies or private drinking water supply wells within the study area currently use the proposed exempted formations as a source of drinking water.

The nearest public water supply system is within the town of San Ardo. These wells are completed substantially above the formations proposed for exemption. The town of San Ardo is served by the San Ardo Water District, which operates a water system comprised of two wells completed within the shallow Paso Robles aquifer. One of the San Ardo Water District's wells (Well #2) is completed 131.6 feet below ground surface (bgs), more than 1,600 feet above the Lombardi and Aurignac Sands and is hydraulically separated from the aquifers proposed for exemption. According to DOGGR, a second municipal well (the District's Well #1), which is 100 feet away from the first well, is 76 feet deep and is only used infrequently as a backup well.

DOGGR's well search investigation confirmed there are no domestic or public drinking water supply wells that draw from the Lombardi and Aurignac Sands, and that the portion of the formations proposed for exemption are not currently sources of drinking water and are not hydraulically connected to domestic or public water supply wells.

Ground Water Flow Patterns: DOGGR evaluated available hydrogeologic information on the aquifers proposed for exemption and the overlying formations, including injection and production data, historical reservoir pressure behavior, pressure measurements from observation wells, and pressure data and pressure maps. Because the Lombardi and Aurignac Sands are not exposed to surface recharge, ground water flow is driven by the low pressure created by past and active production in the San Ardo Oil Field, with fluids migrating back into the Main Area of the field. Between 1948 and 2015, Chevron and Aera produced 4,875 MMBBLs of oil and water and injected 3,486 MMBBLs of steam and water, creating a net negative fluid balance of 1,389 MMBBLs.

Confinement of the Formations to Ground Water Flow: DOGGR's AE request included information about the vertical and lateral confinement of the Lombardi and Aurignac Sands, which is summarized below. Additional confinement is provided by an inward pressure gradient caused by the net withdrawal of fluids from the Lombardi and Aurignac Sands in the San Ardo Oil Field (see "Ground Water Flow Patterns" above).

The Lombardi and Aurignac Sands are confined above by more than 800 feet of low-permeability layers, including (principally) the Pancho Rico Mudstone, along with the Upper Monterey Shale, the Lombardi Silt, and the Aurignac Silt. Together, these formations separate the Lombardi and Aurignac Sands from shallow high-quality drinking water sources. The low permeability of the formations above the Lombardi and Aurignac Sands provides a barrier to vertical flow. Evidence for this is based on well logs, which show measured permeabilities from 1.6 to 313 mD, with the majority of data being in the tens of mD permeability range. Lower confinement is provided by the impermeable granitic basement that underlies the Aurignac Sands.

Lateral confinement is provided stratigraphically by changes in the characteristics of the rock (known as "facies changes") that impede the movement of fluids to the southwest, south, and southeast and a stratigraphic pinchout to the north and east. See Figures 3.1 through 3.7.

- To the southwest, south, and southeast, a facies change of the Lombardi and Aurignac Sands to low porosity, low permeability silts and shales provides stratigraphic

containment of injected fluids. Evidence for this facies change is provided in mud logs, sidewall cores, drill cuttings, and whole core descriptions that show that neither the Lombardi nor Aurignac Sands are found in wells beyond the boundary of the AE area.

- To the north and east, the Lombardi and Aurignac Sands pinch out against the impermeable granitic basement rocks to provide lateral containment to fluid movement. Evidence for the presence of the granitic basement is provided in well logs and the results of geologic modeling provided by DOGGR.

After reviewing information regarding the location and depth of the existing drinking water supply wells, ground water flow within the Lombardi and Aurignac Sands, and the lateral and vertical confinement of the formations as described in the AE application, the EPA concludes that the Lombardi and Aurignac Sands are not currently sources of drinking water and are not hydraulically connected to any domestic or public drinking water supply wells. Therefore, the EPA has determined that the aquifers proposed for exemption meet the criteria at 40 CFR § 146.4(a).

40 CFR § 146.4(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.*

DOGGR provided information on the TDS content of the Lombardi and Aurignac Sands, along with supporting information such as analytical sampling data performed by certified laboratories and log-derived TDS data that support a demonstration that the TDS content of the Lombardi and Aurignac Sands are between 3,000 and 10,000 mg/L.

- The measured TDS content of the Lombardi Sands ranges from 4,500 mg/L to 11,200 mg/L, and averages 6,811 mg/L; these data are the results of laboratory analyses of 18 samples taken between 1951 and 2016. These values are corroborated by calculated TDS of 8,576 mg/L to 9,850 mg/L (averaging 9,160 mg/L) based on 12 data points from resistivity logs run between 1981 and 2015.
- The measured TDS content of the Aurignac Sands ranges from 4,842 mg/L to 12,000 mg/L, and averages 7,877 mg/L (these are the results of analyses of 32 samples taken between 1951 and 2016). These measurements are corroborated by calculated TDS from eight resistivity logs run between 1981 and 2015 (ranging from 6,859 mg/L to 10,026 mg/L and averaging 8,371 mg/L).

Information presented by DOGGR in the AE package indicates that the Lombardi and Aurignac Sands are not reasonably expected to supply a public water system due to their depth, limited volume, which is exacerbated by the lack of recharge from the surface, and their low quality.

- As noted above, the Lombardi and Aurignac Sands are 1,800 feet and 2,200 feet bgs, respectively. These deeper aquifers are much less practical to use than the shallow Paso Robles aquifer, which is the current source of drinking water in the region. DOGGR's request also notes that producing water from deep aquifers in the area, such as the Lombardi and Aurignac Sands, could exacerbate saltwater intrusion problems and negatively impact other water resource development initiatives in the southern Salinas River Valley Groundwater Basin.

- Lack of ground water recharge renders the aquifers proposed for exemption unusable and unsustainable for municipal water supply purposes. The finite extent of the Lombardi and Aurignac Sands is supported by multiple lines of evidence, including well log correlation, physical whole core and sidewall core samples, and descriptions of drilling cuttings. Additional evidence for the finite nature of the Lombardi Sands is provided by reservoir simulation models.
- The low quality of water in the Lombardi and Aurignac Sands also makes them impractical for water supply use, due to their high TDS content and the presence of trace hydrocarbons. The TDS content of the Lombardi and Aurignac Sands is an order of magnitude higher than water in the shallow Paso Robles aquifer. Drilling reports show the presence of oil in the Aurignac Sands.

DOGGR's request also describes how the availability of ample ground water in the Paso Robles aquifer makes use of the Lombardi and Aurignac Sands as drinking water sources unlikely. The request notes that ground water levels in the Paso Robles aquifer, which is 300 to 1,100-feet thick in the southern portion of the Valley where the San Ardo municipal wells are located, have been and are predicted to remain stable due to water management activities in the area. The request notes that, since the construction of the Nacimiento and San Antonio Reservoirs, average ground water levels in the upper portion of the Salinas River Valley Groundwater Basin have remained constant. This suggests that the existing municipal sources are adequate to meet future demand. DOGGR's request includes a letter from the San Ardo Water District stating that the Lombardi and Aurignac Sands are not expected to be used as public water supply sources in the future due to the abundance of high quality drinking water in the Alluvium and the Paso Robles aquifer.

In their request, DOGGR reports that shallow ground water in the area, which is continually recharged by the Salinas River, will continue to be able to supply public water systems into the future. Ground water usage by public water systems is not expected to increase substantially in the future. This is because population growth in the area is not predicted to be substantial. Further, any population growth would likely displace agricultural use, which is a regionally more water-intensive land use, resulting in a net decrease in water demand.

In their concurrence on this AE package, the State Board determined that the Lombardi and Aurignac Sands in the San Ardo and McCool Ranch Oil Fields are not reasonably expected to supply a public water system based a review of water quality information (including analytical and log-derived estimates of TDS and the presence of trace hydrocarbons), and the fact that the San Ardo Water District has no plans to use the Lombardi or Aurignac Sands as a future public water supply source given the availability of high quality groundwater from shallower geologic zones.

Based on our review of this information, the EPA concludes that the Lombardi and Aurignac Sands in the San Ardo and McCool Ranch Oil Fields contain between 3,000 mg/L and 10,000 mg/L TDS and are not reasonably expected to supply a public water system. As such, the EPA has determined that the aquifers proposed for exemption meet the criteria at 40 CFR § 146.4(c).

PUBLIC NOTICE AND COMMENT

DOGGR provided public notice of this proposed AE on January 11, 2017 and held a public hearing on February 9, 2017 in King City, CA. The written comment period closed on March 3, 2017. DOGGR provided the EPA a summary of the public comments, copies of the public comments submitted, a transcript of the public hearing, and their responses to the written and oral comments.

In making this decision, the EPA considered all the information submitted by the State, including all the written and oral comments submitted to the State during its public comment process. Most of the issues raised in the comments to the State are addressed by this EPA Record of Decision; additional responses are provided below.

One commenter (The Center for Biological Diversity - CBD) who wrote to DOGGR requested that the EPA reject the exemption request before environmental review has occurred under the National Environmental Policy Act (NEPA). The EPA believes that the public comment and hearing procedures afforded by DOGGR and the in-depth technical analysis to protect USDWs required in the aquifer exemption proposal process under the EPA's UIC regulations and the enabling legislation in the SDWA provide a functionally equivalent environmental review for this action.

This commenter also raised concerns regarding protection of species under the federal Endangered Species Act (ESA). This issue is outside the scope of the EPA's AE decision, as this action does not authorize future injection activities at the surface. Approval of this aquifer exemption concerns ground water that is thousands of feet below the surface, and a review of materials submitted by the commenter indicates that there are no subsurface listed threatened or endangered species that would be affected by the EPA's approval of the AE request.

The CBD also questioned whether the current technical criteria to consider future drinking water uses are adequate given changing climate conditions and new technology available for water treatment. In considering whether the aquifers proposed for exemption cannot now and will not in the future serve as sources of drinking water, the EPA reviewed data regarding the level of contaminants in the ground water and information about the presence of ample high-quality shallow water that is available to meet drinking water demand. Even with the potential for improved treatment technology and higher demand for drinking water due to drought or scarcity, shallower aquifers than the Lombardi and Aurignac Sands would continue to provide an adequate supply of higher quality water for public water systems. As a result, the EPA concluded the aquifers are not reasonably expected to supply a public water system.

