



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION IX**

**75 Hawthorne Street**

**San Francisco, CA 94105-3901**

May 14, 2019

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 Edison Oil Field, Phase 1 Area, Kern 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 (DOGGR) and the State Water Resources Control Board (SWRCB), the U.S. Environmental Protection Agency (EPA) hereby approves the aquifer exemption request for portions of the Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation in the Edison Oil Field, Phase 1 Area, in Kern County, California.

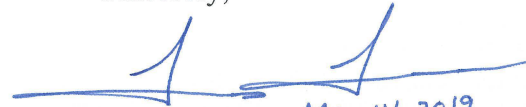
In accordance with applicable regulations at 40 C.F.R. Parts 144, 145, and 146, we find that this aquifer exemption request is a non-substantial program revision, and the requested formations meet the following federal exemption criteria:

- The portions of the formations proposed for exemption in the field do not currently serve as sources of drinking water; and
- The portions of the formations proposed for exemption in the field cannot now and will not in the future serve as a source of drinking water because they are commercially hydrocarbon-producing.

The approved aquifer exemption boundaries and depths, along with the EPA's analysis and rationale in support of the approval, are detailed in the enclosed Record of Decision. In addition, we are enclosing the application and other documents submitted by the DOGGR and SWRCB to the EPA that were considered in this approval decision. Due to the size of these additional enclosures, we are providing, via email, a link to an electronic folder containing all the remaining documents.

If you have any questions, or if you have any difficulty accessing the electronic folder, please contact David Albright, Acting Assistant Director of our Tribal and State Assistance Branch, at (415) 972-3971.

Sincerely,

A handwritten signature in blue ink, appearing to be 'Tomás Torres', written over a horizontal line.

Tomás Torres  
Director, Water Division

May 14, 2019

Enclosures: Aquifer Exemption Record of Decision for Phase 1 Edison Oil Field  
GIS Shape Files of Approved Aquifer Exemption  
Final Edison Phase 1 Exemption Application  
Letter from Kenneth Harris to David Albright dated April 23, 2019

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

**US Environmental Protection Agency 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 Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation in the Edison Oil Field, 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:** November 7, 2018

**Exemption Criteria:** DOGGR requests this exemption because it has determined that it meets the criteria at 40 CFR § 146.4(a) and § 146.4(b)(1).

**Substantial or Non-Substantial Program Revision:** Non-Substantial

Although the EPA must approve all revisions to EPA-approved state Underground Injection Control (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 that 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 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.

**Current Operators:** Naftex Operating Company and Redbank Oil Company.

**Well/Project Name:** The Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation in the Edison Oil Field.

**Well/Project Permit Number:** There are currently 17 Class II enhanced oil recovery (EOR) wells and 2 produced water disposal wells in the Edison Oil Field within the portions of the aquifer proposed for exemption. In the future, the State anticipates there will be additional Class II wells permitted to inject within the portions of the aquifer proposed for exemption.

**Well/Project Location:** The aquifer proposed for exemption underlies Township 29 South Range 29 East, Sections 22, 26, 27, 28, and 35, Mount Diablo Base and Meridian (MDB&M) in the Race Track Hill Area of the field (Transition/Santa Margarita Formation); Township 30 South Range 29 East, Sections 5, 6, 7, and 8 MDB&M in the Portals-Fairfax Area of the field (Main Wicker Sand); and Township 30 South Range 29 East, Sections 4, 8, and 9 MDB&M in the Race Track Hill Area of the field (Pyramid Hill Sands and Vedder Formation). [Refer to Figure 1.]

**County:** Kern

**State:** California

**Current Well Class/Type:** Class II EOR (in the Pyramid Hill Sands, Vedder Formation, and Transition/Santa Margarita) and Class II waste disposal (in the Main Wicker Sand). Upon EPA’s approval of the AE, injection into these wells will be into an exempt aquifer.

**DESCRIPTION OF PROPOSED AQUIFER EXEMPTION**

**Aquifer to be Exempted:** Portions of the Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation in the Edison Oil Field.

**Areal Extent of Aquifer Exemption:** Each area proposed for exemption represents an expansion of a formation that EPA exempted at the time DOGGR received primacy to implement the Class II UIC program. In the Race Track Hill Area of the field, DOGGR proposes to extend the current exemption of the Transition/Santa Margarita Formation to the Ant Hill Fault to the east, and to where the formation pinches out to the north, south, and west. In the Portals-Fairfax Area, DOGGR proposes to extend the current Main Wicker Sand exemption to the boundary of where oil is present in the formation (this is known as the “oil-water contact”). DOGGR also proposes to extend the exempt portion of the Pyramid Hill Sands and Vedder Formation in the Race Track Hill Area of the field to the sealing faults that surround the previously exempted areas to the north, south, east, and west.

DOGGR provided GIS shape files that delineate the AE boundaries, which are included in the administrative record for this ROD. Refer to Figures 2.1 through 2.4 for a depiction of the proposed exempt formations.

A breakdown of the existing exempted area, in acres, and the proposed expansion of the exempted area for each of the formations follows:

Formation	Existing Exempted Area (approx. acres)	Proposed Exempted Area (approx. acres)
Transition/Santa Margarita Formation	6,826	162
Main Wicker Sand	5,106	102
Pyramid Hill Sands	6,826	99
Vedder Formation	4,231	108

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

<i>Formation</i>	<i>Lithology</i>	<i>TDS (mg/L)</i>	<i>Approximate Depth to Top (feet)</i>	<i>Average Thickness (feet)</i>	<i>Porosity and Permeability</i>
Transition/ Santa Margarita Formation	Predominantly fine to medium-grained light gray sand with some coarse-grained sand, pebbles and cobbles that grade into shales.	440 mg/L to 820 mg/L	790-1050 feet below ground surface (bgs).	20 feet.	Porosity ranges from 24% to 35%. Permeability ranges from 150 millidarcies (mD) to over 2 Darcy.
Main Wicker Sand	Friable, silty marine sand containing thin laminations and beds of mudstone and siltstone; conglomeratic in places.	3,300 mg/L (1 sample).	3,800 to 4,700 feet bgs.	200 feet.	Porosity ranges from 21.2% to 34.5%. Permeability ranges from 12 to 1,570 mD.
Pyramid Hill Sands	Predominantly fine to medium-grained light gray sand with some coarse-grained sand, pebbles and cobbles that grade into shales.	8,500 mg/L to 15,256 mg/L	4,300 feet to over 5,000 feet bgs.	100 feet.	Porosity ranges from 10.4% to 34.5%. Permeability ranges from 1.0 to 1,280 mD.
Vedder Formation	Predominantly fine to medium-grained light gray sand with some coarse-grained sand, pebbles and cobbles that grade into shales.	8,500 mg/L to 15,256 mg/L	4,400 feet to over 5,000 feet bgs.	300 feet.	Porosity ranges from 11.7% to 44.5%. Permeability ranges from 0.4 to 2,170 mD.

**Confining Zone(s):** In the Edison Oil Field, the formations proposed for exemption are confined above and below by low-permeability formations consisting of clays, muds, shales, and silts. Lateral confinement is provided by faults and pinch-outs (for the Transition/Santa Margarita Formation); an inward pressure gradient (for the Main Wicker Sand); and sealing faults (for the Pyramid Hill Sands and Vedder Formation). See Figures 3.1 through 3.6.

### BACKGROUND

On November 7, 2018, the EPA received a request from DOGGR for approval to exempt portions of the Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation in the Edison Oil Field, in Kern County, California. DOGGR reviewed the operator's request and proposed this AE based on the criteria at 40 CFR §146.4(a): it does not currently serve as a source of drinking water; and at 40 CFR §146.4(b)(1): it cannot now and will not in the future serve as a source of drinking water because 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. 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. As noted above, 19 Class II injection wells (17 EOR wells and 2 produced water disposal wells) are currently permitted for injection into the expanded portions of the formations proposed for exemption. Upon EPA's approval of the AE, injection into these wells will be into an exempt aquifer.

### 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.**

**State Water Resources Control Board (State Water Board) Concurrence:** In their concurrence on this AE request, the State Water Board determined that the portions of the Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation proposed for exemption do not currently serve as sources of drinking water and are not hydraulically connected to any domestic or public water supply wells. The State Water Board's determination was based on an evaluation of information about water supply wells in the area, groundwater flow patterns, and confinement of groundwater flow. These reviews demonstrate that the portions of the aquifer proposed 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 portions of the aquifers that are proposed for exemption. In addition, 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 formations. Further, within the State's water well search area (described more fully below), the Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation are not currently sources of drinking water.

**Water Supply Wells:** DOGGR's AE request included information about wells in the area proposed for exemption to establish that no drinking water wells draw from the aquifer proposed for exemption. The applicant searched well records to identify wells within a water supply well search area ("study area") that includes a one-mile buffer around the boundary of the areas proposed for exemption for each of the four formations. This study area was selected to extend beyond geologic features, such as sealing faults or pinch-outs, that confine the portions of the aquifer proposed for exemption.

The water well inventory was compiled based on data from the Kern County Water Agency, the Kern County Department of Public Health, Environmental Division, the GeoTracker database, Department of Water Resources Water Quality Library, and water well files. Operator staff performed field inspections to supplement the data review.

The State's water well study identified 204 wells within the study area (see Table 1), including 58 drinking water wells. Of the 58 drinking water wells, 55 are screened in the Alluvium, Kern River Formation, or Kern River/Chanac Formations, all of which are hydrologically isolated from the formations proposed for exemption. Of the remainder, 1 is inactive or destroyed and two are screened in the Chanac/Transition/Santa Margarita Formation, or the Transition/Santa Margarita Formation but are outside the sealing fault that defines the northwestern boundary of the AE area.

The other well types include 84 agricultural/irrigation wells; 7 industrial wells; 4 monitoring/test wells; 1 corrosion protection well; and 50 wells whose type could not be ascertained. All the wells of unknown purpose are screened in the Alluvium/Kern River Formation which is not proposed for exemption, and is hydraulically isolated from the portion of the formations proposed for exemption.

The nearest municipal service company-owned water wells are operated by the East Niles Community Services District (ENCSD). One ENCSD-operated drinking water well is approximately 0.5 miles south of the Portals-Fairfax Area of the field in T30S R29E, Section 7; this well is screened in the Kern River Formation and is outside of the areas proposed for

exemption. Another ENCSD well is approximately 3 miles west of the Race Track Hill Area of the field and is used for monitoring only. A third ENCSD well is approximately 4.3 miles west of the Race Track Hill Area of the field, in T29S R28E Section 35; this well is used for drinking water supply and is outside of the water well study area. The AE request includes documentation of discussion with staff of the ENCSD, who confirmed that no drinking water wells for the water district are present within the areas proposed for exemption.

**Groundwater Flow Patterns:** Fluid flow in each of the formations proposed for exemption is toward the producing wells in each productive area of the field (i.e., from high to low pressure) and away from the boundaries of the areas proposed for exemption. This is because more fluid is withdrawn from the aquifer than is injected. This is based on injection and production data provided in the AE package, and pressure gradient maps that are based on net fluid withdrawal and static fluid level data.

**Confinement of the Formations to Groundwater Flow:** Vertical confinement of the formations proposed for exemption is provided by impermeable formations above and below the formations. Lateral confinement is provided by faulting, pinch-outs, or inward pressure gradients in various areas of the oil field. Specific information about confinement of the portion of each aquifer proposed for exemption is provided below.

#### *Transition/Santa Margarita Formation*

The lower Chanac Formation provides the upper confinement between the Transition/Santa Margarita Formation and the Kern River Formation, which is the source of drinking water in the area. This silt/shale formation is 30 feet thick as determined by geophysical logs and is depicted in cross sections and geologic maps provided in the AE request. (See Figures 3.1 through 3.3.)