Another commenter, (The Natural Resources Defense Council - NRDC), objected to the issuance of two permits in the oil fields by DOGGR after the Division, in a February 6, 2015 letter to the EPA, outlined its approach to addressing aquifer exemption issues in California. DOGGR acknowledged in subsequent communication with the EPA that permitting of the two wells (which were added to an existing State-approved water disposal injection project) was inconsistent with the State's agreed-upon permitting approach. DOGGR's communication identified the factors that resulted in their permitting of the wells and stated said that these

factors have since been fully addressed. The EPA agrees that permitting of the two subject wells was not consistent with the State's agreed-upon approach, however, this action does not impact whether the proposed formations meet federal exemption criteria. Moreover, the State's submitted AE request demonstrates that the two wells are completed in aquifers that meet criteria for exemption, and the EPA concurs with this demonstration.

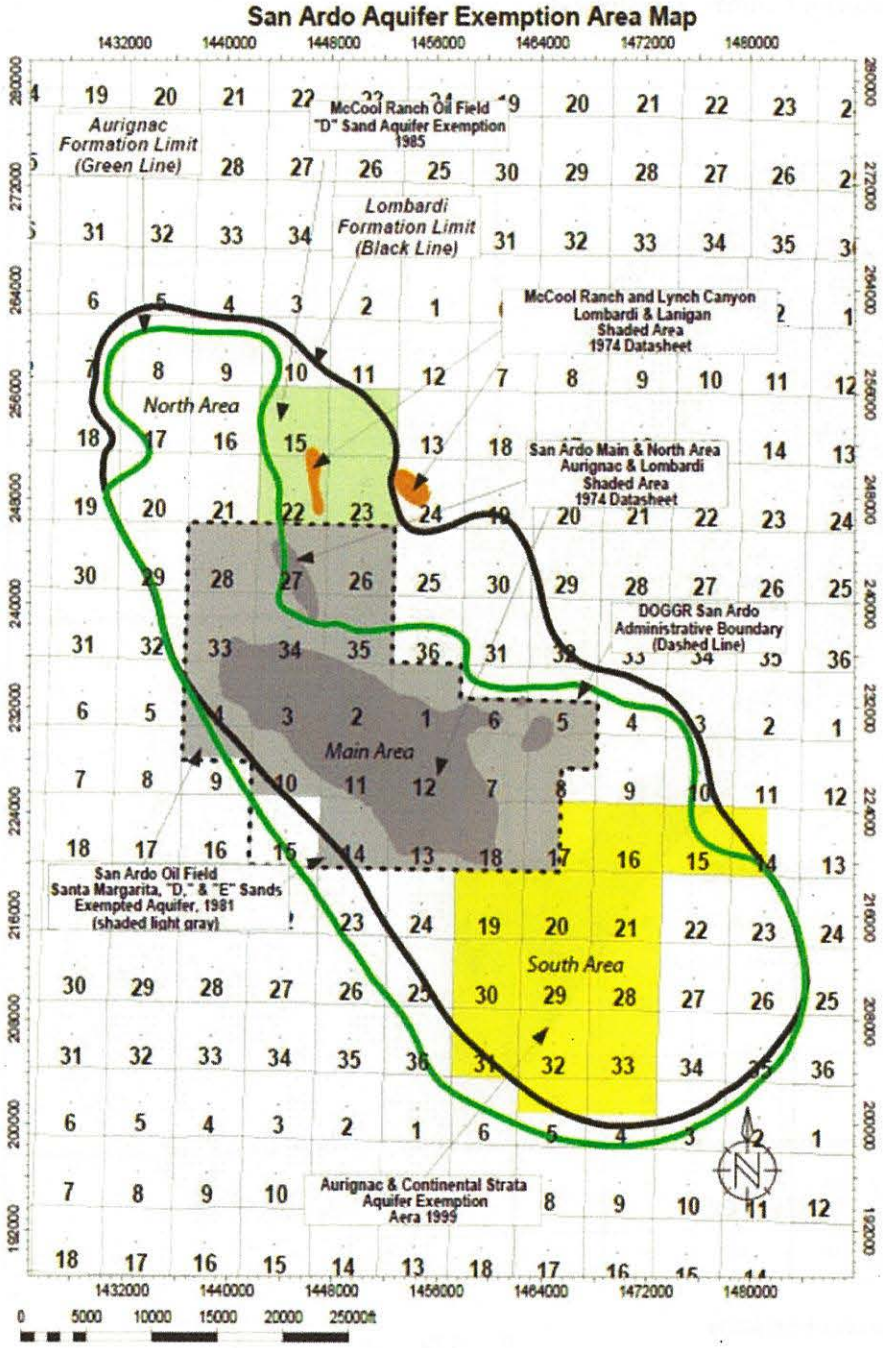
NRDC also commented about two wells identified in the State's water well survey. They noted that the list of identified water wells included two wells with total depths of 967 feet and 1,214 feet, and that the completion depths were listed as "unknown" and the field for "Geologic Formation in Screen Perf Interval" was left blank for both wells. NRDC commented that, without knowing the completion depths of all the wells within the exemption boundary, the applicant cannot credibly claim that the Lombardi and Aurignac aquifers do not currently serve as sources of drinking water. To complete the record, the EPA requested additional information from DOGGR, and received an updated table of water wells (see Table 1). DOGGR provided the EPA with documentation based on Department of Water Resources records which indicate that the two wells (wells 142 and 143 in Table 1) are test wells, not drinking water wells, and that they do not penetrate the aquifers proposed for exemption NRDC also attached to their comment a March 23, 2016 Petition to Repeal or Amend the EPA's Aquifer Exemption Regulations to Protect Underground Sources of Drinking Water. This petition for rulemaking does not impact whether the proposed formations meet the currently applicable federal aquifer exemption criteria.

CONCLUSION AND DECISION

Based on a review of the entire record, including all the written and oral comments submitted to DOGGR during its public comment process, the EPA finds that the exemption criteria at 40 CFR § 146.4(a) and § 146.4(c) have been met and the EPA approves the aquifer exemption request as a non-substantial program revision.

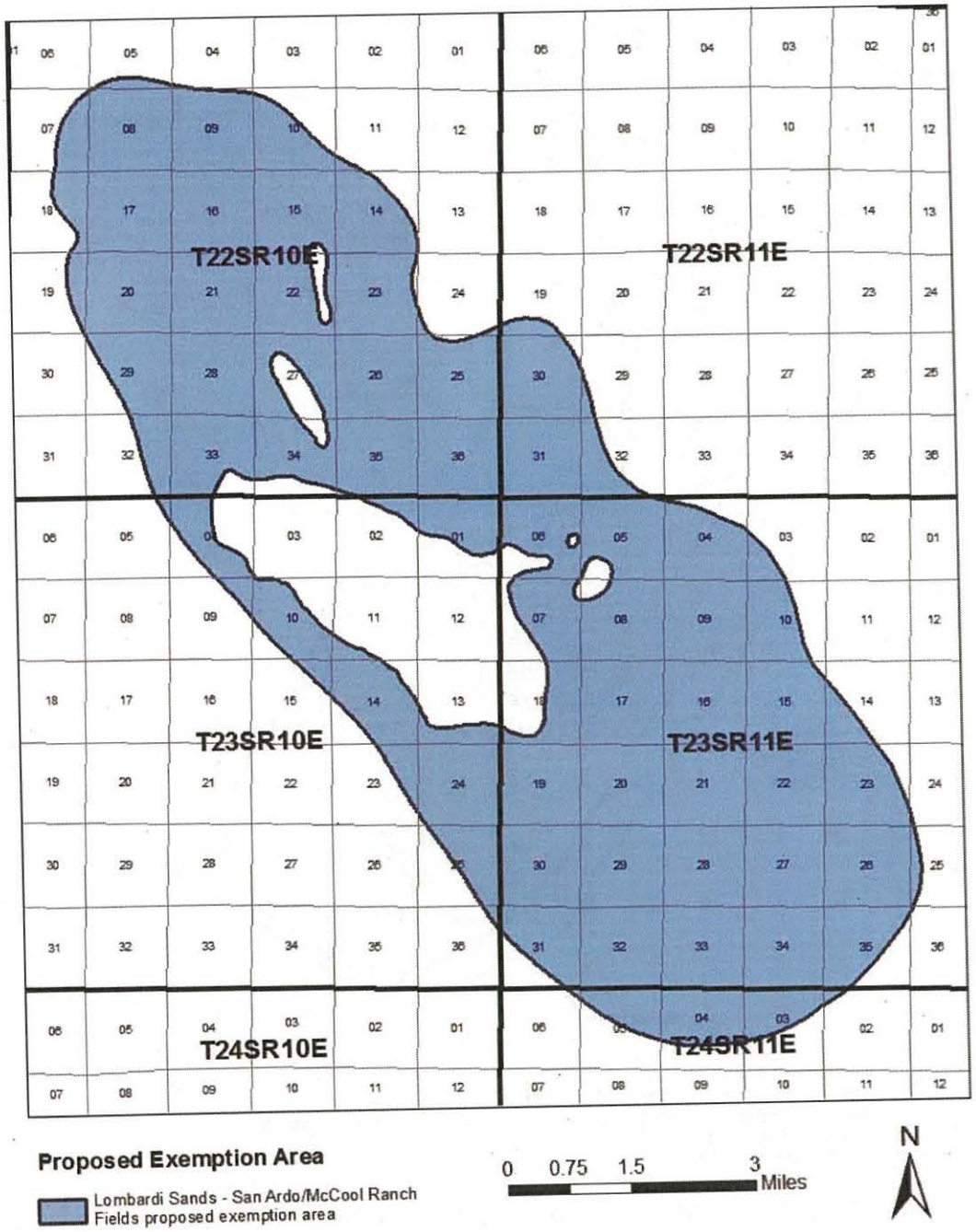
Effective Date: 11/21/2018

Figure 1: Location of the San Ardo and McCool Ranch Oil Fields, Monterey County, California