Lower confinement is provided by a shale below the Santa Margarita Formation that is 5 feet thick and is present throughout the area proposed for exemption, as shown on cross sections that were developed based on geophysical logging (see Figures 3.1 through 3.3). Evidence for confinement is also provided by a lack of oil in the shale (based on core data) and pressure changes that result in reduced fluid levels due to the withdrawal of fluids.

Lateral confinement of the Transition/Santa Margarita Formation in the Race Track Hill Area of the Edison Oil Field is provided by faulting to the east, and pinch-outs of the formation to the north, south, and west, as follows:

- *To the east*, confinement is provided by the sealing faults of the Ant Hill Fault System. Evidence for the sealing nature of the faults is provided by changes in the oil-water contact across the fault (as shown in well logs), accumulation of oil within the fault boundary, and the absence of oil in wells on the opposite side of the fault.
- *To the north, south, and west*, confinement is due to a pinch-out of the Transition/Santa Margarita Formation. This pinch-out is shown on the isochore maps and cross sections that were created based on well logs provided in the AE request. These areas are also contiguous with the portion of the Transition/Santa Margarita Formation that was exempted at the time DOGGR received primacy to implement the Class II UIC Program.

### ***Main Wicker Sand***

Upper confinement is provided by the marine claystones and mudstones of the Fruitvale Formation. This formation, which is present throughout the area proposed for exemption, is 80 to 150 feet thick and has a permeability of 1.1 mD. Evidence for this permeability is based on lithologic studies of the formation and corroborated by measurements in nearby oil fields. Additional confinement is provided in places where the overlying Upper Wicker Sands transition to an impermeable shale, thereby increasing the overall thickness of the confining layer. (See Figures 3.4 through 3.6.)

Lower confinement for the Main Wicker Sand is provided by a series of low-permeability layers, including the Nozu Sands, the Fruitvale Shale, and the Freeman Jewett Silt (which is almost 700 feet thick). Evidence for the confining nature of these formations includes core data indicating permeabilities of 1.3 mD to 4.5 mD for the Freeman Jewett Silt in the Race Track Hill Area and lithologic studies that show similar properties for the Fruitvale Shale throughout the field. Additional vertical confinement is provided by an inward pressure gradient that is due to a greater volume of fluids being withdrawn from the formation than is injected.

The lateral boundary of the Main Wicker Sand in the Portals-Fairfax Area of the Edison Oil Field is defined by an inward pressure gradient and the previously exempted portion of the formation.

- *To the south, east, and west*, containment along the oil-water contact is the result of an inward pressure gradient caused by the withdrawal of fluids from the Main Wicker Sand in the area proposed for exemption. Evidence of this pressure gradient is based on pressure data and fluid level measurements in production wells. The AE request provides production and water disposal injection volumes for the years 1977 through 2015. During that time, 608,784 bbl of oil and water have been produced from the Main Wicker Sand and 74,339 bbl of water have been injected, for a net fluid withdrawal of 534,445 bbl.
- *To the north*, the area of the Main Wicker Sand that is proposed for exemption abuts the portion of the formation that was previously exempted at the time DOGGR received primacy to implement the Class II UIC program.

### ***Pyramid Hill Sands and Vedder Formation***

Confinement above the Pyramid Hill Sands is provided by the Freeman Jewett Silt. The upper confining unit has an average thickness of 750 feet and a permeability of 1.3 to 4.5 mD. Evidence for the presence of this layer is provided by sidewall core data included in the AE request. Above the Freeman Jewett Silt lies the Nozu Sands and the Main Wicker Sand, which were exempted at primacy in the Race Track Hill Area (see Figures 3.4 through 3.6).

Confinement below the Vedder Formation is provided by a clay interval that separates the Vedder Formation from the Walker Formation, which sits on granitic basement. The lower confining unit has an average thickness of 10 feet and a permeability of 28 mD to 70 mD, based on sidewall core data. Evidence for the presence of this lower confining layer is also provided by electric logs. Though relatively thin, the lower confining zone is continuous throughout the area proposed for exemption. As a secondary means of containment, fluids are expected to follow the inward pressure gradient towards the production wells.



Lateral confinement of the Pyramid Hill Sands and Vedder Formation in the Race Track Hill Area of the Edison Oil Field is provided by sealing faults, including: unnamed faults to the north, east, and west; and the Graham Fault and several unnamed faults to the south. Evidence for the sealing nature of these faults is provided by differences in the elevation of oil-water contacts (based on historical well data and pressure measurements) or the absence of oil in wells outside of the fault blocks, which is documented in the well history reports provided by DOGGR. Additional evidence for the sealing nature of the faults is provided by differences in water quality and in pressure across the fault blocks.

The boundary of the proposed exemption abuts the previously exempted portions of the Pyramid Hill Sands and Vedder Formation.

After reviewing information regarding the location and depth of the existing drinking water wells, groundwater flow within the Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation, and the lateral and vertical confinement of the formations as described in the AE request, the EPA concludes that the portions of these formations that are proposed for exemption 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 portions of the aquifers proposed for exemption meet the criteria at 40 CFR § 146.4(a).

40 CFR § 146.4(b)(1) *It cannot now and will not in the future serve as a source of drinking water because 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.*

DOGGR provided information on hydrocarbon production in the areas proposed for exemption along with supporting documentation such as historic production data, the locations of current and historical producing wells, and well logs and core data to demonstrate the presence of commercially producible quantities of oil in the formations proposed for exemption within the Edison Oil Field.

The Race Track Hill Area of the Edison Oil Field was discovered in September of 1944. Shortly thereafter, production began in the Pyramid Hill Sands and the Vedder Formation. Oil production by steam injection (steaming) has been underway in the Transition/Santa Margarita Formation since 1953. Both steaming and water flood operations occur in the Race Track Hill Area. More than 29 million barrels of oil have been produced in the Race Track Hill Area of the Edison Oil Field. In the Portals-Fairfax Area, production from the Wicker Sand began in 1934. More than 5 million barrels of oil have been produced in the Portals-Fairfax Area of the Edison Oil Field.

There are 163 producing wells in the Race Track Hill Area and 56 producing wells in the Portals-Fairfax Area of the Edison Oil Field. To date, overall, the Edison Oil Field has produced nearly 148 million barrels (bbl) of oil and 72 billion cubic feet of gas field-wide.

DOGGR's AE request provides data demonstrating that each of the four formations proposed for exemption produces hydrocarbons throughout the productive areas of the field:

- The Transition/Santa Margarita Formation currently produces nearly 40,000 bbl/year; this is based on production data provided in the AE request.
- The Main Wicker Sand is the main productive interval in the Portals-Fairfax Area of the Edison Oil Field. The AE request includes production data from selected wells within the portion of the Main Wicker Sand proposed for exemption; these wells have produced 170,000 bbl of oil since 1973.
- The Pyramid Hill Sands and the Vedder Formation are fully hydrocarbon producing in each fault block of the Race Track Hill Area of the Edison Oil Field. DOGGR provided a summary of monthly production data between 1977 and 2015 which shows that the Pyramid Hill Sands and Vedder Formation produce between 1,000 and 2,000 bbl of oil per month.

DOGGR's AE package also includes maps that illustrate cumulative oil production from wells in the proposed exemption areas. (See Figures 4.1 through 4.3.)

Each of the formations proposed for exemption are hydrocarbon-bearing, and hydrocarbons are distributed vertically and laterally throughout the oil field, in the currently exempted portions and the portions proposed for exemption in each formation. Evidence that the formations are commercially productive is presented in sidewall core data, mud logs, and well histories provided in the AE request.

Oil saturation information based on core samples from wells within the oil field also demonstrates the presence of commercially producible quantities of hydrocarbons in each formation. Average oil saturations provided in the AE request are as follows: 32.4% in the Transition/Santa Margarita Formation (with values ranging up to 49.6%); 19.8% in the Main Wicker Sand (ranging up to 23.3%); 7.24% in the Pyramid Hill Sands (ranging up to 16.4%); and 3.0 % in the Vedder Formation (ranging up to 17.6%).

Based on a review of information including well logs, production data, oil saturation, the history of oil production, and the effective implementation of enhanced recovery techniques such as steaming, the EPA has determined that the aquifer proposed for exemption meets the criteria at 40 CFR § 146.4(b)(1).

### **PUBLIC NOTICE AND COMMENT**

DOGGR provided public notice of this proposed AE on July 2, 2018, and held a public hearing on August 2, 2018, in Bakersfield, CA. The public comment period closed on August 9, 2018. DOGGR provided the EPA a summary of the single public comment it received, a copy of the public comment, a transcript of the public hearing, and their responses to the written comment.

In making this decision, the EPA considered all the information submitted by the State, including the written comment submitted to the State during its public comment process. Most of the issues raised in the comments are outside of the scope of this AE decision; specific responses not addressed by DOGGR are provided below.

One commenter (The Center for Biological Diversity) wrote to DOGGR and commented that the EPA should reject the aquifer exemption request until an environmental review has occurred under the National Environmental Policy Act (NEPA). NEPA review is not required because the

public comment and hearing process afforded by DOGGR, the 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 decision.

The same commenter also raised concerns regarding protection of species under the federal Endangered Species Act. After consideration of this issue, the EPA has determined that ESA consultation is not required because the AE approval has no effect on any listed, threatened or endangered species or the designated critical habitat of such species. EPA's conclusion is based upon a number of considerations. First, the AE approval changes the jurisdictional status of a confined aquifer hundreds to thousands of feet below the ground surface under the SDWA. None of the species are present in the subsurface portions of the aquifer considered in EPA's approval action and it is speculative whether any listed species or critical habitat overlaps with the surface-level activities. EPA's approval of the AE is only one preliminary step in the process leading to potential fluid injection in the aquifer, with many additional steps (including state actions and decisions and actions by third party operators) that must occur prior to injection and prior to any potential effects to protected species or habitat at the surface. For example, new injection well(s) into the AE require a separate permit, which the State of California must review and approve before any fluids may be injected into the AE. Thus, EPA would not be the legal cause of potential effects to listed species or designated critical habitat, if any.