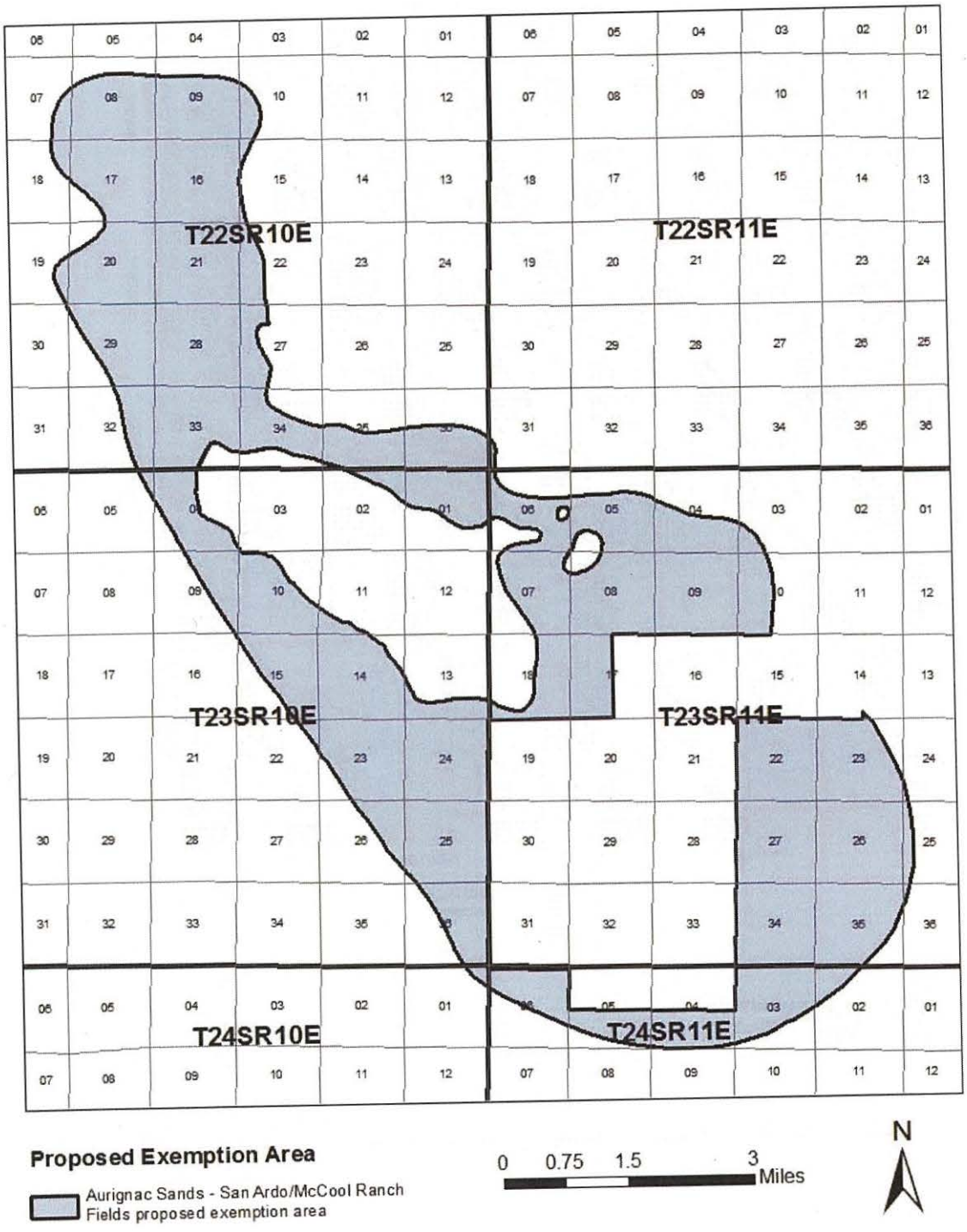
Source: Figure 1A, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Figure 2.1: Lombardi Sands Aquifer Exemption Location Map, San Ardo and McCool Ranch Oil Fields, Monterey County, California



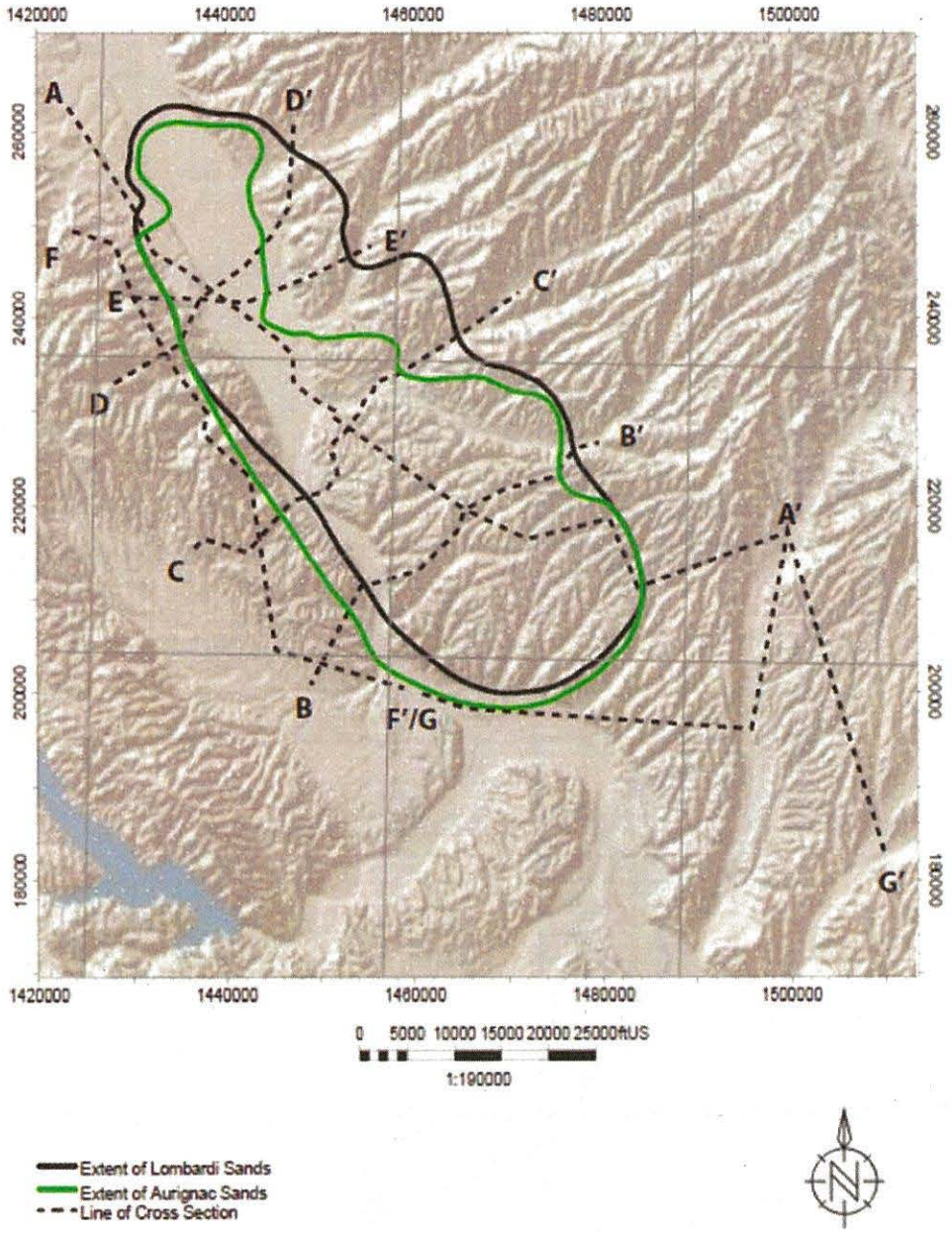
Source: DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Figure 2.2: Aurignac Sands Aquifer Exemption Location Map, San Ardo and McCool Ranch Oil Fields, Monterey County, California



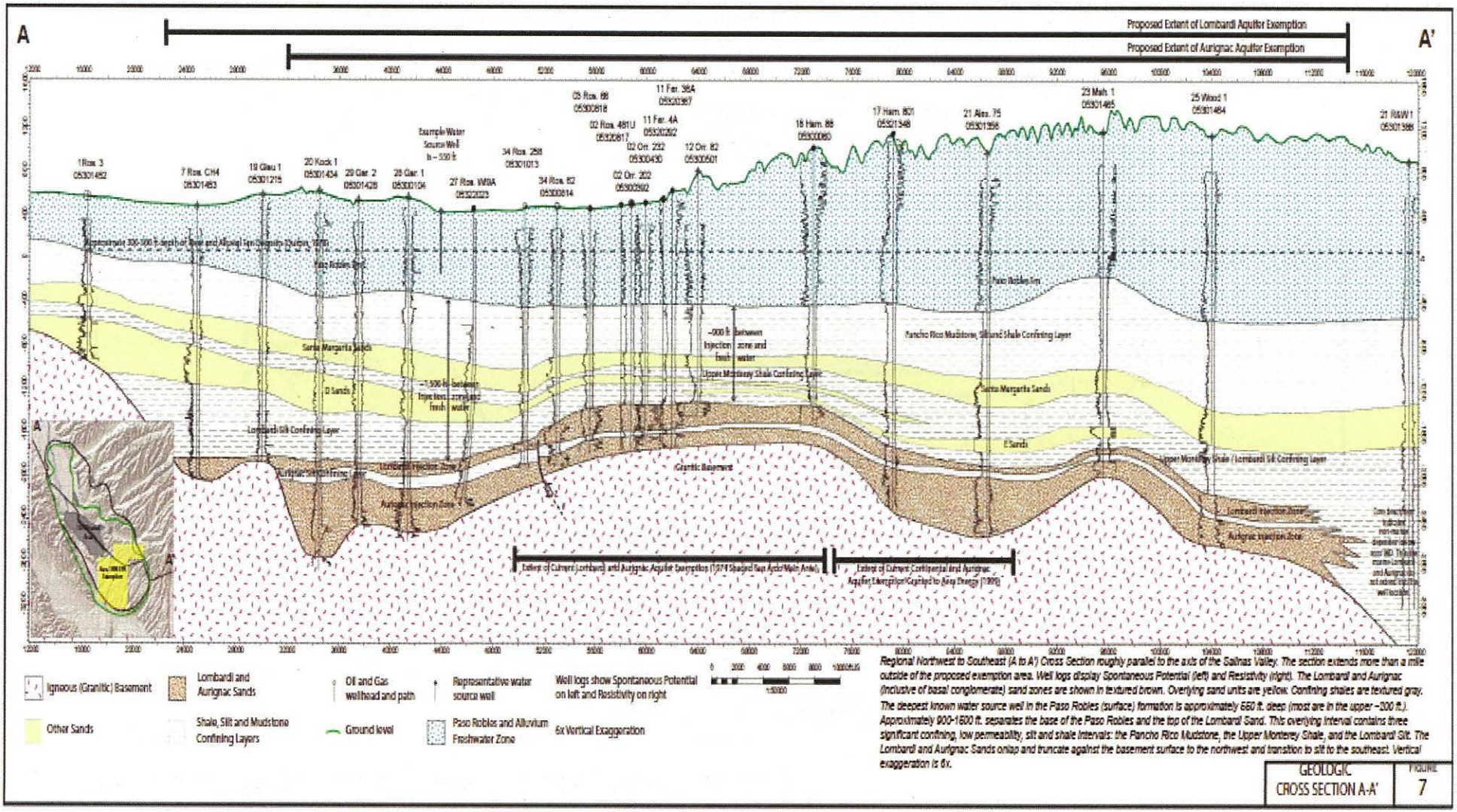
Source: DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Figure 3.1: Cross Section Index Map, San Ardo and McCool Ranch Oil Fields, Monterey County, California