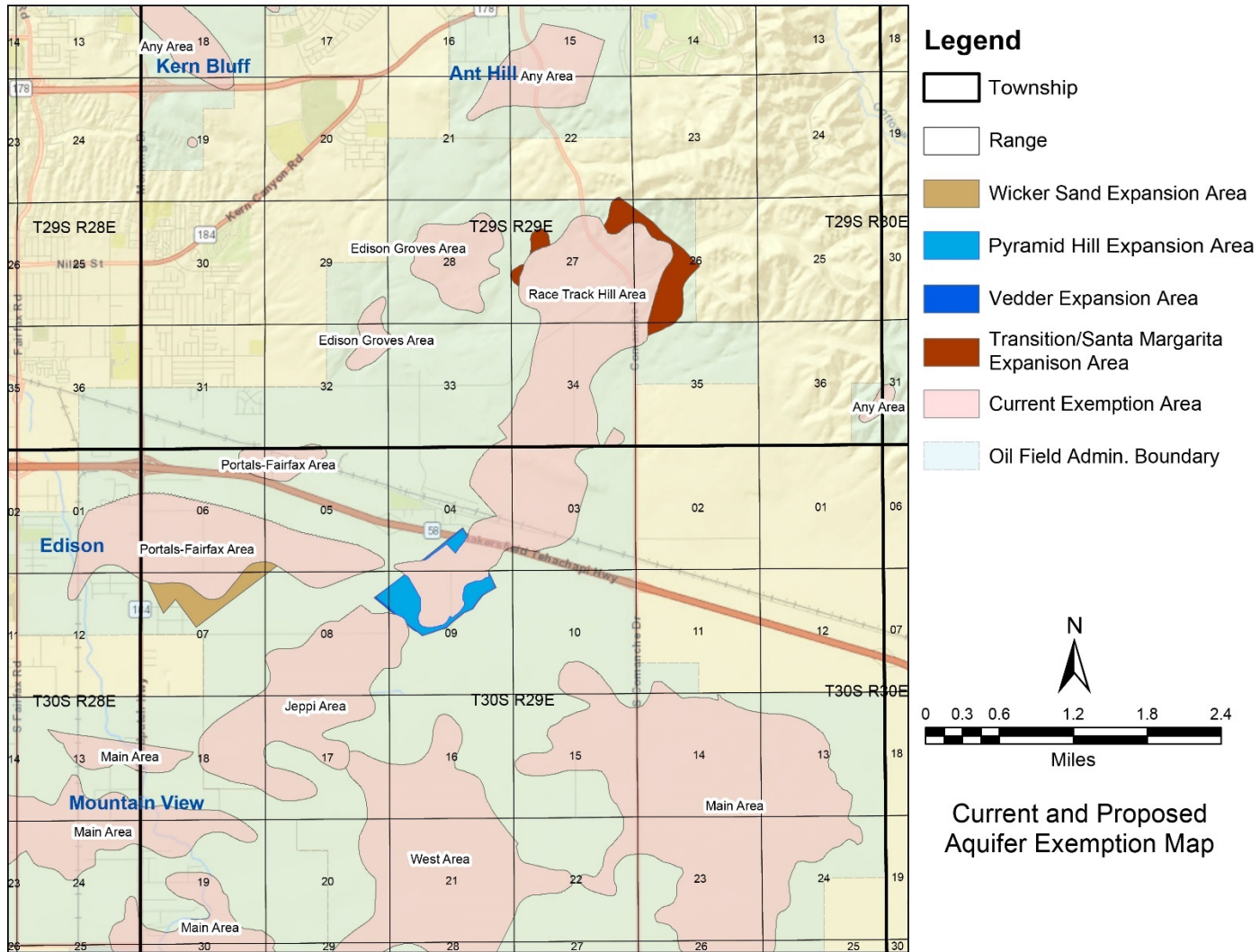
Additionally, the commenter questioned whether the current aquifer exemption criteria reflect changing climate conditions and modern water treatment technologies. In considering whether the aquifers proposed for exemption cannot now and will not in the future serve as sources of drinking water because they are hydrocarbon producing, the EPA reviewed data about hydrocarbon production in the portions of the Transition/Santa Margarita Formation, Main Wicker Sand, Pyramid Hill Sands, and Vedder Formation that are proposed for exemption. Based on a review of historic production data, well logs, and core data, the EPA concludes that the formations will continue to be commercially producible into the foreseeable future and meet the existing requirements at 40 CFR § 146.4(b)(1).

### CONCLUSION AND DECISION

Based on a review of the entire record, including all written and oral comments submitted to DOGGR during its public comment process, EPA finds that the exemption criteria at 40 CFR § 146.4(a) and § 146.4(b)(1) have been met, and EPA approves the aquifer exemption request as a non-substantial program revision.

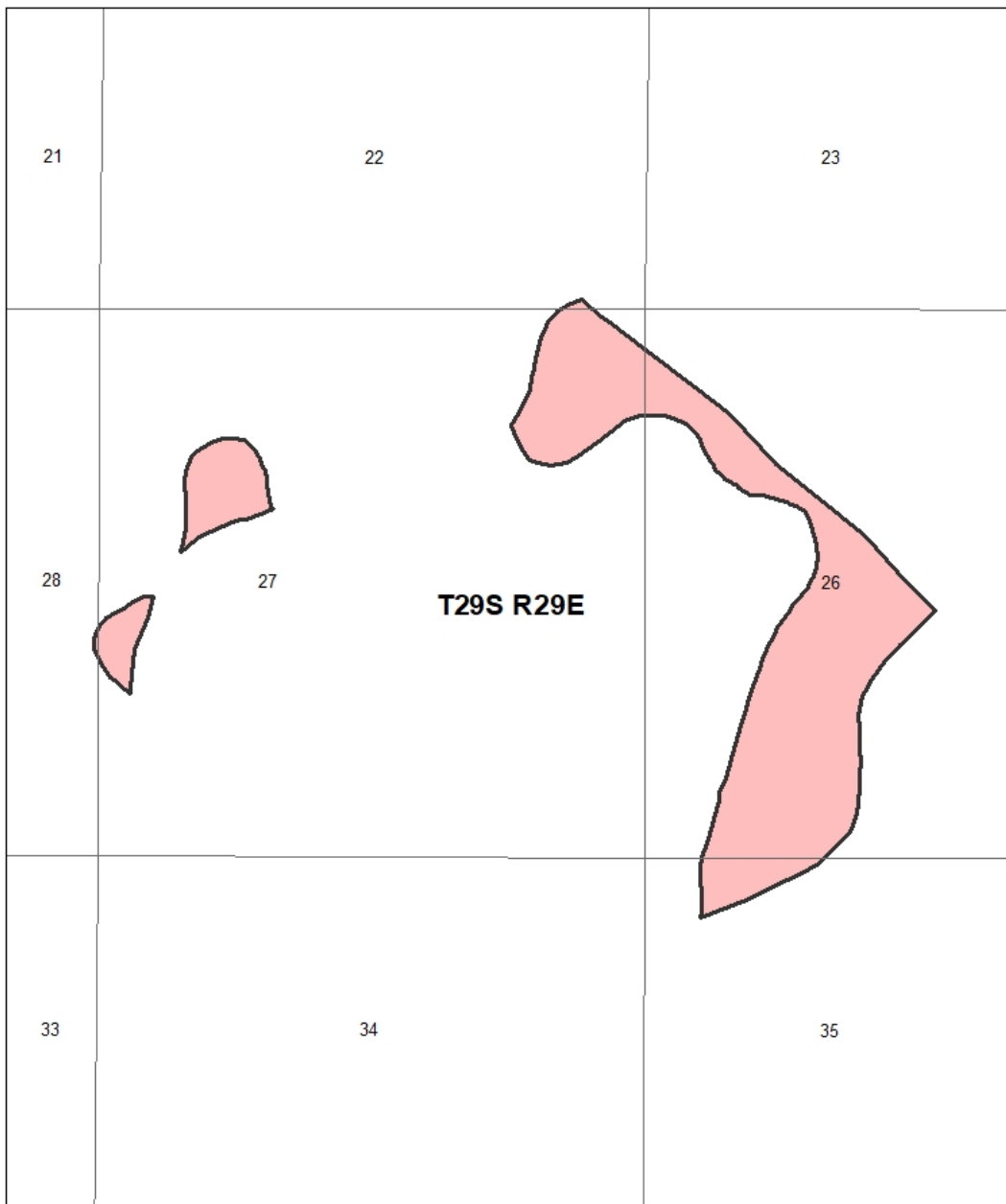
Effective Date: May 14, 2019

**Figure 1: Location of the Edison Oil Field, Kern County, California**



**Source: Figure Ex-15, DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Figure 2.1: Transition/Santa Margarita Formation Aquifer Exemption Location Map, Edison Oil Field, Kern County, California**



**Proposed Exemption Area**

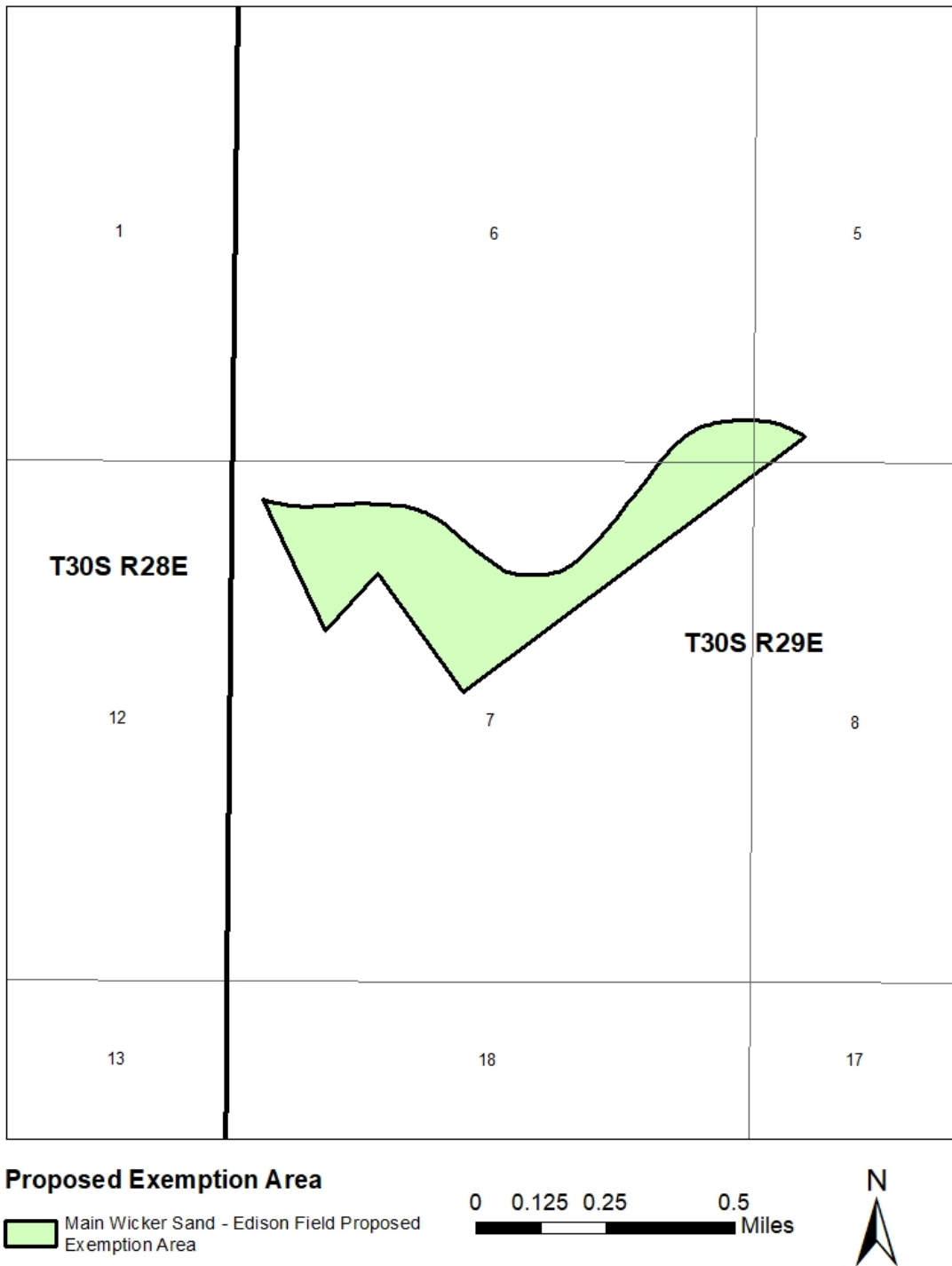
Transition/Santa Margarita Formations - Edison Field Proposed Exemption Area

0 0.125 0.25 0.5 Miles



**Source: DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Figure 2.2: Main Wicker Sand Aquifer Exemption Location Map, Edison Oil Field, Kern County, California**



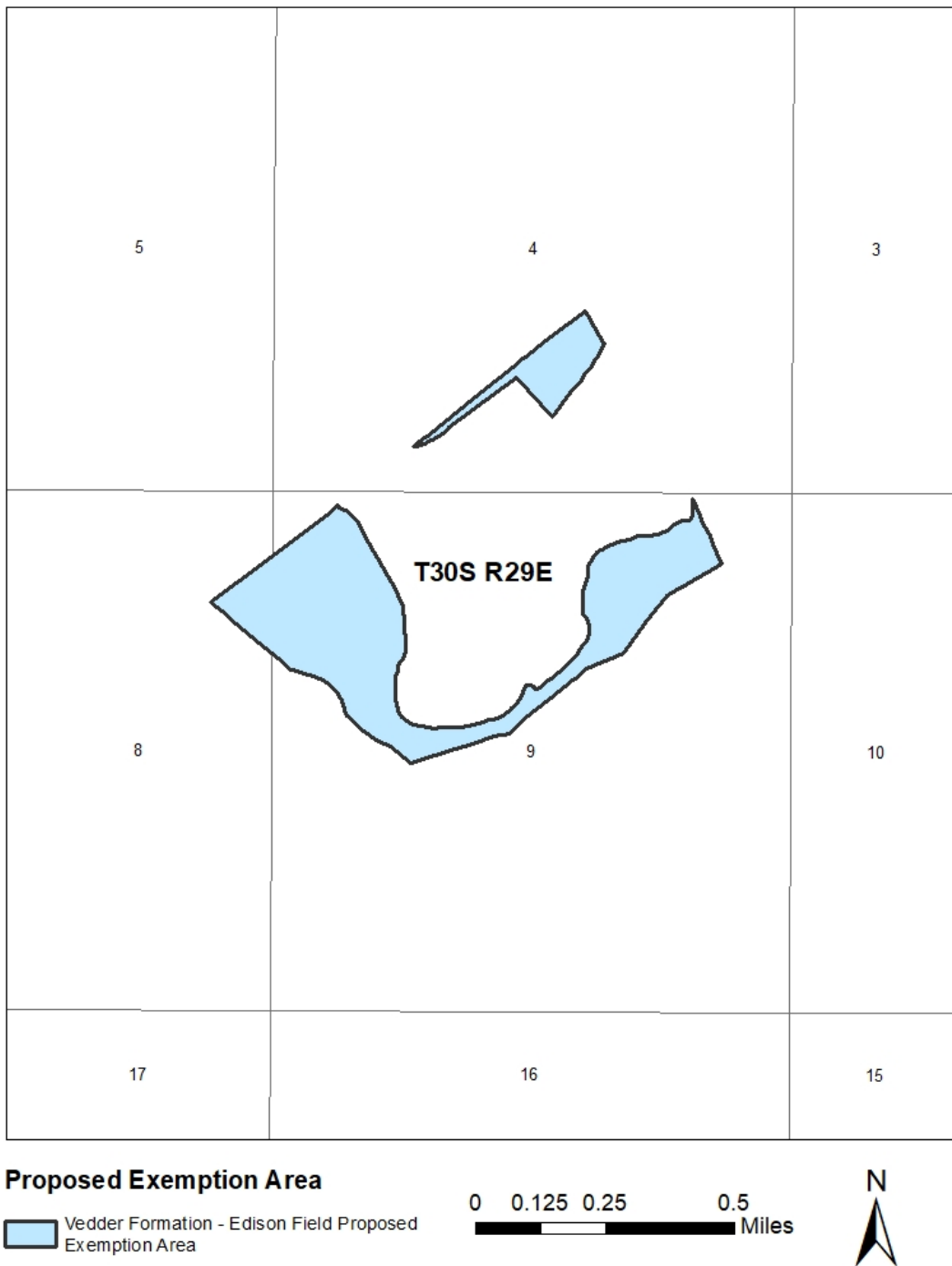
**Source: DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Figure 2.3: Pyramid Hill Sands Aquifer Exemption Location Map, Edison Oil Field, Kern County, California**



**Source: DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

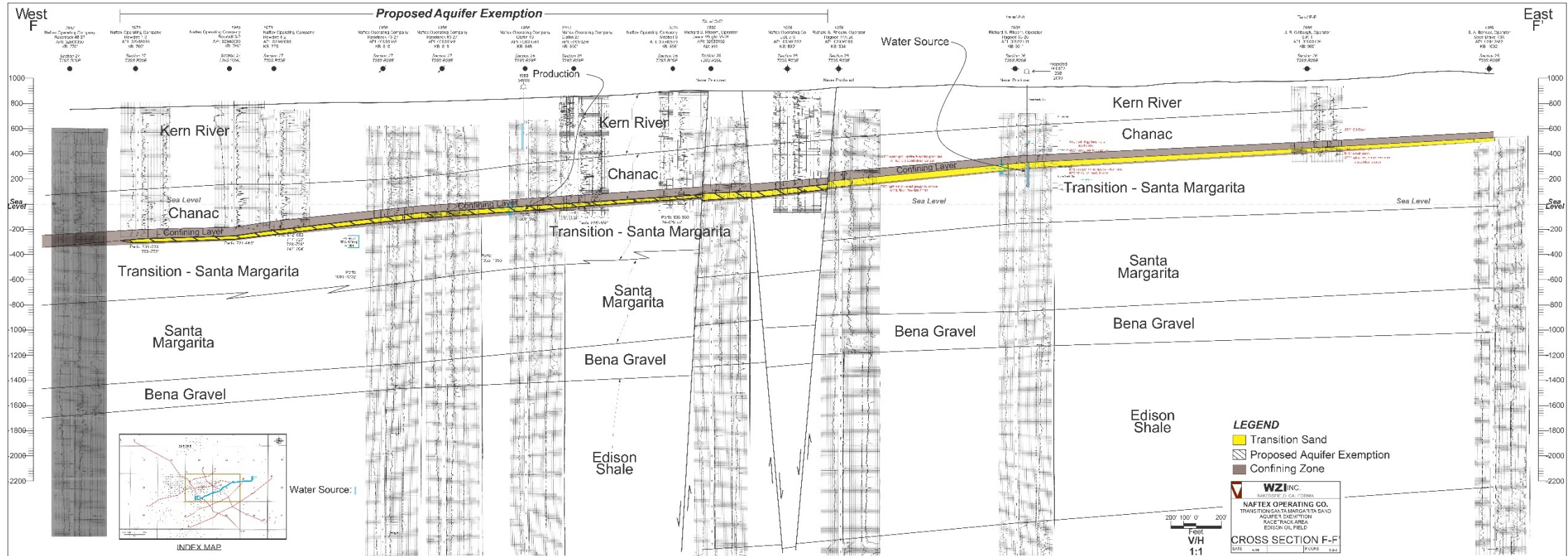
**Figure 2.4: Vedder Formation Aquifer Exemption Location Map, Edison Oil Field, Kern County, California**



**Source: DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

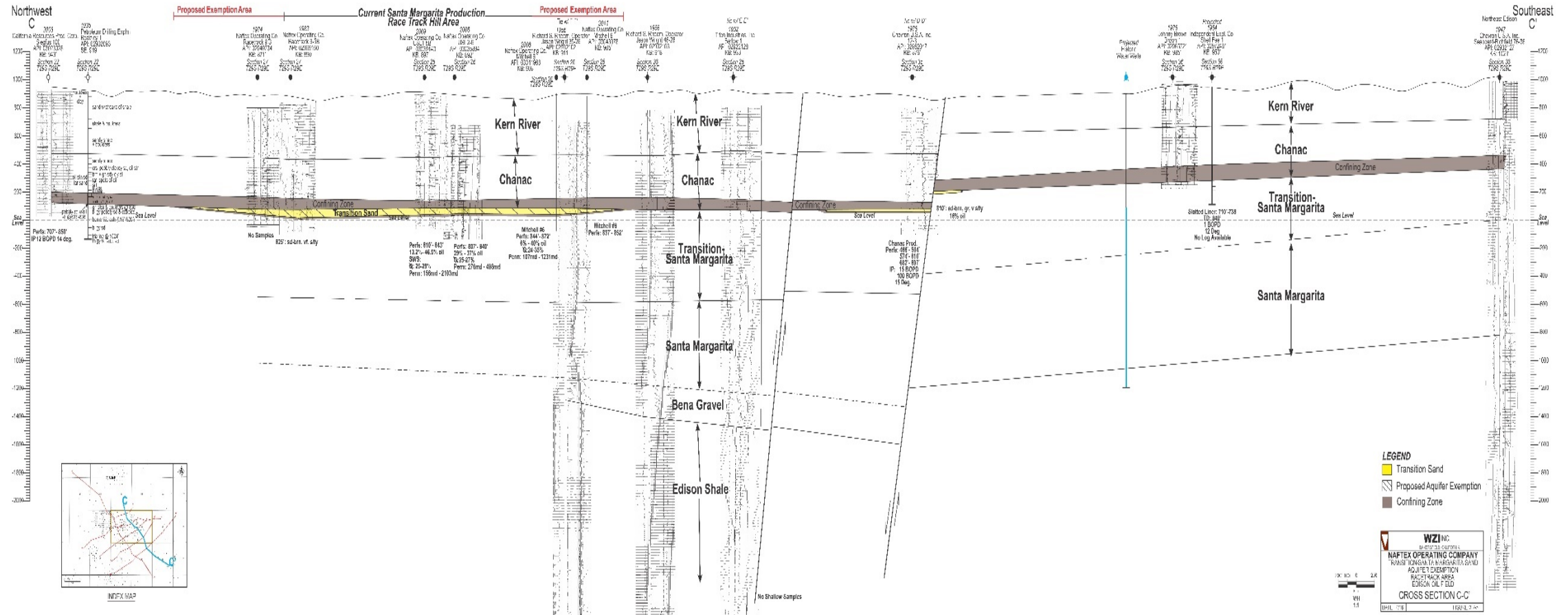


**Figure 3.1: Cross Section F-F' across the Edison Oil Field, Kern County, California**



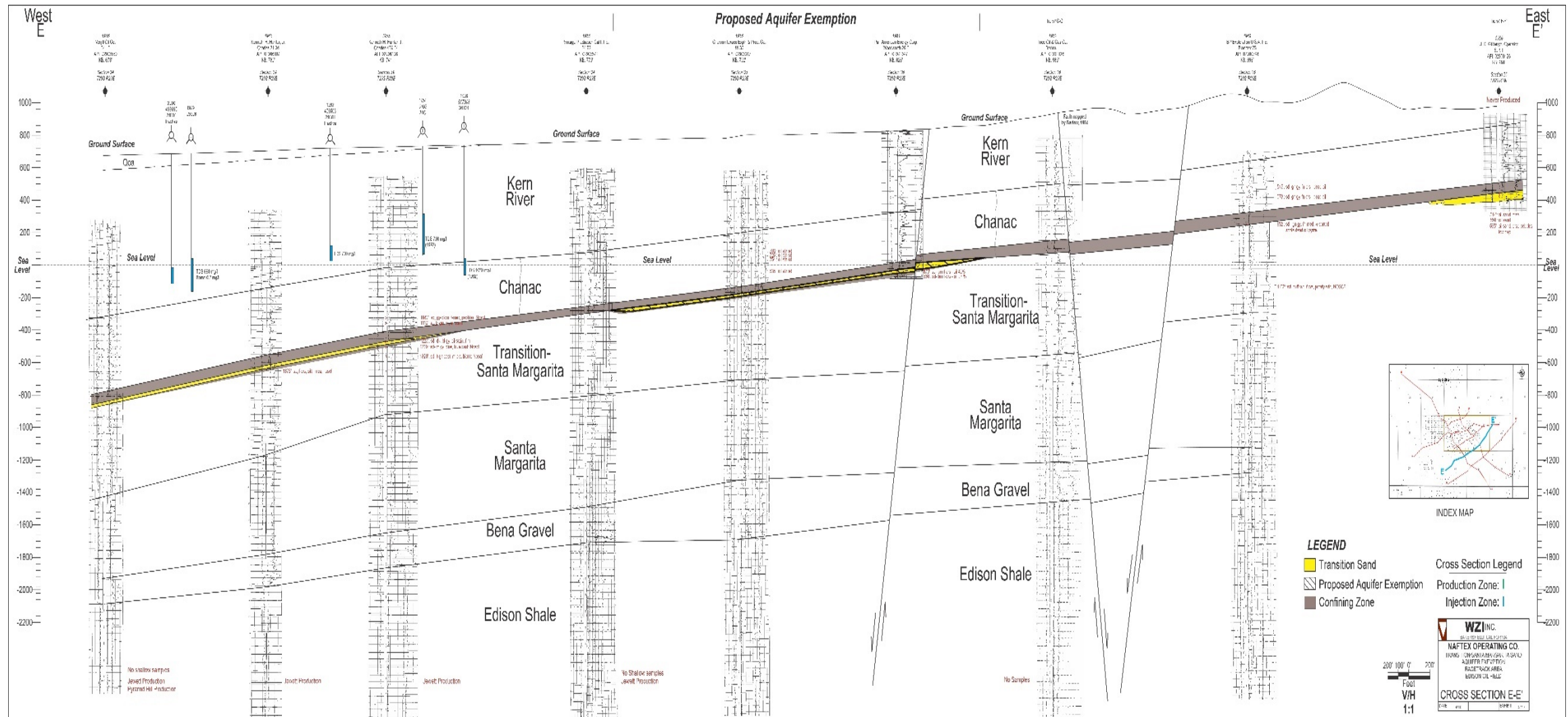
**Source: Figure Ch3.3.2-8, DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Figure 3.2: Cross Section C-C' across the Edison Oil Field, Kern County, California**