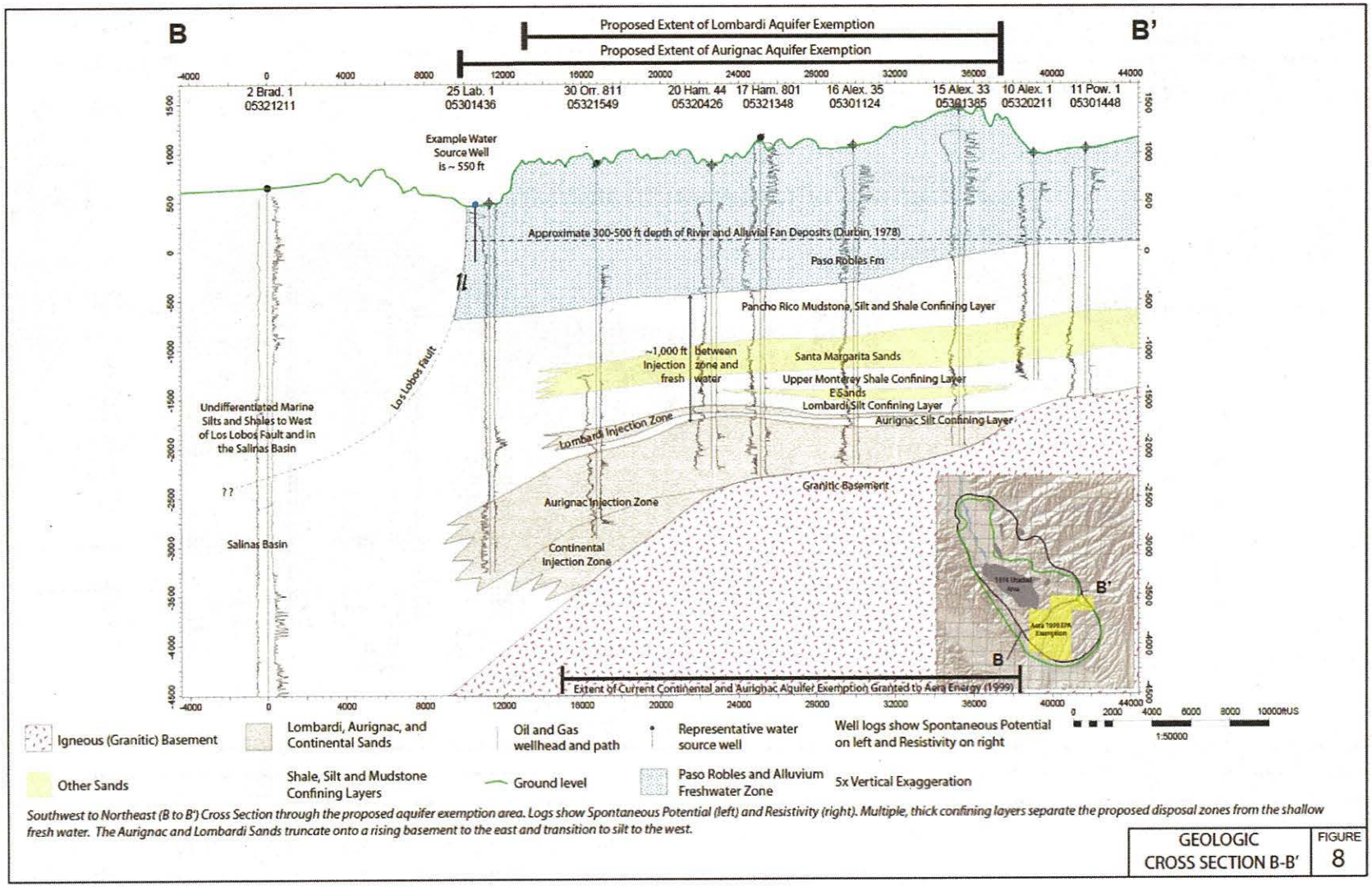
Source: Figure 6, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Figure 3.2: Cross Section A-A' through the Lombardi and Aurignac Sands Aquifer Exemption Area San Ardo and McCool Ranch Oil Fields, Monterey County, California



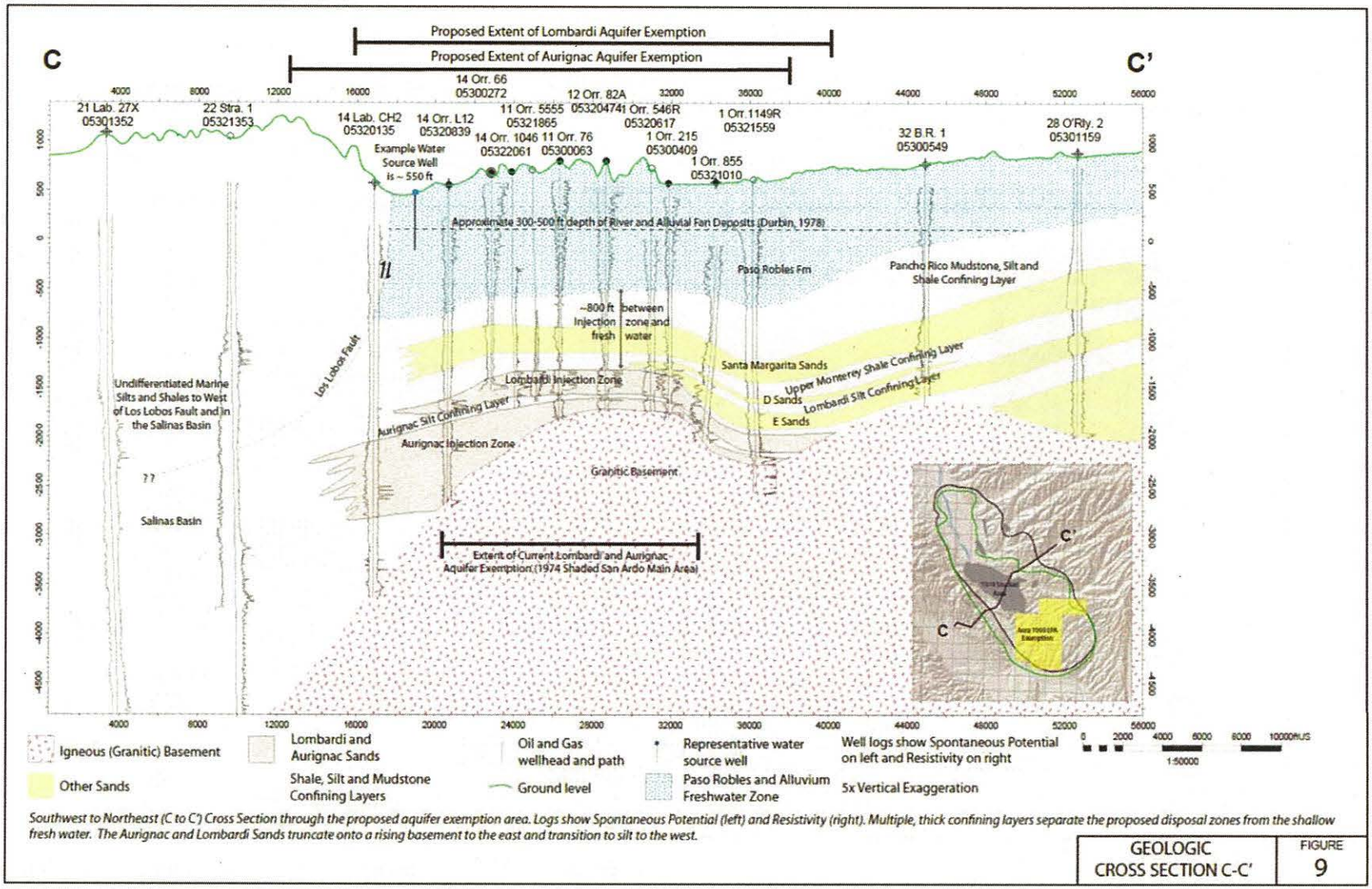
Source: Figure 7, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Figure 3.3: Cross Section B-B' across the Lombardi and Aurignac Sands Aquifer Exemption Area San Ardo and McCool Ranch Oil Fields, Monterey County, California



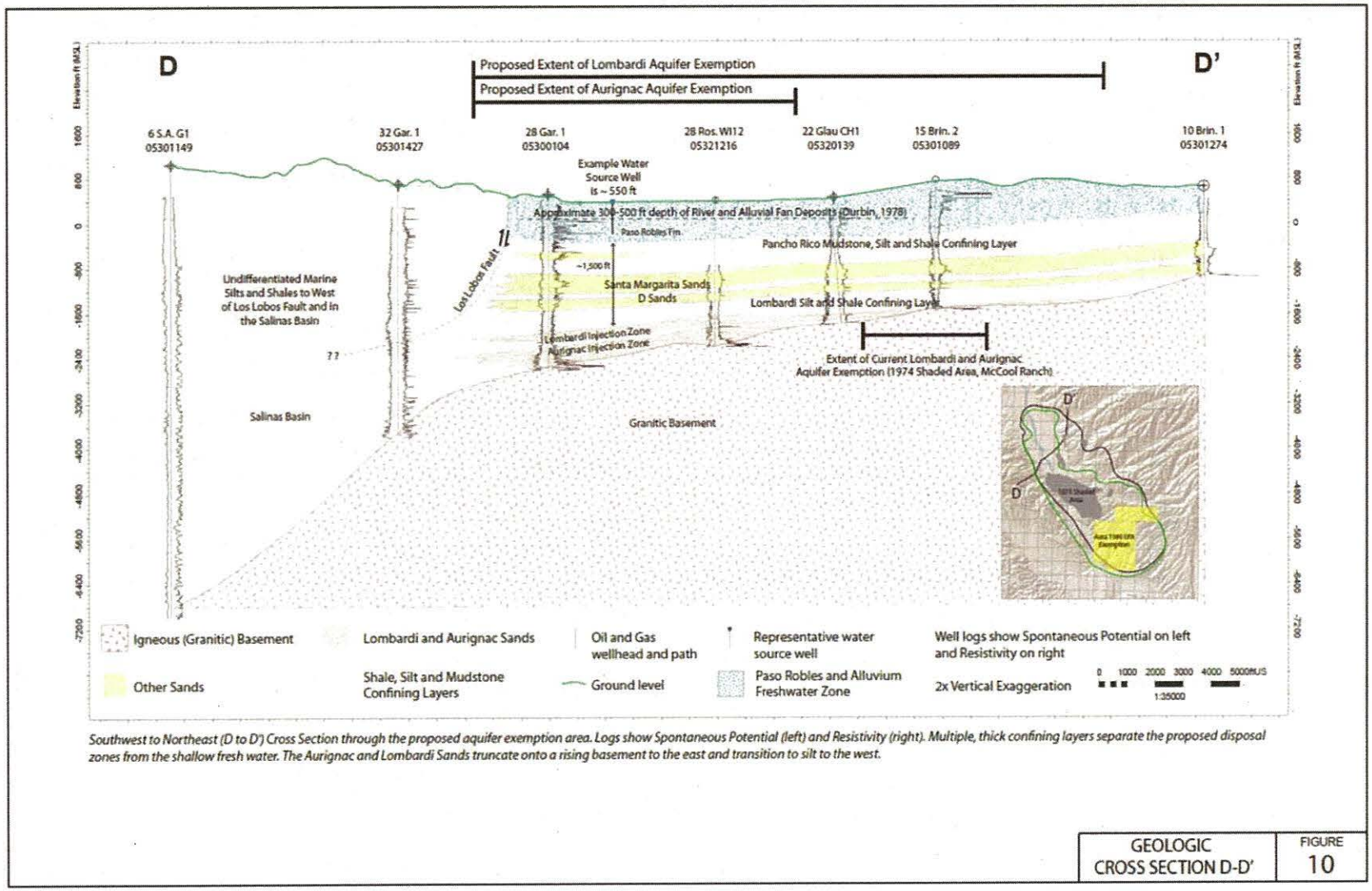
Source: Figure 8, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Figure 3.4: Cross Section C-C' across the Lombardi and Aurignac Sands Aquifer Exemption Area San Ardo and McCool Ranch Oil Fields, Monterey County, California