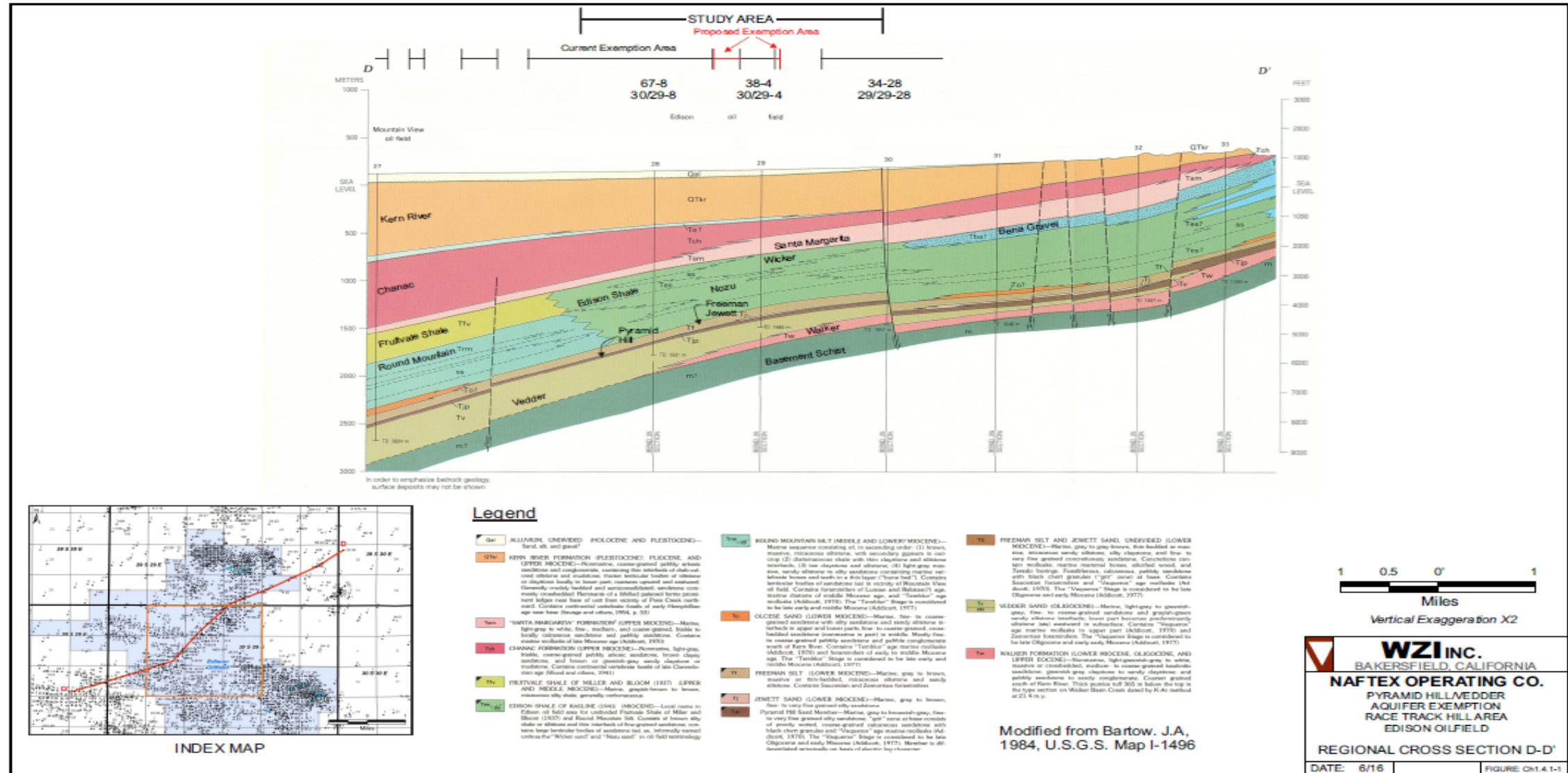
**Source: Figure Ch3.3.2-5, DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Figure 3.3: Cross Section E-E' across the Edison Oil Field, Kern County, California**



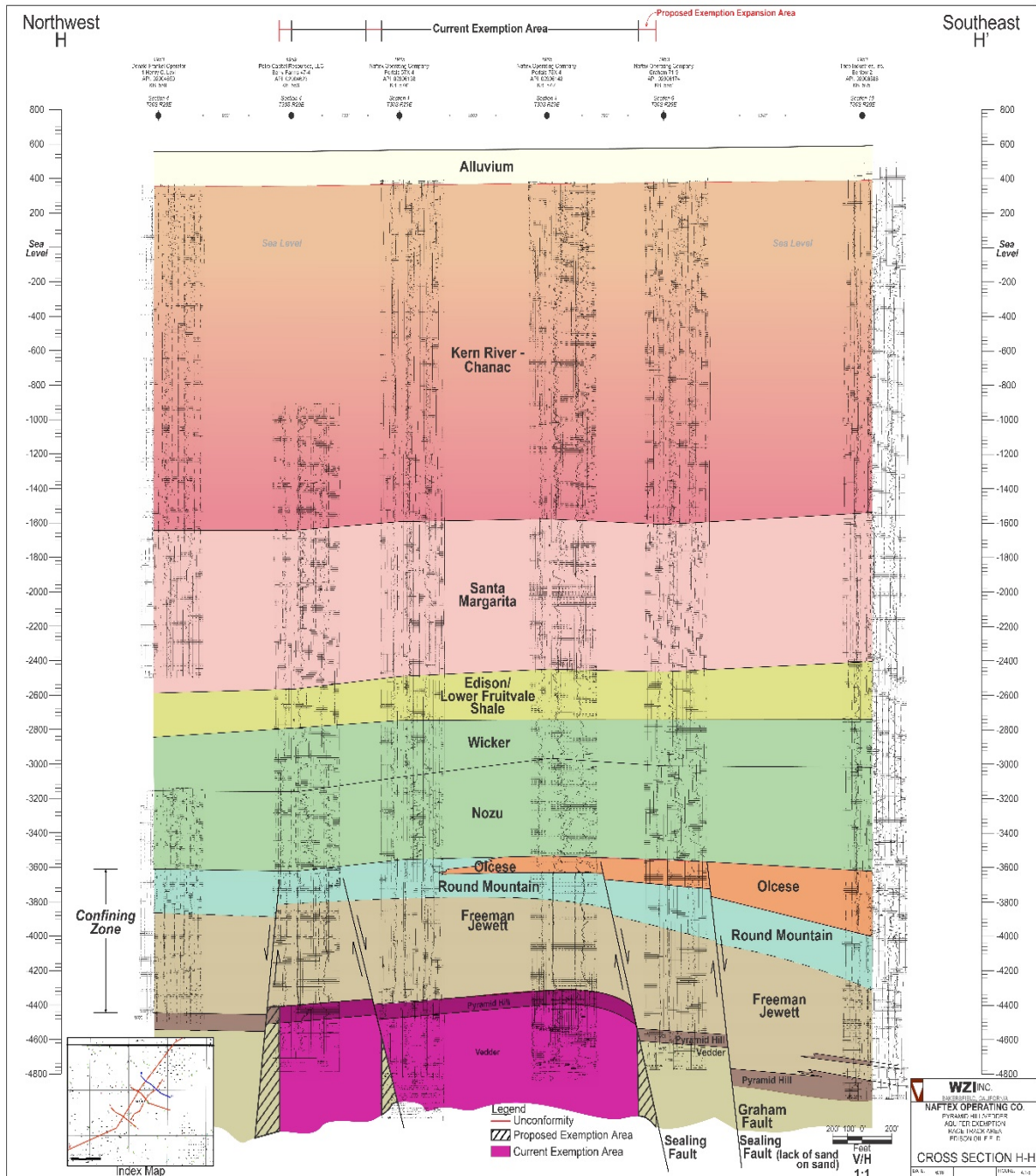
**Source: Figure Ch3.3.2-7, DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1).**

Figure 3.4: Regional Cross Section D-D' across the Edison Oil Field, Kern County, California



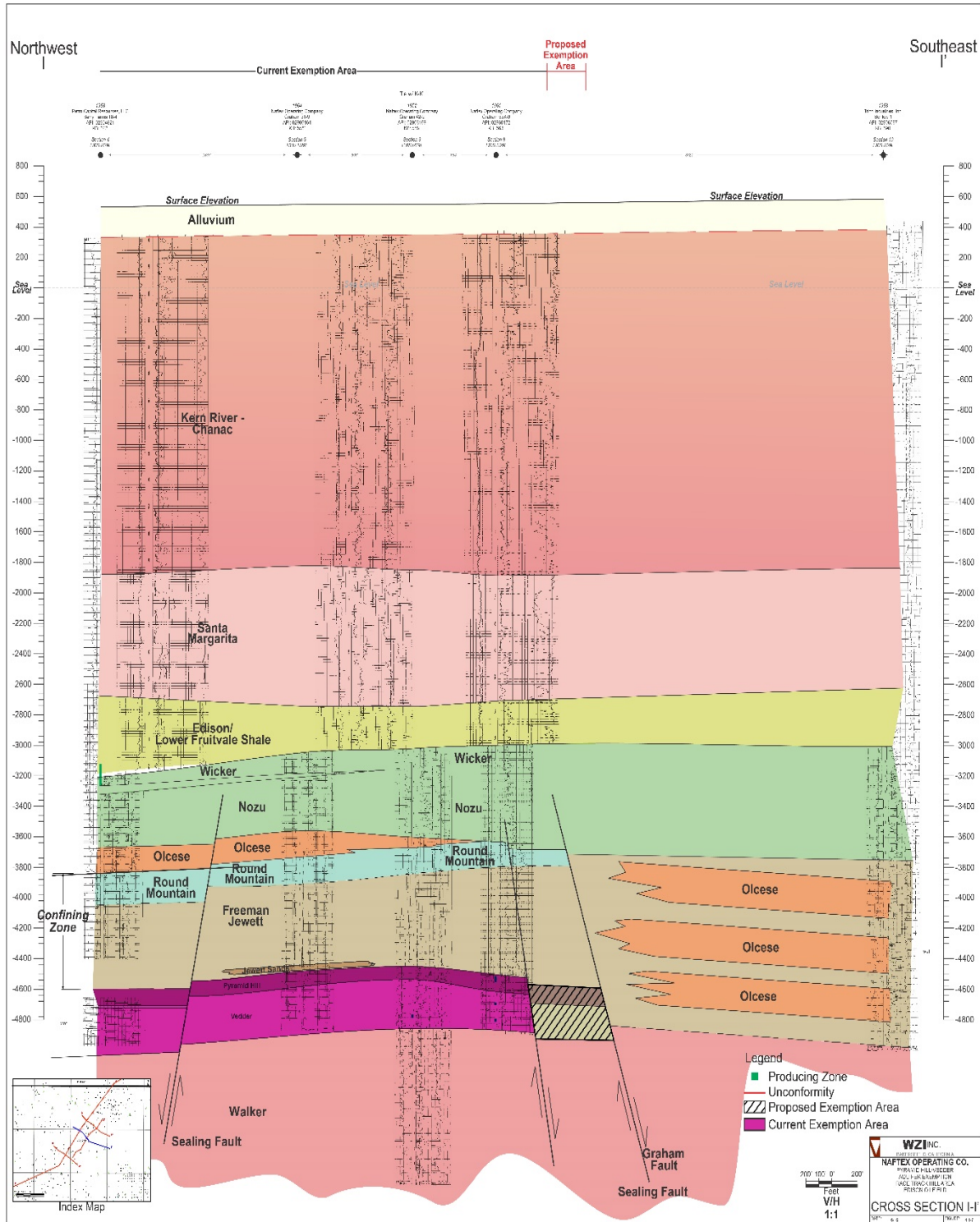
Source: Figure Ch1.4.1-1, DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)