Source: Figure 9, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

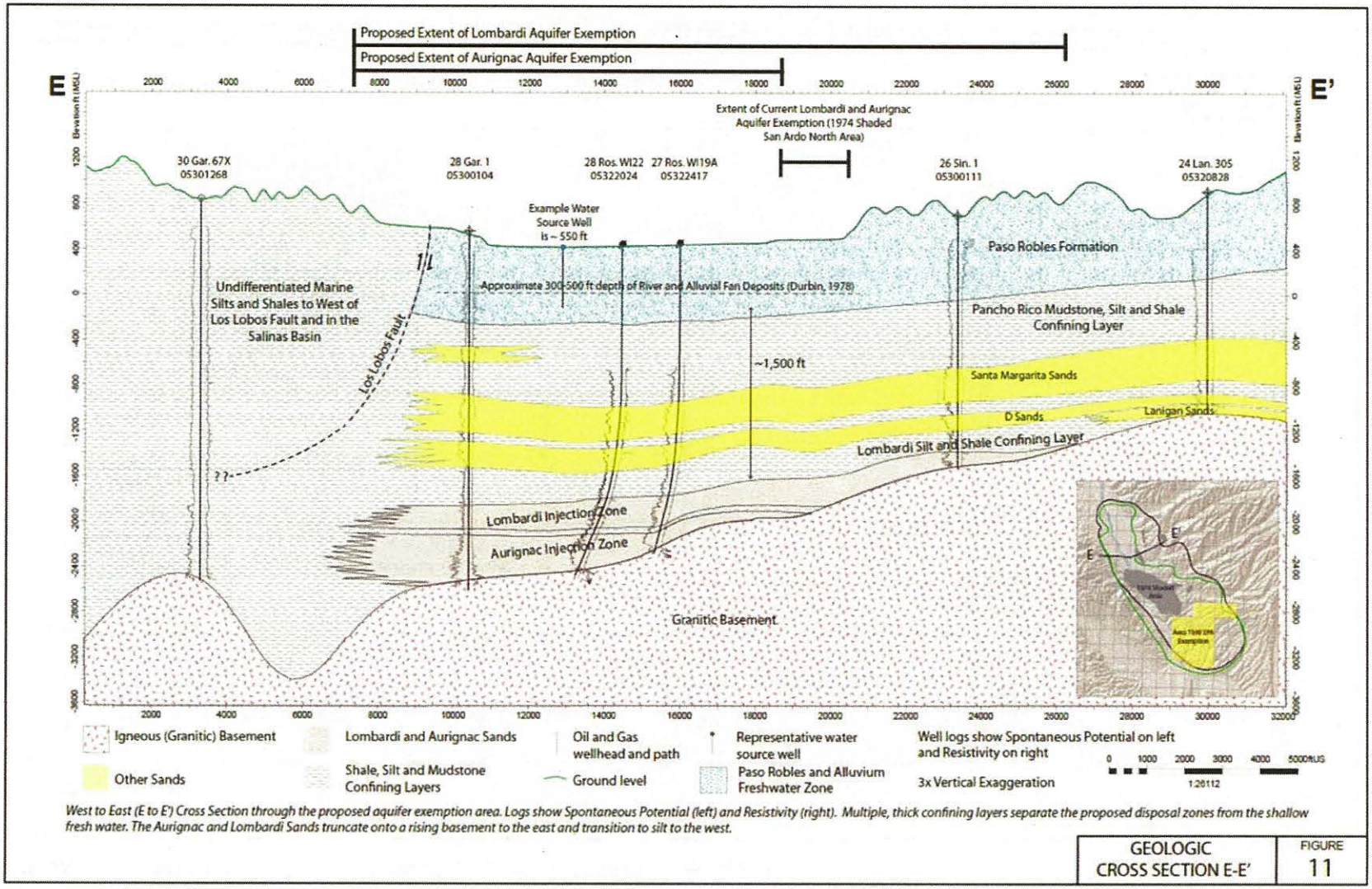
Figure 3.5: Cross Section D-D' across the Lombardi and Aurignac Sands Aquifer Exemption Area San Ardo and McCool Ranch Oil Fields, Monterey County, California



Southwest to Northeast (D to D') Cross Section through the proposed aquifer exemption area. Logs show Spontaneous Potential (left) and Resistivity (right). Multiple, thick confining layers separate the proposed disposal zones from the shallow fresh water. The Aurignac and Lombardi Sands truncate onto a rising basement to the east and transition to silt to the west.

Source: Figure 10, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

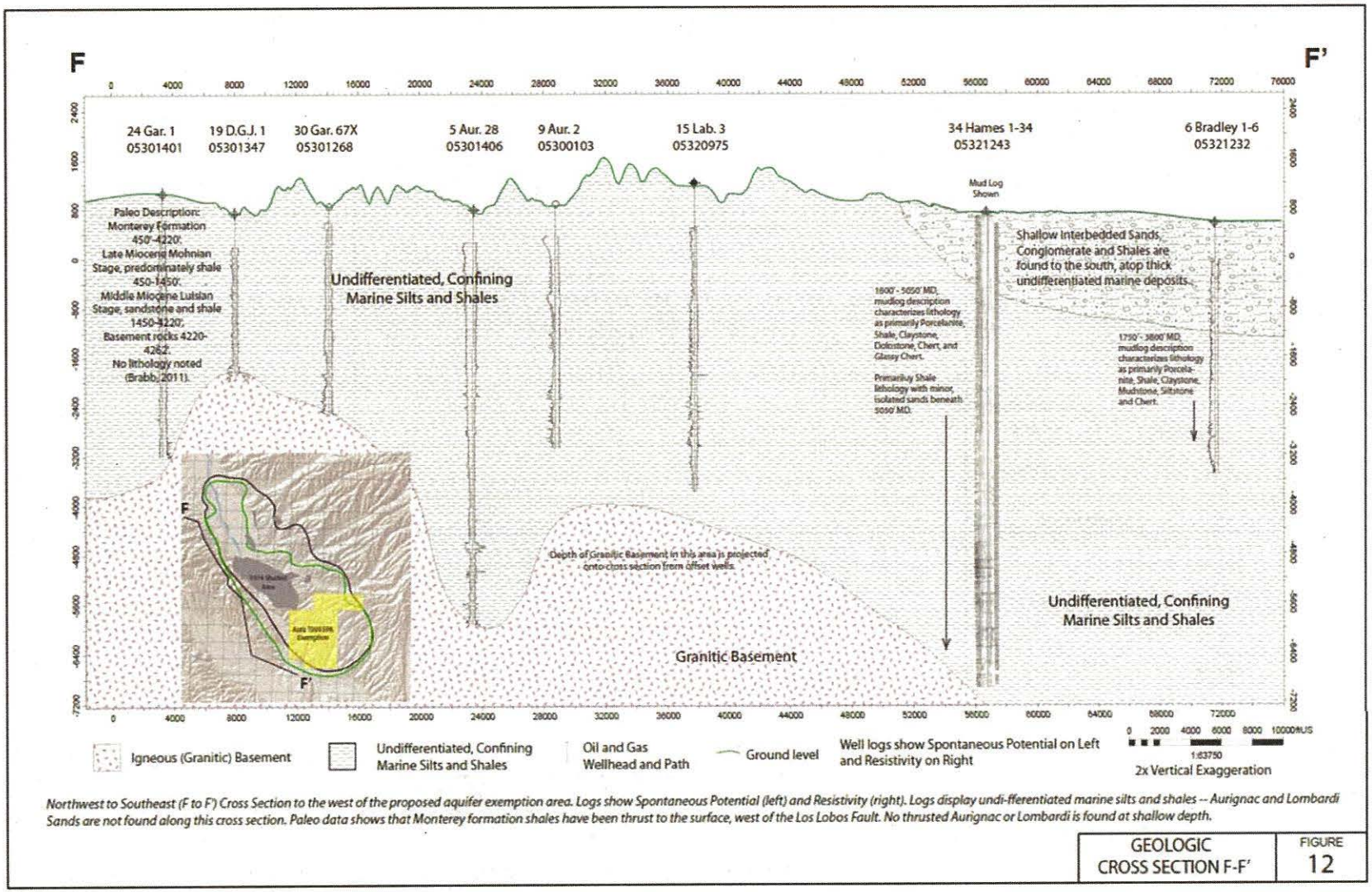
Figure 3.6: Cross Section E-E' across the Lombardi and Aurignac Sands Aquifer Exemption Area San Ardo and McCool Ranch Oil Fields, Monterey County, California



West to East (E to E') Cross Section through the proposed aquifer exemption area. Logs show Spontaneous Potential (left) and Resistivity (right). Multiple, thick confining layers separate the proposed disposal zones from the shallow fresh water. The Aurignac and Lombardi Sands truncate onto a rising basement to the east and transition to silt to the west.

Source: Figure 11, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Figure 3.7: Cross Section F-F' across the Lombardi and Aurignac Sands Aquifer Exemption Area San Ardo and McCool Ranch Oil Fields, Monterey County, California



Source: Figure 12, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields

Table 1: List of Active Water Wells

	Location					Identification		Description	Well Details				
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
1	22S	10E	19	-120.928277	36.006976	T22S/R10E-19	N/A	Irrigation	1951	135'-180'	192'	Alluvium or Paso Robles Fm	Yes
2	22S	10E	18	-120.923946	36.011933	T22S/R10E-18	N/A	Domestic	1969	80'-200'	200'	Alluvium or Paso Robles Fm	Yes
3	22S	10E	6	-120.921798	36.045997	T22S/R10E-6	N/A	Domestic	1983	60'-80'	80'	Alluvium or Paso Robles Fm	Yes
4	22S	10E	18	-120.921359	36.010586	T22S/R10E-18	N/A	Domestic	1978	100'-180'	180'	Alluvium or Paso Robles Fm	Yes
5	22S	10E	17	-120.918364	36.022862	T22S/R10E-17	N/A	Domestic, Irrigation	2000	70'-130'	140'	Alluvium or Paso Robles Fm	Yes
6	22S	10E	20	-120.918172	36.006589	T22S/R10E-20	N/A	Irrigation	1961	126'-171'	181'	Alluvium or Paso Robles Fm	Yes
7	22S	10E	20	-120.916401	36.004246	T22S/R10E-20	N/A	Irrigation	2007	Not perforated	90'	Alluvium or Paso Robles Fm	No
8	22S	10E	17	-120.915541	36.017445	T22S/R10E-17	N/A	Irrigation	1999	65-135'	140'	Alluvium or Paso Robles Fm	Yes
10	22S	10E	8	-120.912650	36.027380	T22S/R10E-8	N/A	Test Well	1986	53'-73'	80'	Alluvium or Paso Robles Fm	Yes
11	22S	10E	5	-120.912582	36.044875	T22S/R10E-5D	N/A	Irrigation	2015	25'-80'	100'	Alluvium or Paso Robles Fm	Yes
12	22S	10E	17	-120.915285	36.013706	T22S/R10E-17	N/A	Municipal	1983	80'-130'	130'	Alluvium or Paso Robles Fm	Yes
13	22S	10E	8	-120.904936	36.024703	T22S/R10E-8	N/A	Irrigation	2013	25'-65'	122'	Alluvium or Paso Robles Fm	Yes
14	22S	10E	8	-120.904354	36.026939	T22S/R10E-8	N/A	Test Well	1986	60'-90'	90'	Alluvium or Paso Robles Fm	Yes
15	22S	10E	8	-120.904210	36.026914	T22S/R10E-8	N/A	Test Well	1986	10'-40'	40'	Alluvium or Paso Robles Fm	Yes
16	22S	10E	28	-120.904030	35.985801	T22S/R10E-28	N/A	Irrigation	1990	440'-540'	540'	Alluvium or Paso Robles Fm	Yes
17	22S	10E	9	-120.903681	36.025604	T22S/R10E-9R	N/A	Domestic	1981	100'-399'	400'	Alluvium or Paso Robles Fm	Yes

	Location					Identification		Description		Well Details			
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
18	22S	10E	28	-120.903458	35.991056	T22S/R10E-28	N/A	Irrigation	2013	25'-60'	80'	Alluvium or Paso Robles Fm	Yes
19	22S	10E	16	-120.901288	36.023190	T22S/R10E-16	N/A	Irrigation	2003	120-140', 150'-155', 195'-215'	280'	Alluvium or Paso Robles Fm	Yes
20	22S	10E	29	-120.898534	35.971917	T22S/R10E-29	N/A	Irrigation	1989	100'-120', 420'-450'	450'	Alluvium or Paso Robles Fm	Yes
21	22S	10E	21	-120.895409	35.999445	T22S/R10E-21C1	22S10E21C001M	Agricultural	Unknown	Unknown	200	Alluvium or Paso Robles Fm	No
24	22S	10E	16	-120.891944	36.013611	T22S/R10E-16	N/A	Agricultural	Unknown	120-140', 150-155', 195-215', 245-265'	300'	Alluvium or Paso Robles Fm	Yes
25	22S	10E	28	-120.888284	35.992107	T22S/R10E-28B1	22S10E28B001M	Agricultural	Unknown	Unknown	200	Alluvium or Paso Robles Fm	Yes
26	23S	10E	4	-120.887223	35.960239	T23S/R10E-4	N/A	Monitoring	1990	220'-280'	280'	Alluvium or Paso Robles Fm	Yes
27	23S	10E	4	-120.886788	35.957911	T23S/R10E-4	N/A	Monitoring	1991	190'-200'	200'	Alluvium or Paso Robles Fm	Yes
28	22S	10E	16	-120.886033	36.009038	T22S/R10E-16	N/A	Domestic	1984	50'-60', 70'-140'	140'	Alluvium or Paso Robles Fm	Yes
29	22S	10E	16	-120.886033	36.009038	T22S/R10E-16	N/A	Domestic	1982	105'-145'	145'	Alluvium or Paso Robles Fm	No
30	22S	10E	16	-120.886033	36.009038	T22S/R10E-16	N/A	Domestic	1984	400'-560'	560'	Alluvium or Paso Robles Fm	No
31	22S	10E	22	-120.885969	36.008313	T22S/R10E-22A1	N/A	Irrigation	1961	80'-115', 155'-163'	168'	Alluvium or Paso Robles Fm	Yes
33	22S	10E	34	-120.884641	35.970261	MW-1	N/A	Monitoring	2007	10'-25'	25'	Alluvium or Paso Robles Fm	Yes
34	22S	10E	22	-120.882155	35.995660	T22S/R10E-22	N/A	Domestic, Irrigation	1970	150'-210'	210'	Alluvium or Paso Robles Fm	Yes
36	23S	10E	3	-120.881640	35.962231	MW-3	N/A	Monitoring	2007	4'-20'	20'	Alluvium or Paso Robles Fm	Yes
37	23S	10E	3	-120.881453	35.956812	Well #9	N/A	Industrial	Unknown	Unknown	32	Alluvium or Paso Robles Fm	Yes
38	22S	10E	22	-120.881360	35.995191	T22S/R10E-22N1	22S10E22N001M	Domestic	1930s	Unknown	100'	Alluvium or Paso Robles Fm	Yes
39	22S	10E	34	-120.879328	35.978848	T22S/R10E-27/34	N/A	Irrigation	1978	60'-132'	152'	Alluvium or Paso Robles Fm	Yes
40	22S	10E	27	-120.876330	35.984370	T22S/R10E-27M1	22S10E27M001M	Water Supply Well	Unknown	Unknown	132'	Alluvium or Paso Robles Fm	Yes
41	22S	10E	34	-120.875751	35.979397	T22S/R10E-34	N/A	Irrigation	1977	100'-150'	152'	Alluvium or Paso Robles Fm	Yes

	Location					Identification		Description	Well Details				
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
42	22S	10E	34	-120.874830	35.978946	T22S/R10E-34B1	N/A	Irrigation	1949	Unknown	300'	Alluvium or Paso Robles Fm	Yes
44	23S	10E	3	-120.872336	35.962553	MW-2	N/A	Monitoring	2007	6'-21'	21'	Alluvium or Paso Robles Fm	Yes
45	22S	10E	22	-120.872194	35.999555	T22S/R10E-22	N/A	Industrial	1975	25'-170'	250'	Alluvium or Paso Robles Fm	Yes
46	23S	10E	3	-120.871435	35.958998	Monterey County San Ardo North	N/A	Monitoring	1992	72' - 132'	142'	Alluvium or Paso Robles Fm	Yes
47	23S	10E	3	-120.871079	35.957149	Well #1	N/A	Domestic	1971	90'-180'	180'	Alluvium or Paso Robles Fm	Yes
48	23S	10E	3	-120.871058	35.963208	Well # 5B	N/A	Domestic	2009	145'-165', 185'-240'	240'	Alluvium or Paso Robles Fm	Yes
49	23S	10E	3	-120.870850	35.963976	Well #5A	N/A	Industrial	2007	90'-130', 140'-160', 180'-200'	200'	Alluvium or Paso Robles Fm	Yes
51	22S	10E	35	-120.868422	35.973382	T22S/R10E-35	N/A	Irrigation & Industrial	2011	100'-547'	547'	Alluvium or Paso Robles Fm	Yes
52	22S	10E	24	-120.867819	35.976534	T22S/R10E-24	N/A	Domestic	2006	165'-375'	375'	Alluvium or Paso Robles Fm	Yes
53	22S	10E	3	-120.869045	35.955330	Boiler Plant Well #2	N/A	Industrial (Steam generation)	1972	93'-183'	183'	Alluvium or Paso Robles Fm	Yes
54	22S	10E	35	-120.867367	35.970068	T22S/R10E-35M	N/A	Irrigation	2012	150'-230', 280'-310'	310'	Alluvium or Paso Robles Fm	Yes
55	23S	10E	14	-120.866103	35.936069	Monterey County San Ardo South	N/A	Monitoring	1992	72'-132'	142'	Alluvium or Paso Robles Fm	Yes
56	23S	10E	2	-120.863428	35.958138	Well #7A	N/A	Domestic	2003	150'-240'	240'	Alluvium or Paso Robles Fm	Yes
58	23S	10E	2	-120.859455	35.953603	T23S/R10E-2	N/A	Irrigation	1963	16'-175'	180'	Alluvium or Paso Robles Fm	Yes
59	23S	10E	2	-120.862194	35.954732	Well CWS-2	N/A	Domestic, Industrial	2013	155'-195', 215'-235'	240'	Alluvium or Paso Robles Fm	Yes
60	23S	10E	2	-120.861931	35.953927	Well CWS-1	N/A	Domestic, Industrial	2013	153'-208', 224'-238'	230'	Alluvium or Paso Robles Fm	Yes
61	22S	10E	16	-120.889540	36.015282	T22S/R10E-16	N/A	Irrigation	2000	120'-210'	230'	Alluvium or Paso Robles Fm	No
62	22S	10E	16	-120.889540	36.015282	T22S/R10E-16	N/A	Irrigation	1998	47'-107'	107'	Alluvium or Paso Robles Fm	No
63	22S	10E	10	-120.876894	36.024389	T22S/R10E-10	N/A	Domestic, Irrigation	2000	64' - 124'	134'	Alluvium or Paso Robles Fm	No