**Figure 3.5: Cross Section H-H' across the Edison Oil Field, Kern County, California**



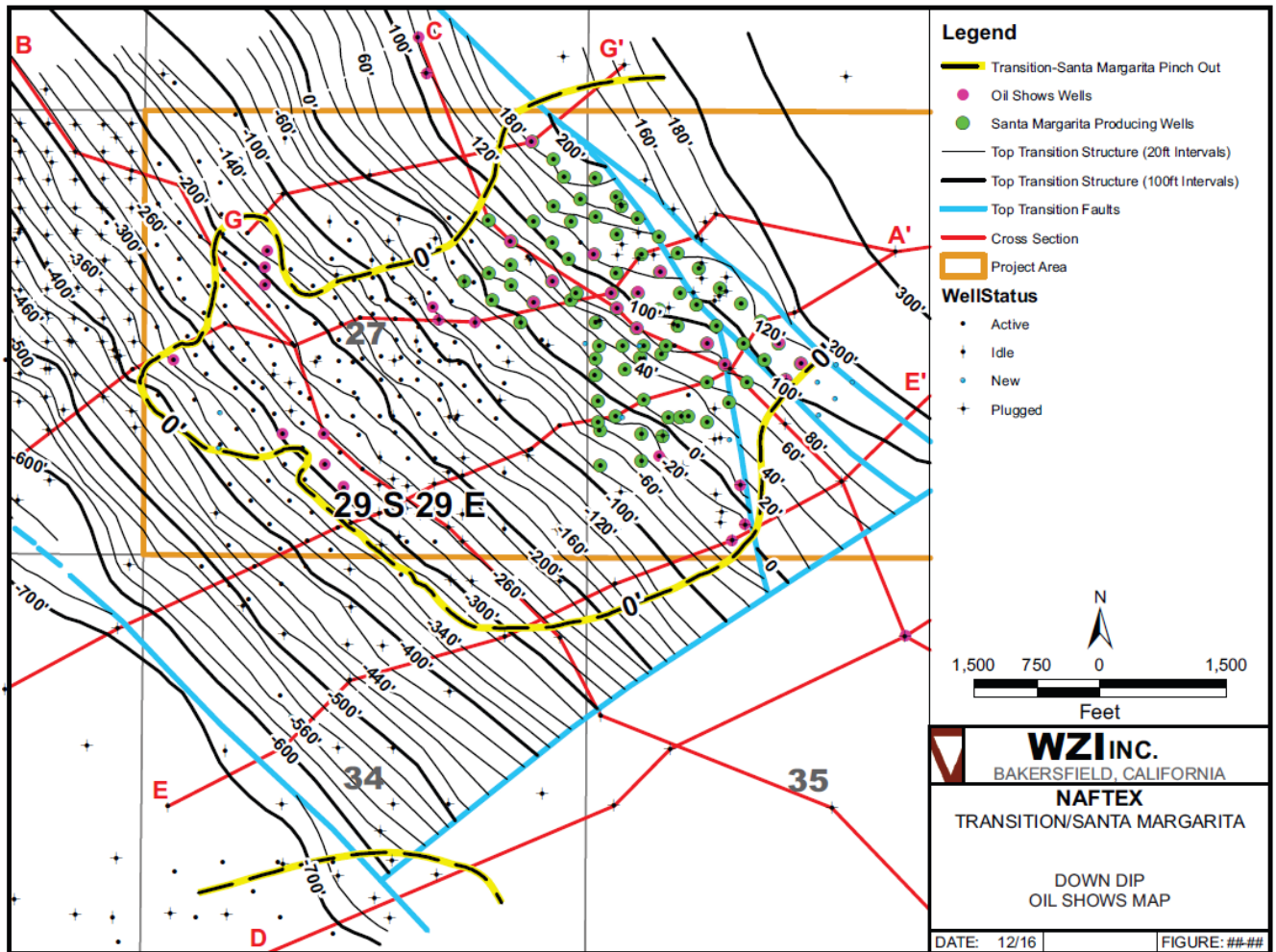
**Source: Figure Ch1.4.1-6, DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Figure 3.6: Cross Section I-I' across the Edison Oil Field, Kern County, California**



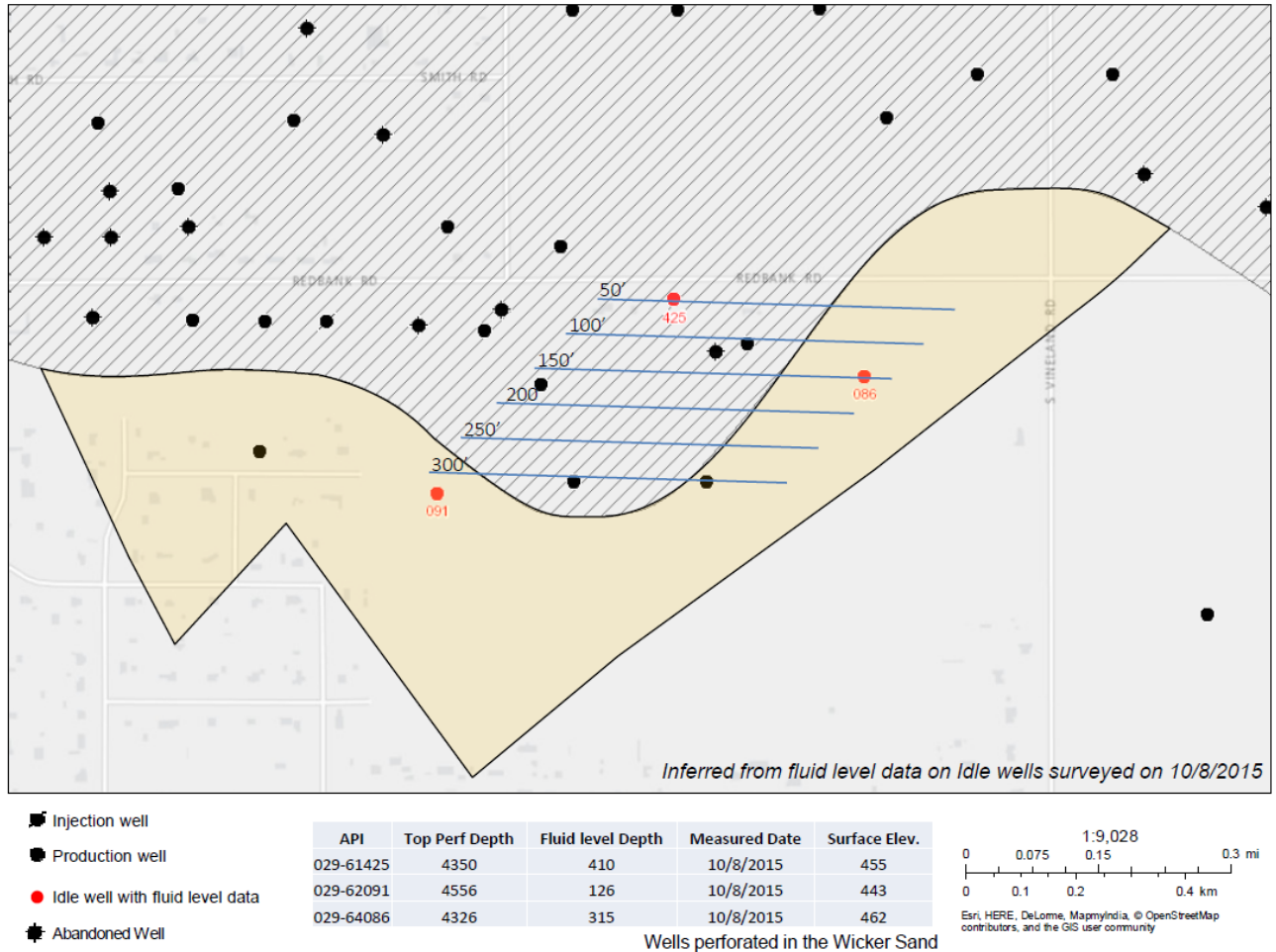
**Source: Figure Ch1.4.1-7, DOGGR’s Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Figure 4.1: Producing Wells in the Transition/Santa Margarita Formation, Edison Oil Field, Kern County, California**



Source: DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)

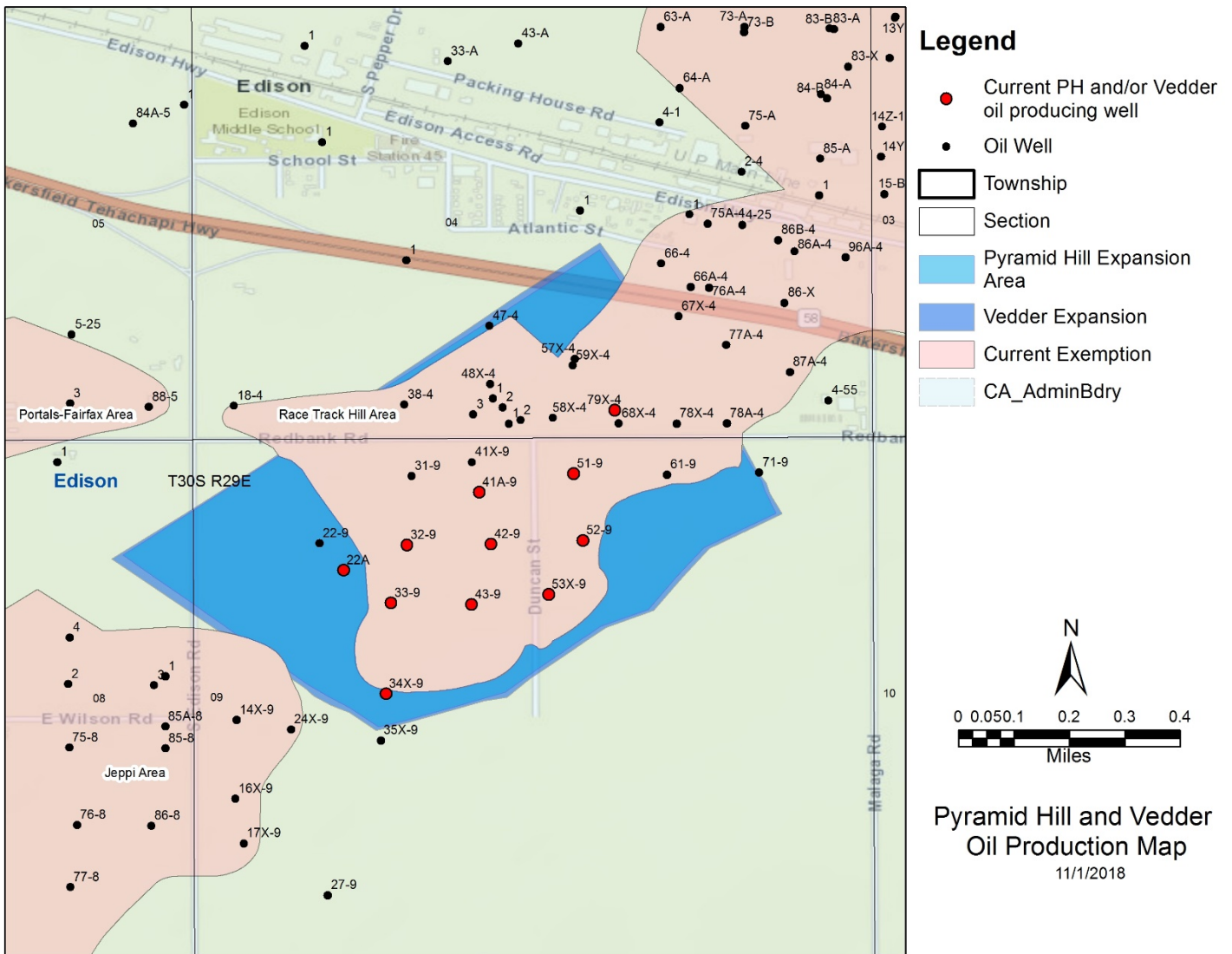
**Figure 4.2: Producing Wells in the Main Wicker Sand, Edison Oil Field, Kern County, California**