	Location					Identification		Description	Well Details				
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
64	22S	10E	18	-120.935062	36.017778	T22S/R10E-18	N/A	Irrigation	2000	120'-210'	210'	Alluvium or Paso Robles Fm	No
65	22S	10E	6	-120.933033	36.038159	T22S/R10E-6	N/A	Irrigation	1980	42'-82'	82'	Alluvium or Paso Robles Fm	No
66	22S	10E	20	-120.919559	36.006976	T22S/R10E-20	N/A	Irrigation	2010	20'-40'	60'	Alluvium or Paso Robles Fm	No
67	22S	10E	20	-120.919559	36.006976	T22S/R10E-20P1	N/A	Irrigation	1961	74'-124', 148'-200', 220'-270', 290'-314'	314'	Alluvium or Paso Robles Fm	No
68	22S	10E	17	-120.917305	36.017376	T22S/R10E-17	N/A	Domestic	1952	Unknown	193'	Alluvium or Paso Robles Fm	No
69	22S	10E	17	-120.913348	36.015641	T22S/R10E-17	N/A	Irrigation	1977	40'-107', 125'-150'	160'	Alluvium or Paso Robles Fm	
70	22S	10E	17	-120.913348	36.015641	T22S/R10E-17	N/A	Cathodic Protection	1993	Unknown	415'	Alluvium or Paso Robles Fm	
71	22S	10E	17	-120.916534	36.013477	T22S/R10E-17	N/A	Monitoring	1988	88'-98'	98'	Alluvium or Paso Robles Fm	No
72	22S	10E	5	-120.915056	36.047523	T22S/R10E-5	N/A	Irrigation	1998	0-100'	100'	Alluvium or Paso Robles Fm	No
74	22S	10E	33	-120.899168	35.970657	T22S/R10E-33	22S10E33F001 M	Irrigation	2011	30'-70'	70'	Alluvium or Paso Robles Fm	
77	22S	10E	4	-120.895208	36.040029	T22S/R10E-4	N/A	Monitoring	1990	140'-220'	220'	Alluvium or Paso Robles Fm	No
78	22S	10E	4	-120.895208	36.040029	T22S/R10E-4	N/A	Monitoring	1990	147'-307'	307'	Alluvium or Paso Robles Fm	No
79	22S	10E	4	-120.895208	36.040029	T22S/R10E-4	N/A	Monitoring	1990	210'-270'	270'	Alluvium or Paso Robles Fm	No
80	22S	10E	16	-120.889944	36.010264	T22S/R10E-16/17	N/A	Irrigation	1996	0-140'	140'	Alluvium or Paso Robles Fm	No
83	22S	10E	27	-120.878119	35.987822	T22S/R10E-27	N/A	Monitoring	1996	7.5'-22.5'	22'	Alluvium or Paso Robles Fm	No
85	22S	10E	28	-120.888330	35.993330	USGS-355936120531801	23/10-2	Irrigation	7/8/1963	Unknown	106'	Alluvium or Paso Robles Fm	No
87	22S	10E	27	-120.878402	35.986933	T22S/R10E-22 NSA Water Well	N/A	Industrial	9/17/2010	157'-237'	237'	Alluvium or Paso Robles Fm	Yes

	Location					Identification		Description		Well Details			
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
88	22S	10E	22	-120.878682	35.999069	22S10E_22_UIW7	N/A	Agricultural	1930s	Unknown	200	Alluvium or Paso Robles Fm	No
90	22S	10E	22	-120.885888	36.008228	22S10E_22D_UIW 3	N/A	Agricultural	1930s	Unknown	200	Alluvium or Paso Robles Fm	No
91	22S	10E	21	-120.896527	36.005705	22S10E_34_UIW1	N/A	Agricultural	Unknown	Unknown	200	Alluvium or Paso Robles Fm	YES - DOGGR
93	22S	10E	34	-120.875491	35.974216	22S10E_34_UIW5	N/A	Irrigation	Unknown	Unknown	<200'	Alluvium or Paso Robles Fm	YES - DOGGR
95	22S	10E	34	-120.879980	35.972314	T22S/R10E-34C1	22S10E34C001 M	Irrigation	Unknown	Unknown	<200'	Alluvium or Paso Robles Fm	YES - DOGGR
96	22S	10E	34	-120.880010	35.972280	T22S/R10E-34D1	22S10E34D001 M	Agricultural	Unknown	Unknown	200	Alluvium or Paso Robles Fm	YES - DOG
97	22S	10E	34	-120.873889	35.974167	T22S/R10E-34G1	22S10E34G001 M	Monitoring	1971	Unknown	182	Alluvium or Paso Robles Fm	YES - DOGGR
100	23S	10E	2	-120.859833	35.958437	T23S/R10E-2	N/A	Irrigation	1963	75'-122'	130'	Alluvium or Paso Robles Fm	
103	23S	11E	6	-120.831521	35.961074	T23S/R11E-6D80	23S11E06D080 M	Stock	Unknown	Unknown	250	Alluvium or Paso Robles Fm	No
105	22S	11E	31	-120.819501	35.968669	T22S/R11E-31	N/A	Domestic	2000	160'-180', 200'-240', 260'-300', 340'-355'	355'	Alluvium or Paso Robles Fm	No
106	24S	11E	8	-120.809053	35.864029	T24S/R11E-8D	N/A	Domestic	1983	55' - 115'	115'	Alluvium or Paso Robles Fm	No
107	23S	11E	8	-120.805319	35.946350	T23S/R11E-8	N/A	Domestic	1979	Unknown	166'	Alluvium or Paso Robles Fm	No
108	24S	11E	5	-120.798394	35.871687	T24S/R11E-5	N/A	Test Well	1987	None	32'	None	No
109	24S	11E	5	-120.798394	35.871687	T24S/R11E-5	N/A	Test Well	1987	None	52'	None	No
110	24S	11E	5	-120.798394	35.871687	T24S/R11E-5	N/A	Test Well	1987	None	46'	None	No
111	23S	11E	9	-120.793254	35.942718	T23S/R11E-9E1	23S11E09E001 M	Domestic	Unknown	Unknown	250	Alluvium or Paso Robles Fm	No
112	24S	11E	4	-120.791367	35.869881	T24S/R11E-04	N/A	Stock	Unknown	Unknown	265	Alluvium or Paso Robles Fm	Yes
115	23S	11E	33	-120.782356	35.892782	T23S/R11E-33	N/A	Monitoring	2008	10'-25'	25'	Alluvium or Paso Robles Fm	
117	23S	11E	11	-120.756630	35.947012	T23S/R11E-11	N/A	Domestic	1957	620' - 650'	670'	Alluvium or Paso Robles Fm	No
118	24S	11E	3	-120.770114	35.861849	T24S/R11E-3	N/A	Domestic	2003	Unknown	260'	Alluvium or Paso Robles Fm	No
119	23S	11E	34	-120.783648	35.889378	T23S/R11E-34	N/A	Domestic	2003	200' - 240', 280' - 400'	400'	Alluvium or Paso Robles Fm	No
120	24S	11E	4	-120.796810	35.861810	T24S/R11E-4	N/A	Domestic	1976	180' -380'	380'	Alluvium or Paso Robles Fm	No
121	24S	11E	5	-120.798898	35.870568	T24S/R11E-5	N/A	Domestic	1967	60' - 100'	100'	Alluvium or Paso Robles Fm	No

	Location					Identification		Description	Well Details				
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
122	24S	11E	8	-120.800317	35.863019	T24S/R11E-8	N/A	Domestic	1973	75'-135'	135'	Alluvium or Paso Robles Fm	No
123	24S	11E	4	-120.800351	35.862734	T24S/R11E-04	N/A	Irrigation	1996	152'-163', 314'-320', 365'-375'	400'	Alluvium or Paso Robles Fm	No
124	24S	11E	5	-120.800351	35.862734	T24S/R11E-5	N/A	Domestic	1989	350'-430'	430'	Alluvium or Paso Robles Fm	No
125	24S	11E	8	-120.800351	35.862734	T24S/R11E-8	N/A	Irrigation	2000	200' - 400'	400'	Alluvium or Paso Robles Fm	No
126	24S	11E	5	-120.800639	35.862590	T24S/R11E-5	N/A	Domestic	1966	68' - 95'	100'	Alluvium or Paso Robles Fm	No
128	24S	11E	8	-120.800738	35.863283	T24S/R11E-8	N/A	Domestic	1971	60' - 110'	110'	Alluvium or Paso Robles Fm	No
129	24S	11E	8	-120.800738	35.863283	T24S/R11E-8	N/A	Domestic	1953	60' - 106'	106'	Alluvium or Paso Robles Fm	No
130	24S	11E	8	-120.800738	35.863283	T24S/R11E-8	N/A	Domestic	1967	85' - 125'	125'	Alluvium or Paso Robles Fm	No
131	24S	11E	8	-120.800738	35.863283	T24S/R11E-8	N/A	Domestic	1970	60'-100'	100'	Alluvium or Paso Robles Fm	No
132	24S	11E	8	-120.804103	35.864281	T24S/R11E-8	N/A	Domestic	2003	Unknown	205'	Alluvium or Paso Robles Fm	No
133	24S	11E	9	-120.805725	35.862674	T24S/R11E-9	N/A	Domestic	2002	Unknown	105'	Alluvium or Paso Robles Fm	No
134	24S	11E	5	-120.805728	35.862724	T24S/R11E- 5	N/A	Domestic	1973	60' - 110'	110'	Alluvium or Paso Robles Fm	No
135	22S	11E	32	-120.809765	35.972884	T22S/R11E-32	N/A	Domestic	2008	250' - 500'	500'	Alluvium or Paso Robles Fm	No
136	23S	11E	7	-120.816073	35.949035	T23S/R11E	N/A	Stock	1985	45' - 180'	180'	Alluvium or Paso Robles Fm	No
137	23S	11E	7	-120.816073	35.949035	T23S/R11E	N/A	Domestic	1984	200' - 300'	300'	Alluvium or Paso Robles Fm	No
138	23S	11E	7	-120.816073	35.949035	T23SR/11E	N/A	Stock	1985	44' - 120'	120'	Alluvium or Paso Robles Fm	No
139	24S	10E	1	-120.834732	35.875256	T24S/R10E-1	N/A	Irrigation	1967	10' - 32'	36'	Alluvium or Paso Robles Fm	No
140	24S	10E	1	-120.834732	35.875256	T24S/R10E-1	N/A	Water Well	1953	78' - 108'	112'	Alluvium or Paso Robles Fm	No