**Source: DOGGR’s Aquifer Exemption Application for the Edison Oil Field (Volume 1)**



**Figure 4.3: Producing Wells in the Pyramid Hill Sands and Vedder Formation, Edison Oil Field, Kern County, California**



**Source: DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)**

**Table 1: List of Water Supply Wells**

Map ID	Record ID	Permit Number	APN	Program/Element	Township	Range	Section	Well Number	Status	Date Drilled	Total Depth (ft)	Screen Interval (ft)	Zone
EC01				Domestic	29	29	16	G	UNK	4/4/1977	741	380-580, 640-741	Kern River/Chanac
EC02				Domestic	29	29	16	H4	UNK	9/14/1972	480	340-480	Kern River
EC03	WP0010905	WP 10905	387-160-12	Domestic	29	29	16	J	Destroyed	UNK	500	N/A	Kern River
EC04				Domestic	29	29	16	K1	UNK	4/25/1975	741	350-741	Kern River/Chanac
EC05	WP0004880	EH-116-96		Domestic	29	29	16	K2	Destroyed	6/26/1996	1200	80-1200	Kern River/Chanac/Santa Margarita
EC06				Domestic	29	29	16	K		2/7/1977	750	450-750	Kern River/Chanac
EC07				Domestic	29	29	20	B		7/31/1981	1600	300-500;540-1600	Chanac/Transition/Santa Margarita-
EC08				Domestic	29	29	20	C	UNK	4/29/1974	673	60-140, 160-180, 200-	Kern River/Chanac
EC09				Domestic	29	29	20	E	UNK	7/6/1988		375-675	Kern River /Chanac outside exemption area
EC10	WP0005154	EH-141-97	387-050-01	Industrial	29	29	21	E	Destroyed	6/6/1997	1040	UNK	Chanac
EC11				Domestic	29	29	22	J	UNK	12/28/1974	618		Kern River/Chanac
EC12				Agricultural	29	29	22	P	No Well	8/23/1973	800	500'-750'	Chanac
EC13					29	29	24						Kern River <sup>1</sup>
EC14	WP0000227	EH-347-89	387-060-12	Domestic	29	29	24	J	Inactive code	10/25/1989	600	240-360	Chanac
EC15	WP0002684	EH-044-91	387-060-07	Domestic	29	29	24	N1	Inactive code	9/14/1991	460	360-460	Chanac
EC16				Agricultural	29	29	24	N2		3/15/1971	400	180-400	Chanac
EC17	WP0007333	EH-1717	388-010-14	DOMESTIC / I	29	29	26	B01	Completed	10/31/2003	820	600-800	Transition/Santa Margarita- outside exemption area
EC18				Domestic	29	29	26	C	UNK	2/12/1980	455	250-455	Kern River/Chanac
EC19				Agricultural	29	29	26	J		12/22/1954	300	108-300	Kern River
EC28	WP0009352	EH-3703	388-140-11	Agricultural	29	29	31	A	Destroyed	6/21/2006	205	UNK	Kern River
EC21	WP0008570	EH-2951	388-010-28	DOMESTIC / I	29	29	26	N	Destroyed	5/11/2005	820	620-680	Kern River/Chanac
EC22	e067899	WP1167	388-010-29	Domestic	29	29	26	N2		8/28/2008	900	570-750	Kern River/Chanac
EC23	WP0007629	EH-2001	388-020-27	(none)	29	29	28	P01	Inactive code	4/13/2004	775	670-750	Kern River
EC24	WP0008828	EH-3186	388-072-10	st Hole/Agricultu	29	29	30	A	Destroyed	9/3/2005	1200	N/A	Chanac
EC29	WP0009351	EH-3702	388-140-11	Agricultural	29	29	31	A1	Destroyed	6/21/2006	1000	UNK	Kern River
EC43				Agricultural	29	29	32	F		7/7/1975	750	505-720	Kern River
EC27	WP0009101	EH-3434	388-720-10	APPL: AGRICUL	29	29	30	G01	Destroyed	6/28/2006	1100	500-1100	Kern River
EC53				Agricultural	29	29	33	N2	UNK	0/00/1909	375		Kern River
EC57			388-050-08	Agricultural	29	29	34	C02		7/11/1973	800	550-800	Kern River
EC30					29	29	31	E	UNK	0/00/1909	279		Kern River
EC31					29	29	31	F	UNK	0/00/1909	188		Kern River
EC32					29	29	31	G	UNK	0/00/1909	376		Kern River
EC58				Agricultural	29	29	34	C03		8/18/1954	672	420-666	Kern River
EC34					29	29	31	H01					Kern River <sup>1</sup>
EC35	WP0007203	EH-1586	388-150-04	Test Well	29	29	31	L	Destroyed	7/29/2003	850		Kern River
EC36	WP0007624	EH-1997	388-150-04	Monitor	29	29	31	L1	Inactive code	8/26/2004	695		Kern River
EC37				Municipal	29	29	31	L2	UNK	3/20/1956	1002	432-1002	Kern River
EC38					29	29	31	N1	UNK	3/00/1947	300		Kern River
EC39					29	29	31	N02	UNK				Kern River <sup>1</sup>
EC64	USBR 29/29-36M1			Agricultural	29	29	36	M1		6/1/1949	1502	1037-1502	Transition/Santa Margarita- outside exemption area
EC41					29	29	32	A1	UNK	4/30/1905	660		Kern River

**Table 1: List of Water Supply Wells (continued)**

Map ID	Record ID	Permit Number	APN	Program/Element	Township	Range	Section	Well Number	Status	Date Drilled	Total Depth (ft)	Screen Interval (ft)	Zone
EC65	USBR 29/29-36M2			Agricultural	29	29	36	M2		8/15/1956	2125	UNK	Transition/Santa Margarita- outside exemption area
EC20				Irrigation	29	29	26	M	UNK	1/22/1980	406	200-400	Kern River
EC44				Domestic	29	29	32	H1	UNK	1/13/1977	422	222-422	Kern River
EC25	e052131	WP 9887	388-072-10	Irrigation	29	29	30	A1	UNK	12/2/2006	940	420-930	Kern River/Chanac
EC46					29	29	32	L01					Kern River <sup>1</sup>
EC26				Irrigation	29	29	30	E	UNK	2/21/1966	1006	546-1006	Kern River
EC33				Irrigation	29	29	31	H	UNK	3/16/1959	2150	500-1005, 944-2150	Kern River/Chanac/Santa Margarita
EC49					29	29	33	E1	UNK		382		Kern River
EC40				Irrigation	29	29	31	R1	UNK	7/12/1949			Kern River <sup>1</sup>
EC42				Irrigation	29	29	32	A2	UNK	3/7/1958	1250		Kern River/Chanac
EC52					29	29	33	N1	UNK		680+		Kern River at 680
EC45				Irrigation	29	29	32	H	UNK	2/7/1958	1000	488-1000	Kern River
EC47				Irrigation	29	29	32	M	UNK	11/16/1964	860	580-860	Kern River
EC55	WP0005392	EH-048-98	388-050-30	Domestic	29	29	34	B	Inactive code	4/17/1998	800	700-800	Kern River/Chanac
EC56	WP0003630	EH-419-92	388-050-05	(none)	29	29	34	C01	Inactive code	12/18/1992	700	600-700	Kern River
EC48				Irrigation	29	29	32	M1	UNK	12/31/1951	600	381-594	Kern River
EC50				Irrigation	29	29	33	F2	UNK	12/2/1957	1957	1388-1957	Chanac/Transition/Santa Margarita- outside exemption area
EC59	WP0009019	EH-336	388-050-08	DOMESTIC / I	29	29	34	E1	Inactive code	2/15/2000	800	700-800	Kern River
EC60				Domestic	29	29	34	E2		3/1/1979	850	650-850	Kern River/ Chanac
EC51				Irrigation	29	29	33	H01	UNK	10/1/1945	700		Kern River
EC62	e0086600	WP 1151	388-060-04	Industrial	29	29	36	E2	UNK	12/15/2008	1800	720-800, 850-1780	Transition/Santa Margarita- outside exemption area
EC54				Irrigation	29	29	33	R1	UNK	5/28/1951	830	402-744, 750-830	Kern River/Chanac
EC63				Irrigation	29	29	36	E1	UNK	9/12/1959	2200	797-2200	Transition/Santa Margarita- outside exemption area
EC66				Irrigation	29	29	36	N1	UNK	10/11/1950	1308	918-1308	Transition/Santa Margarita- outside exemption area
EC67				Irrigation	29	29	36		UNK		1140		No well present
EC68				Irrigation	30	28	1	A	UNK	7/11/1959	356		Kern River
EC69				Irrigation	30	28	1	C	UNK	6/00/1952	171	92-170	Kern River
EC74				Irrigation	30	28	1	P3	UNK	3/9/1952	675		Kern River
EC70				Domestic	30	28	1	E	UNK	12/30/1966	394	374-390	Kern River
EC71				Domestic	30	28	1	F	UNK	1/26/1967	750	350-750	Kern River
EC72	e0094116	WP 11906			30	28	1	L	Destroyed		600	450-600	Kern River
EC73				Domestic	30	28	1	P2	UNK	7/20/1970	405	250-310, 370-390	Kern River
EC79				Irrigation	30	28	12	C1	UNK	4/6/959	423	270-423	Kern River
EC75				Domestic	30	28	1		UNK	1/30/1975	620	360-600	Kern River
EC76				Domestic	30	28	12	A1	UNK	9/16/1966	550	300-550	Kern River
EC77				Domestic	30	28	12	A2	UNK	5/13/1959	584	328-584	Kern River

**Table 1: List of Water Supply Wells (continued)**

Map ID	Record ID	Permit Number	APN	Program/Element	Township	Range	Section	Well Number	Status	Date Drilled	Total Depth (ft)	Screen Interval (ft)	Zone
EC78				Domestic	30	28	12	B	UNK	5/1/1978	700	358-700	Kern River
EC86				Irrigation	30	28	12	J2	UNK	9/1/1954	378	180-378	Kern River
EC80				Domestic	30	28	12	C2	UNK	1/31/1963	300	240-300	Kern River
EC81				Domestic	30	28	12	D	UNK	9/5/1973	457	307-457	Kern River
EC82					30	28	12	E1	UNK	2/9/1946	575+		Kern River <sup>1</sup>
EC83				Domestic	30	28	12	F	UNK	11/23/1977	519	400-500	Kern River
EC84				Domestic	30	28	12	H	UNK	2/7/1977	471	271-471	Kern River
EC85					30	28	12	J1	UNK				Kern River <sup>1</sup>
EC97				Irrigation	30	29	2	D	UNK	12/30/1968	750	513-693, 674-739	Kern River
EC87		EH-155-97	173-290-03	Domestic	30	28	12	K	UNK	6/19/1997	520	400-500	Kern River
EC88				Domestic	30	28	12	L	UNK	3/14/1977	500	260-500	Kern River
EC89	e028225	3105	173-291-04	Domestic	30	28	12	M	UNK	8/14/2005	500	420-500	Kern River
EC90				Domestic	30	28	12	N	UNK	5/17/1974	430		Kern River
EC91				Domestic	30	28	12	N1	UNK	12/7/1973	417	317-417	Kern River
EC92			173-293-07	Domestic	30	28	12	N2	UNK	9/24/1996	400	340-400	Kern River
EC93		WP 9976	173-293-03	Industrial	30	28	12	N3	UNK	2/21/2007	450	370-450	Kern River
EC94		EH-031-94		Domestic	30	28	12	N4	UNK	2/1/1994	405		Kern River
EC95				Domestic	30	28	12	P	UNK	11/13/1987	644	324-624	Kern River
EC96					30	28	12	Q1	UNK	0/00/1949			Kern River <sup>1</sup>
EC101				Irrigation	30	29	2	L1	UNK	10/2/1946	706		Kern River
EC98				Other	30	29	2		UNK	3/1/1964	516	410-510	Kern River
EC99					30	29	2	J1					Kern River <sup>1</sup>
EC100					30	29	2	K1	UNK	7/12/1949	796	425-796	Kern River
EC102				Irrigation	30	29	3	B	UNK	11/10/1951	1212	800-1212	Kern River/Chanac
EC105				Irrigation	30	29	3	K2	UNK	11/3/1955	811	0-794	Kern River
EC103					30	29	3	F	UNK		430	272-424	Kern River
EC104					30	29	3	K	UNK		795	393-795	Kern River
EC108				Irrigation	30	29	3		UNK	12/5/1961	830	256-824	Kern River
EC106					30	29	3	L1		7/12/1949			Kern River <sup>1</sup>
EC107					30	29	3	Q1	Destroyed	5/15/1909	431	202-431	Alluvium/Kern River
EC113				Irrigation	30	29	4	F1	UNK	3/26/1958	879	479-879	Kern River
EC109					30	29	4	C1	UNK		300	176.5-280.5	Kern River
EC110	e0180280	WP 14110	177-030-30	Domestic	30	29	4	E	Active	5/28/2013	825	500-800	Kern River
EC111					30	29	4	E1	UNK	7/13/1949	500		Kern River
EC112				Domestic	30	29	4	F	UNK	3/11/1966	900	450-900	Kern River
EC114				Irrigation	30	29	4	G	UNK	9/14/1970	810	510-800	Kern River
EC122				Irrigation	30	29	4		UNK		1140		Kern River
EC115					30	29	4	J1	UNK	0/00/1947			Kern River <sup>1</sup>
EC116				Industrial	30	29	4	K	UNK	10/8/1959	600	150-600	Alluvium/Kern River
EC117					30	29	4	K1	UNK	0/00/1944			Kern River <sup>1</sup>
EC118					30	29	4	P1	UNK	12/31/1943			Kern River <sup>1</sup>
EC119					30	29	4	Q1	UNK		1008	252-542	Kern River

**Table 1: List of Water Supply Wells (continued)**

Map ID	Record ID	Permit Number	APN	Program/Element	Township	Range	Section	Well Number	Status	Date Drilled	Total Depth (ft)	Screen Interval (ft)	Zone
EC120				Industrial	30	29	4	R	UNK	7/17/1968	715	402-708	Kern River
EC121				Industrial	30	29	4		UNK	1/16/1957	700	544-694	Kern River
EC124				Irrigation	30	29	4		UNK	11/10/1954	528	288-522	Kern River
EC123					30	29	4		UNK		350		Kern River
EC125		EH 36-99	127-130-24	Irrigation	30	29	5	A	UNK	3/18/1999	630	302-606	Kern River
EC129				Irrigation	30	29	5	C	UNK	7/26/1991	600	300-600	Kern River
EC126					30	29	5	B1	UNK	07/00/1947	600		Kern River
EC127					30	29	5	B3	UNK	08/00/1946	660		Kern river
EC128					30	29	5	B4	UNK	0/00/1938	352	22-322	Alluvium/Kern River
EC131				Irrigation	30	29	5	D1	UNK	8/8/1956	400	306-400	Kern River
EC130				Domestic	30	29	5	D	UNK	12/19/1959	452	0-452	Alluvium/Kern River
EC135				Irrigation	30	29	5	J	UNK	9/14/1958	663	513-657	Kern River
EC132					30	29	5	D2		01/00/1950	300		Kern River
EC133					30	29	5	E		0/00/1914			Kern River <sup>1</sup>
EC134					30	29	5	H1	UNK		1336	304-619 (illegible)	Kern River
EC136				Irrigation	30	29	5	L	UNK	9/6/1974	1040	564-1040	Kern River
EC138				Irrigation	30	29	5	R	UNK	3/8/1988	603	362-603	Kern River
EC137				Domestic	30	29	5	N	UNK	1/17/1697	397	0-367	Alluvium/Kern River
EC140				Irrigation	30	29	5		UNK	2/17/1962	800	360-800	Kern River
EC139					30	29	5	R1	UNK	0/00/1950			Kern River <sup>1</sup>
EC145				Irrigation	30	29	6	H1	UNK	2/25/1954	562	350-556	Kern River
EC141				Cathodic	30	29	6	A	UNK	2/12/1978	120		Kern River
EC142				Domestic	30	29	6	C	UNK	3/17/1966	500	400-500	Kern River
EC143				Irrigation / Domestic	30	29	6	E	UNK	11/8/1975	500	350-500	Kern River
EC144				Domestic	30	29	6	F	UNK	11/5/1976	500	207-227, 250-270,	Kern River
EC146				Irrigation	30	29	6	H2	UNK	7/8/1969	501	291-497	Kern River
EC155				Irrigation	30	29	7	K3	UNK	12/15/1952	330	174-324	Kern River
EC147				Domestic	30	29	6	N	UNK	9/30/1966	406	346-406	Kern River
EC148				Irrigation / Domestic	30	29	6	P	UNK	4/3/1956	402	234-396	Kern River
EC149				Domestic	30	29	6	Q	UNK	10/1/1986	720	600-700	Kern River
EC150				Domestic	30	29	6	Q2		4/10/1970	400	300-400	Kern River
EC151				Domestic	30	29	6	R	UNK	10/18/1960	402	252-402	Kern River
EC152				Domestic	30	29	7	C	UNK	9/15/1976	496	300-500	Kern River
EC153					30	29	7	F	UNK	10/4/1978	500	241-500	Kern River
EC154				Domestic	30	29	7	K1	UNK	7/11/1986	608	410-608	Kern River
EC156				Irrigation	30	29	7	L2	UNK	1/22/1957	360	204-354	Kern River
EC158				Irrigation	30	29	7	M1	UNK	6/24/1980	614	338-614	Kern River
EC157					30	29	7	M					Kern River <sup>1</sup>
EC161				Irrigation	30	29	7	P	UNK	3/8/1995	615	400-600	Kern River
EC159				Monitor	30	29	7	M2	UNK	7/16/2004	885	440-835	Kern River
EC160				Domestic	30	29	7	N	UNK	3/18/1978	500	250-500	Kern River
EC163				Irrigation	30	29	7	Q1	UNK	0/00/1954	605		Kern River
EC162				Domestic	30	29	7	Q	UNK	5/5/1977	500	300-496	Kern River

**Table 1: List of Water Supply Wells (continued)**

Map ID	Record ID	Permit Number	APN	Program/Element	Township	Range	Section	Well Number	Status	Date Drilled	Total Depth (ft)	Screen Interval (ft)	Zone
EC167				Irrigation	30	29	8	A	UNK	7/6/1965	800	500-800	Kern River
EC164					30	29	7	R1	UNK				Kern River
EC165				Domestic	30	29	7	unk	UNK	6/17/1980	600	400-600	Kern River
EC166				Domestic	30	29	7	unk	UNK	8/11/1976	500	200-280, 300-420,	Kern River
EC168				Irrigation	30	29	8	A1	UNK	10/00/1951	490	219-464	Alluvium/Kern River
EC170		WP 14191	177-210-29	Irrigation	30	29	9	F1	UNK	6/11/2013	820	400-800	Kern River
EC169					30	29	9	C2	UNK		603	294-600	Kern River
EC172				Irrigation	30	29	9	K1	UNK	11/8/1956	1200	402-1200	Kern River
EC171					30	29	9	H1	UNK	3/14/1947	1001		Kern River
EC173		EH 3573	177-210-33	Irrigation	30	29	9	M	UNK	5/1/2006	1220	400-550, 570-1180	Kern River
EC174		EH 3574	177-210-33	Irrigation	30	29	9	N	UNK	3/15/2006	1220	400-590, 610-1180	Kern River
EC175		EH 3409	177-210-33	Irrigation	30	29	9	N1	UNK	12/1/2005	1210	400-580, 610-1189	Kern River
EC176		EH 3410	177-210-33	Irrigation	30	29	9	N2	UNK	12/1/2005	1180	300-470, 500-1170	Kern River
EC177				Irrigation	30	29	10	N1	UNK	3/10/1951	524	207-501	Alluvium/Kern River
EC178				Irrigation	30	29	10	N3	UNK	6/2/1964	1243	500-1210	Kern River
EC180				Irrigation	30	29	10		UNK	10/1/1990	1099	510-1080	Kern River
EC179					30	29	10	Q1	UNK		600		Kern River
EC181		EH 483-91		Irrigation	30	29	10		UNK	12/26/1991	1080	355-1050	Kern River
EC183				Irrigation	30	29	15	D1	UNK	12/1/1955	604	300-552	Kern River
EC182					30	29	15	C1	UNK	10/12/1956		290-469	Kern River
EC185				Irrigation	30	29	15	G	UNK	12/3/1959	700	468-700	Kern River
EC184					30	29	15	F1	UNK		474		Kern River
EC186				Irrigation	30	29	15	G1	UNK	10/20/1974	850	440-840	Kern River
EC187				Irrigation	30	29	15	H1	UNK	10/25/1951	700	545-700	Kern River
EC188				Irrigation	30	29	15	H2	UNK	10/18/1951	598	242-592	Alluvium/Kern River
EC189				Irrigation	30	29	15	K1	UNK	9/5/1953	300	336-600	Kern River
EC190				Irrigation	30	29	15	L2	UNK	6/28/1955	599	192-599	Alluvium/Kern River
EC191		110201		Irrigation	30	29	15	N	UNK	8/23/1977	850	450-840	Kern River
EC193				Irrigation	30	29	16	B1	UNK	12/8/1951	564	260-564	Alluvium/Kern River
EC192					30	29	16	A1	UNK	10/22/1936	400+		Kern River at 400'
EC196				Irrigation	30	29	16	K	UNK	8/1/1972	902	480-816	Kern River
EC194					30	29	16	E1	UNK	11/19/1946	467		Kern River
EC195					30	29	16	J2	UNK		1010		Kern River
EC197				Irrigation	30	29	16	L	UNK	11/00/1946	480		Kern River
EC199				Irrigation	30	29	16		UNK	11/26/1974	919	500-900	Kern River
EC198	e0086598	WP 11415	177-240-36	Industrial	30	29	16	R1	UNK	2/9/2009	960	500-930	Kern River
EC200				Irrigation	30	29	17	B3	UNK	5/12/1964	600	400-600	Kern River
EC201				Irrigation	30	29	17	G1	UNK	2/4/1960	790	0-400	Alluvium/Kern River
EC202				Irrigation	30	29	17	H1	UNK	2/22/1951	600	350-600	Kern River
EC203				Irrigation	30	29	17		UNK	6/30/1986	884	400-871	Kern River
EC61				Irrigation	29	29	35	B		8/4/1949	1300		Transition/Santa Margarita- outside exemption area
EC204				Unknown	29	29	15	L1	UNK	8/17/1994	640		Chanac/ Santa Margarita

<sup>1</sup> Based on the surrounding well data these wells are suspected to be completed in the Kern River Formation.

Source: DOGGR's Aquifer Exemption Application for the Edison Oil Field (Volume 1)