	Location					Identification		Description		Well Details			
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
141	24S	10E	1	-120.834732	35.875256	T24S/R10E-1	N/A	Irrigation	1966	88' - 130' and 140' - 158'	168'	Alluvium or Paso Robles Fm	No
142	24S	10E	1	-120.834732	35.875256	T24S/R10E	N/A	Test Well	1975	None	967'	None	No
143	24S	10E	1	-120.834732	35.875256	T24S/R10E	N/A	Test Well	1975	None	1214'	None	No
145	22S	10E		-120.894745	36.023065	T22S/R10E	N/A	Domestic	1996	240'-300'	300'	Alluvium or Paso Robles Fm	No
146	22S	11E	32	-120.903792	35.956504	T22S/R11E-32	N/A	Domestic	1980	287' - 387'	387'	Alluvium or Paso Robles Fm	No
147	24S	10E	1	-120.906433	36.017525	T24S/R10E-1	N/A	Domestic	1981	140' - 200'	200'	Alluvium or Paso Robles Fm	No
148	22S	10E	18	-120.918758	36.006909	T22S/R10E-18	N/A	Irrigation	2008	100'-190'	220'	Alluvium or Paso Robles Fm	No
149	22S	10E	18	-120.918758	36.006909	T22S/R10E-18	N/A	Irrigation	2008	140'-230'	230'	Alluvium or Paso Robles Fm	No
150	22S	10E	18	-120.918758	36.006909	T22S/R10E-18	N/A	Irrigation	2008	140'-230'	220'	Alluvium or Paso Robles Fm	No
151	22S	10E	21	-120.901637	36.018978	T22S/R10E-21	N/A	Domestic	2007	61'-121'	121'	Alluvium or Paso Robles Fm	No
152	22S	10E	17	-120.907507	36.018073	T22S/R10E-17	N/A	Domestic	1954	60'-116'	128'	Alluvium or Paso Robles Fm	No
153	22S	10E	5	-120.911784	36.037720	T22S/R10E-5	N/A	Irrigation	2010	25'-90'	130'	Alluvium or Paso Robles Fm	No
154	22S	10E	18	-120.922448	36.012601	T22S/R10E-18	N/A	Irrigation	2011	110'-200'	220'	Alluvium or Paso Robles Fm	No
155	22S	10E	18	-120.922448	36.012601	T22S/R10E-18	N/A	Irrigation	2011	110'-200'	220'	Alluvium or Paso Robles Fm	No
156	22S	10E	18	-120.922448	36.012601	T22S/R10E-18	N/A	Irrigation	2011	110'-200'	220'	Alluvium or Paso Robles Fm	No
160	23S	10E	1	-120.841912	35.958220	2701187-001	N/A	Industrial	Unknown	Unknown	<220'	Alluvium or Paso Robles Fm	No
161	23S	10E	3	-120.877855	35.958559	MSSV-01	N/A	Monitoring	1994	10'-30'	30'	Alluvium or Paso Robles Fm	No
163	22S	10E	4	-120.895686	35.871836	T22S/R10E-4	N/A	Irrigation	2012	540'-640', 680'-720', 740'-800', 860'-920', 1000'-1040', 1080'-1100'	1100'	Alluvium or Paso Robles Fm	No

	Location					Identification		Description		Well Details			
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
164	22S	10E	6	-120.930181	36.044926	T22S/R10E-6	N/A	Irrigation	1980	40'-110'	110'	Alluvium or Paso Robles Fm	No
165	22S	10E	6	-120.930181	36.044926	T22S/R10E-6	N/A	Irrigation	1980	40'-80'	80'	Alluvium or Paso Robles Fm	No
166	22S	10E	6	-120.930181	36.044926	T22S/R10E-6	N/A	Irrigation	1980	42'-82'	82'	Alluvium or Paso Robles Fm	No
168	22S	10E	17	-120.913348	36.015641	T22S/R10E-17	N/A	Irrigation	1977	40'-106', 116'-152'	160'	Alluvium or Paso Robles Fm	
169	22S	10E	17	-120.913348	36.015641	T22S/R10E-17	N/A	Irrigation	1977	40'-50', 60'-115', 120'-144'	156'	Alluvium or Paso Robles Fm	
170	22S	10E	17	-120.913348	36.015641	T22S/R10E-17	N/A	Domestic, Irrigation	1999	63'-103'	113'	Alluvium or Paso Robles Fm	No
171	22S	10E	17	-120.913348	36.015641	T22S/R10E-17	N/A	Irrigation	1997	35'-110'	110'	Alluvium or Paso Robles Fm	
172	22S	10E	18	-120.930886	36.015197	T22S/R10E-18	N/A	Irrigation	2005	109'-239'	239'	Alluvium or Paso Robles Fm	No
173	22S	10E	22	-120.882155	35.995660	T22S/R10E-22	N/A	Domestic, Irrigation	1970	150'-210'	210'	Alluvium or Paso Robles Fm	Yes
174	22S	10E	24	-120.841727	36.001302	T22S/R10E-24	N/A	Domestic	2005	65'-530'	530'	Alluvium or Paso Robles Fm	
175	22S	10E	24	-120.841727	36.001302	T22S/R10E-24	N/A	Domestic	2005	300'-530'	530'	Alluvium or Paso Robles Fm	No
177	22S	10E	28	-120.895298	35.987081	T22S/R10E-28	N/A	Irrigation	2012	80'-220'	230'	Alluvium or Paso Robles Fm	
178	22S	10E	34	-120.879512	35.977222	T22S/R10E-27/34	N/A	Irrigation	1978	60'-132'	152'	Alluvium or Paso Robles Fm	Yes
180	22S	10E		-120.886852	35.921280	T22S/R10E	N/A	Irrigation	1999	55'-95'	105'	Alluvium or Paso Robles Fm	No
181	22S	10E		-120.886852	35.921280	T22S/R10E	N/A	Irrigation	1999	65'-135'	140'	Alluvium or Paso Robles Fm	No
182	22S	10E		-120.886852	35.921280	T22S/R10E	N/A	Irrigation	1999	60'-130'	130'	Alluvium or Paso Robles Fm	No
183	22S	10E		-120.886852	35.921280	T22S/R10E	N/A	Domestic	1972	90'-192'	192'	Alluvium or Paso Robles Fm	No
185	23S	10E	4	-120.895823	35.958395	T23S/R10E-4	N/A	Municipal	1991	280'-300'	312'	Alluvium or Paso Robles Fm	No
186	23S	10E	4	-120.895823	35.958395	T23S/R10E-4	N/A	Municipal	1991	280'-300'	300'	Alluvium or Paso Robles Fm	No
187	23S	10E	4	-120.895823	35.958395	T23S/R10E-4	N/A	Municipal	1991	280'-300'	300'	Alluvium or Paso Robles Fm	No

	Location					Identification		Description		Well Details			
Index	Township	Range	Section	NAD83 Long	NAD83 Lat	Well ID	State Well ID	Well Type	Year of Completion	Perforation Intervals	Total Well Depth	Geologic Formation in Screen Perf Interval	Field Verified
188	23S	10E	4	-120.895823	35.958395	T23S/R10E-4	N/A	Municipal	1991	240'-260'	280'	Alluvium or Paso Robles Fm	No
189	23S	10E	4	-120.887054	35.869033	T23S/R10E-4	N/A	Irrigation	2014	603'-1083'	1083'	Alluvium or Paso Robles Fm	
190	23S	10E	4	-120.895823	35.958395	T23S/R10E-4	N/A	Domestic	2014	300'-600'	600'	Alluvium or Paso Robles Fm	
206	24S	10E		-120.8836381	35.8371907	T24S/R10E	N/A	Other	1973	152' - 232'	232'	Alluvium or Paso Robles Fm	No
207	24S	10E		-120.8836381	35.8371907	T24S/R10E	N/A	Domestic	1981	154' - 234'	234'	Alluvium or Paso Robles Fm	No
208	24S	11E	3	-120.771507	35.871294	T24S/R11E-3	N/A	Test Well	1986	19' - 39'	39'	Alluvium or Paso Robles Fm	No
212	24S	11E	8	-120.807133	35.857089	T24S/R11E-8B	N/A	Domestic	1982	128' - 150'	160'	Alluvium or Paso Robles Fm	No
214	24S	11E	9	-120.789365	35.856894	T24S/R11E-9	N/A	Domestic	1968	40'-60', 80'-90', 110'-120', 140'-156'	156'	Alluvium or Paso Robles Fm	No
215	24S	11E	10	-120.771593	35.856868	T24S/R11E	N/A	Public	1999	100'-120', 180'-300'	302'	Alluvium or Paso Robles Fm	No
216	24S	11E	10	-120.771593	35.856868	T24S/R11E-10	N/A	Domestic, Public	2009	150' - 240'	250'	Alluvium or Paso Robles Fm	No
218	24S	11E		-120.780397	35.835159	T24S/R11E	N/A	Domestic	1980	74'-114'	114'	Alluvium or Paso Robles Fm	
221	23S	11E	33	-120.787251	35.885314	Orradre Ranch House Well	N/A	Domestic / Stock	Unknown	Unknown	83'	Alluvium or Paso Robles Fm	
222	23S	10E	9	-120.888142	35.947203	Greg Traynor Stock Well	N/A	Stock	Unknown	Unknown	<250'	Alluvium or Paso Robles Fm	
223	22S	10E	33	-120.898786	35.971914	Greg Traynor Stock Well	N/A	Stock	Unknown	Unknown	<250'	Alluvium or Paso Robles Fm	
224	22S	10E	33	-120.900058	35.979694	Greg Traynor Irrigation Well	N/A	Irrigation	Unknown	Unknown	<250'	Alluvium or Paso Robles Fm	
225	22S	10E	28	-120.901639	35.980803	Greg Traynor Domestic Well	N/A	Domestic	Unknown	Unknown	<250'	Alluvium or Paso Robles Fm	
226	22S	10E	22	-120.885833	36.008611	Glau Ranch #1	N/A	Agricultural	Unknown	Unknown	200'	Alluvium or Paso Robles Fm	
227	22S	10E	27	-120.876674	35.994198	O'Conner 31X-27	N/A	Stock	Unknown	Unknown	80'	Alluvium or Paso Robles Fm	
	22S	10E	17	-120.915282	36.013580	SAWD "Old Well 001"	N/A	Municipal	prior to 1950	unknown	80'	Alluvium or Paso Robles Fm	Yes

Source: Table 4, DOGGR's Aquifer Exemption Application for the San Ardo and McCool Ranch Oil Fields